


The Forsta logo is located in the top left corner. It consists of a stylized 'F' icon made of two vertical bars, one pink and one blue, followed by the word 'Forsta' in a bold, dark blue sans-serif font.

Forsta

The background of the cover is a photograph of a man in a grey sweater sitting at a wooden desk in a modern office. He is viewed from behind, looking at a laptop and a large monitor. The office has large windows and other people working in the background.

Scripting Manual

Forsta v2022

This is revision 1 of the Forsta v2022 Scripting Manual published in January 2022. The information herein describes Forsta Scripting and its features as of Build nr. 2022.1.23. New features may be introduced into the product after this date. Go to www.forsta.com or check “News” on the Customer Extranet for the latest updates.

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The companies, names and data used or described in the examples herein are fictitious.

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What's New in this Revision?

Note: Only the latest changes to this documentation are listed here. Changes made to earlier revisions are listed in the "Changes to the User Documentation" document which can be downloaded from the Forsta Extranet at <https://extranet.confirmit.com>.

The following changes have been made since the last revision:

- The manual is updated with new logo, company and product names. Note that images will be updated at a later date, and URLs, folder names etc. will be corrected as the changes become applicable.
- The SendPdfMail topic is updated (see SendPdfMail on page 154 for more information).
- The SendPdfMailWithCopy topic is updated (see SendPdfMailWithCopy on page 155 for more information).
- The QualityTerminate code example is added to the CintFulfillmentRespondentsTransition topic (see CintFulfillmentRespondentsTransition on page 161 for more information).
- Appendix B is removed as it is no longer relevant.

Note: The general layout and language in this document is continually being corrected, adjusted and improved to ensure the user has the best possible source of information. Only NEW information and details of functionality that has changed since the previous revision are listed here - minor corrections to the text and document layout are not listed.

Important!

We need your feedback so we can improve this document and provide you with the information you require. If you have any comments or constructive criticism concerning the content or layout of this documentation, please send an email to documentation@forsta.com. Please include in your email the section number and/or heading text of the section to which your comment applies.

1. Introduction

Most Forsta surveys contain a quantity of script code. Scripts are used:

- In conditions, for controlling the flow through the questionnaire (skipping logic) and controlling whether or not questions are to be displayed (question masks and column masks (in 3D grids)).
- For filtering the lists displayed in questions and the iterations in loops based on previous answers (code and scale masks).
- In form elements for text substitution (response piping).
- For custom validation of user input.
- In general-purpose code contained in script nodes.

Forsta uses Microsoft's JScript .NET scripting engine to evaluate all questionnaire expressions and to execute scripts. The run-time environment of the interview engine supplies a number of functions and objects that provide references to and let you manipulate survey variables. This documentation covers some of the fundamentals of JScript.NET and the functions and objects provided by Forsta.

JScript.NET is not a condensed version of another programming language, nor is it a simplification of anything. It is a modern scripting language with a wide variety of applications.

JScript .NET is JScript extended with features of class-based languages. All script code in Forsta will however be wrapped as functions inside a class. This means that you cannot define your own classes in Forsta scripts.

This manual only covers server-side programming, i.e. scripts that are running on the server. It does not consider client-side scripts (scripts that run on the respondent's browser – typically written in JavaScript), so for example scripting of HTML elements is outside the scope of this documentation.

Tip:

Copying and Pasting the Script Code from a PDF document

When you copy a script from a PDF document and paste it into the relevant script field in Forsta, the markup is not kept intact and the script code is pasted as a single line. To prevent this you can either:

- Open the CHM version of this document and copy the scripts from there, or
- Create or open a Wordpad or MS Word file, paste the copied script into the file, and then copy and paste the script from the Wordpad or MS Word file into Forsta.

1.1. JScript .NET Fast Mode

To allow JScript.NET to execute with optimal performance, the JScript .NET in Forsta surveys will be compiled in *fast* mode. Since fast mode places some restrictions on the type of code allowed, programs can be more efficient and execute faster. However, some features are not available in fast mode.

In fast mode, the following JScript behaviors are triggered:

- All variables must be declared.
- Functions become constants.
- Intrinsic objects cannot have expanded properties.
- Intrinsic objects cannot have properties listed or changed.
- The `arguments` object is not available.
- Cannot assign to a read-only variable, field, or method.
- `eval` method cannot define identifiers in the enclosing scope.
- `eval` method executes scripts in a restricted security context.

Most of these changes should not affect scripts used in Forsta.

Important!

The eval method will not generate errors if used in Forsta, however it is not supported by Forsta and for security reasons should not be used in Forsta surveys.

More details on those requirements that are most relevant when working with scripts, follow.

1.1.1. All Variables Must Be Declared.

Previous versions of JScript did not require explicit declaration of variables. Although this feature saves keystrokes for programmers, it also makes it difficult to trace errors. For example, you could assign a value to a misspelled variable name, which would neither generate an error nor return the desired result. Furthermore, undeclared variables have global scope, which can cause additional confusion. So where previously you could write script code such as

```
codes = f("q1").categories();for(i=0;i<codes.length;i++) { <some
statements...> }
```

you must now declare the variables with the `var` keyword:

```
var codes = f("q1").categories();for(var i=0;i<codes.length;i++) { <some
statements...> }
```

This will still not explicitly declare the type of the variable: It may change type later as a result of an assignment. In addition to this "loose typing", JScript .NET can now be a strongly typed language. JScript .NET provides more flexibility than previous versions of JScript by allowing variables to be type annotated. This binds a variable to a particular data type, and the variable can store only data of that type. Although type annotation is not required, using it helps prevent errors associated with accidentally storing the wrong data in a variable and can increase program execution speed (see Types, Variables and Constants on page 16 for more information).

In addition to this explicit type declaration, a technology called "*implicit type inferencing*" is introduced. Type inferencing analyzes your use of variables in the script code and infers the type of the variable for you. This means that you can achieve considerable improvements in speed using scripts also when you do not specify the type of your variables, as long as your variables are not changing type.

1.1.2. Functions Become Constants

In previous versions of JScript, functions declared with the function statement were treated the same as variables that held a Function object. In particular, any function identifier could be used as a variable to store any type of data.

In fast mode, functions become constants. Consequently, functions cannot have new values assigned to them or be redefined. This prevents the accidental changing of the meaning of a function (either a user-defined or a Forsta function). You will now not be allowed to define several functions with the same name in the same project, or reuse the name of a function as a variable name. This should not cause particular problems for scripts used in Forsta surveys, as it is just a bad programming habit to reuse function names anyhow. Disallowing this will avoid errors when it is not clear what function definition to refer to. It will also make it impossible to make one of your own or the standard functions in Forsta inaccessible because it has accidentally been redefined due for example to it being used as a variable name.

1.1.3. The arguments Object is not Available

Previous versions of JScript provided an arguments object inside function definitions, which allowed functions to accept an arbitrary number of arguments. The arguments object also provided a reference to the current function as well as the calling function.

In fast mode, the arguments object is not available. However, JScript .NET allows function declarations to specify a parameter array in the function parameter list. This allows the function to accept an arbitrary number of arguments, thus replacing part of the functionality of the arguments object (see Functions with a Variable Number of Arguments on page 162 for more information).

Note: It is not possible to directly access and reference the current function or calling function in fast mode.

1.1.4. Using a Sorting Function in the sort Method (on Array)

Arrays can be sorted with the `sort` method. This method takes an optional function name as parameter, a function that defines how to sort elements if they are not to be sorted conventionally.

A script node is wrapped inside a class, so when you refer to the sort function you must use the keyword `this` to refer to the current instance.

```
array.sort ({this.sortFunction})
```

2. Where is Scripting Used in Forsta?

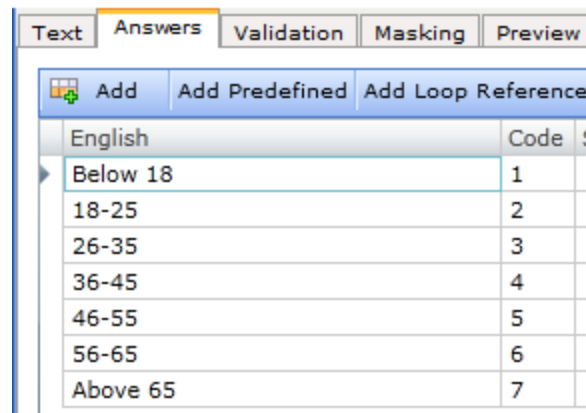
Scripting is used in several places in Forsta. See the following sections for further details.

2.1. Conditions

In conditions you place a logical expression that is evaluated to true or false. If it is true the questions in the THEN-branch will be presented to the respondent. If it is false, the interview skips the THEN-branch. If the condition has an ELSE-branch the questions in the ELSE branch will be presented if the condition is false, otherwise they will be skipped.

Screening Based on a Single Question

Assume the questionnaire has an age question (single), and you wish to screen respondents below the age of 18 from doing the rest of the interview. The age question has the following answer list:



| English | Code |
|----------|------|
| Below 18 | 1 |
| 18-25 | 2 |
| 26-35 | 3 |
| 36-45 | 4 |
| 46-55 | 5 |
| 56-65 | 6 |
| Above 65 | 7 |

To screen respondents that answer "Below 18", insert a condition after the single question with the following syntax:

```
f('age') == '1'
```

(The word "age" here is the question ID of the age question.) Building the conditional expression can be done by using the condition builder:

Branches If..Then ▼

Condition

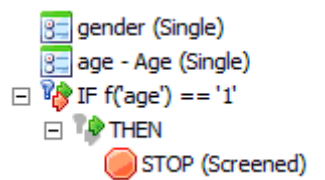
Expression

f('q1')== '1'

Add to expression Preview: && f('q1')== '1'

| Operators | Variables | Functions | Value |
|--------------------------------------|-----------|------------------------------------|--------------|
| <input checked="" type="radio"/> And | q1 | <input checked="" type="radio"/> = | Below 18 [1] |
| <input type="radio"/> Or | | <input type="radio"/> <> | 18-25 [2] |
| <input type="radio"/> None | | <input type="radio"/> < | 26-35 [3] |
| <input type="checkbox"/> Not | | <input type="radio"/> <= | 36-45 [4] |
| | | <input type="radio"/> > | 46-55 [5] |
| | | <input type="radio"/> >= | 56-65 [6] |
| | | <input type="radio"/> Any | Above 65 [7] |
| | | <input type="radio"/> None | |
| | | <input type="radio"/> Answered | |

The routing will look like this:



Status is set to "screened" in the properties of the stop node. The interview will end there for all respondents answering "Below 18", but will continue for all the other respondents.

2.2. Filtering Answer Lists, Scales and Loops

It is very common to filter answer lists, scales and loops based on answers to previous questions. There are two types of filters:

- Masks based on sets of codes, which are used in "code masks" of single, multi, ranking, open text list, numerical list, grid, 3D grid questions and loops and "scale masks" of grids.
- "Column masks", which are used in 3D grids to filter the columns and are based on true/false expressions, just like conditions.

2.2.1. Code Masks and Scale Masks

Code masks are used to filter answer lists of 3D grids, grids, single, multi, ranking, open text list and numeric list questions, and to define the iterations that are to run in a loop. In the code mask field in properties of a question or a loop you may use a JScript .NET expression that evaluates to a set of codes. The answer list (or loop member list) will be filtered based on the set of codes in the code mask field.

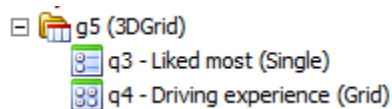
Scale masks are used to filter scale lists of grid questions. Use the scale mask field in the properties of a grid question to enter a JScript .NET expression that evaluates to a set of codes. The scale list will be filtered based on this set of codes.

Filtering a Single Question Based on Answers to a Multi

Assume you have a questionnaire that uses a list called "Cars".

| English | Code |
|--------------|------|
| Acura | |
| Am General | |
| Aston Martin | |
| Audi | |
| Bentley | |
| BMW | |
| Buick | |
| Cadillac | |

The list is used in two questions: First you have a multi question q2 which asks what cars you have tested, and then a 3D grid question g5 with a single question q3 which asks what car you did like most of the ones you tested, and a grid question q4 which asks you to rate the driving experience of the car.



Now, in the 3D grid question g5 you want just the cars answered in q2 to show. This can be achieved with a code mask with the following code:

```
f("q2")
```

that will return a set with the codes of the answers to q2. The answer list of the 3D grid g5 will be filtered so that only the answers with these codes will be displayed.

When the question q3 is displayed to the respondent, it will only show the cars answered in q2.

2.2.2. Column and Question Masks

Column Masks are used for filtering columns in a 3D grid. If you want to dynamically exclude a column (a question element in a 3D grid), use this field to create a JScript .NET expression that evaluates to true or false. The column is then displayed if the result is true, and is not displayed if the result is false. If you leave the field empty, the column is always displayed.

Question Masks are similar to Column Masks, but are used to filter an entire question. This can be useful when you want a group of questions to appear on the same page but one or more of them should not always be displayed. Before a condition a page break is automatically inserted, but for a question mask there will be no extra page break.

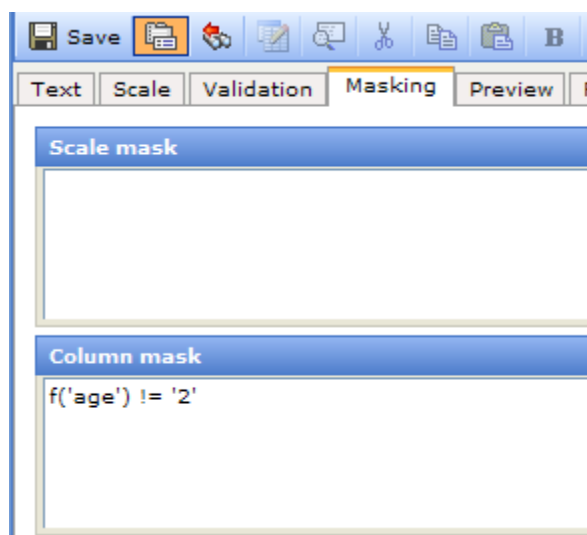
Excluding a Column (Question) in a 3D Grid

Let us say that in the 3D grid question from the previous example, we do not want inexperienced drivers (18-25 years) to answer question q4 – driving experience.

In the column mask field of question q4 we use the following code:

```
f('q2') != '2'
```

to exclude the question from the 3D grid whenever the respondent is in the age group 18-25. (The symbol "!=" means "not equal to".)



2.3. Text Substitution/Response Piping

To retrieve text or values from a question and insert it into the question wording of another question, you may use caret (^ - also known as "hat") in front of and after a JScript .NET expression. This **text substitution** or **response piping** can be used in all text fields (Title, Text, Instruction and Answer list/scale) but not in script nodes, conditions, code/column masks or validation code fields.

Piping in the Response to a Single Question

After the respondent has picked a favorite car in q3, we want to ask how many times he or she has tested that car. We want to pipe in the name of the car, and use the "hat" notation as follows:

```
^f("q3")^
```

The screenshot shows a software interface for configuring a question. At the top is a toolbar with icons for Save, Undo, Redo, Copy, Paste, Cut, and Bold, Italic, Underline. Below the toolbar are tabs for Text, Answers, Validation, Masking, Preview, and Results. The 'Text' tab is active. A 'Question ID' field contains 'q6'. Below this is a language dropdown menu set to 'English'. Underneath are two text input fields: 'Title' with the text 'Number of times the favorite car has been tested' and 'Text' with the text 'How many times have you tested ^f("q3")^?'. The text in the 'Text' field is highlighted in blue.

2.4. Validation Code

Forsta provides several ways of validating survey responses. Some validation is based on the properties you define for your question, for example the field width on an Open Text Question.

Sometimes you need other types of validation on questions, or you want to specify your own error messages different from the error messages provided by the system. Enter your own validation code in the validation code field of the question's properties.

A validation code follows a pattern similar to this:

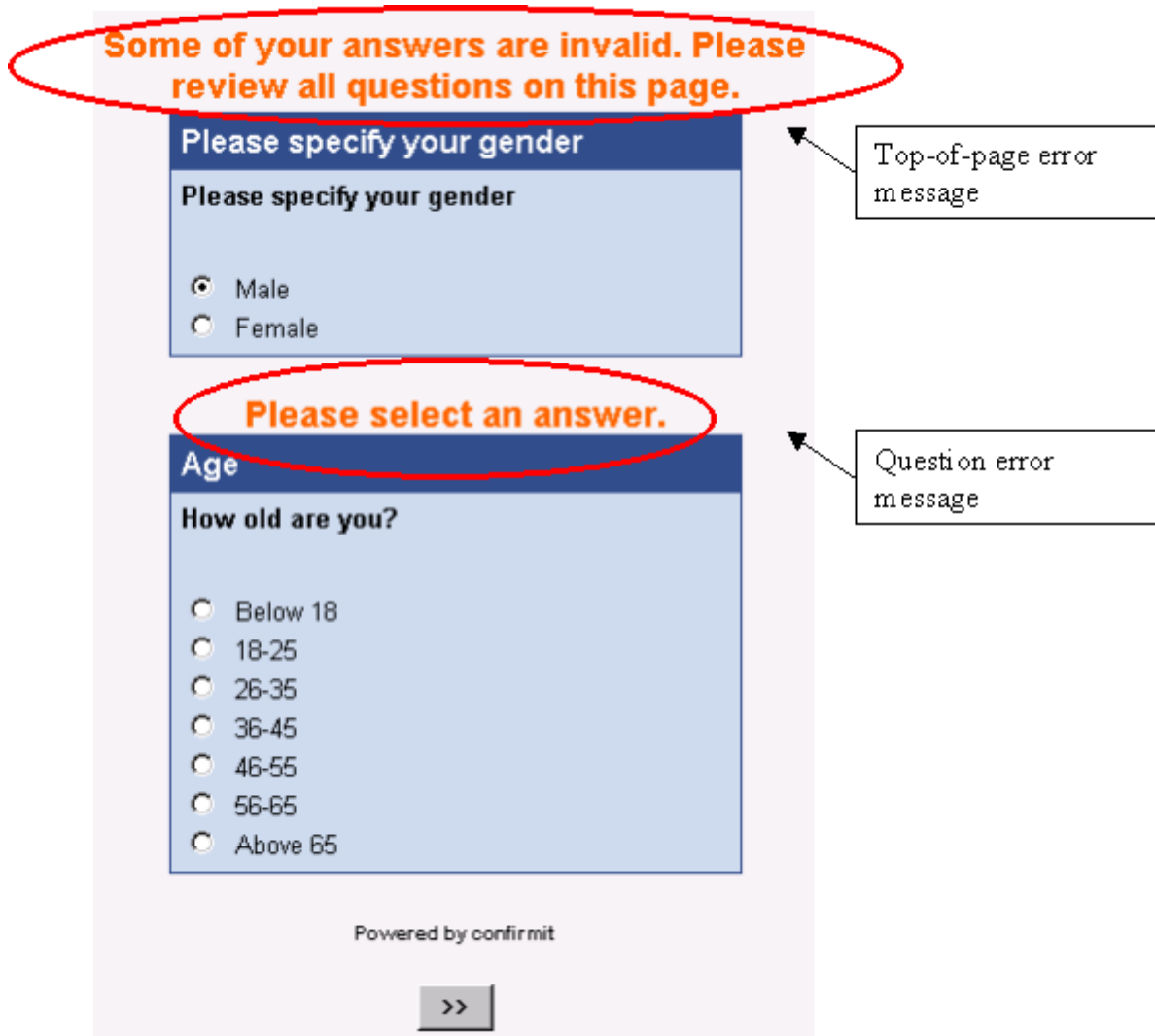
```
if(expression) { RaiseError(); <some function(s) setting the text of
the error message(s)> }
```

We will get back to this later; so don't worry if you don't understand all of it now. The term's expression and function will be explained later (see Operators and Expressions on page 27 for more information) and (see Arrays on page 39 for more information).

Expressions similar to those in conditions and column masks can also be placed in the validation code field, i.e. expressions that are either true or false. If the expression is true, the function:

```
RaiseError()
```

is called. This function tells the interview engine that there is an error situation. This means that the interview page should be re-displayed, this time with one or more error messages. The respondent is thus prohibited from moving to the next page until the expression in the validation returns false.



There are several functions available to set the text of error messages:

| | |
|---|---|
| ClearErrorMessage() | takes away the error message at the top of the page (will remove the default error message). |
| SetErrorMessage(LangID, message) | defines the text of the error message at the top of the page (will replace the default error message). |
| AppendErrorMessage(LangID, message) | adds text to the current page's error message. |
| ClearQuestionErrorMessage() | takes away the error message for the current question (will remove the default question error message). |
| SetQuestionErrorMessage(LangID, message) | defines the text of the error message for the current question. |
| AppendQuestionErrorMessage(LangID, message) | adds message to the current question's error message. |

For LangID, insert a code to specify which language the error message is for. For example, the code

```
LangIDs.en
```

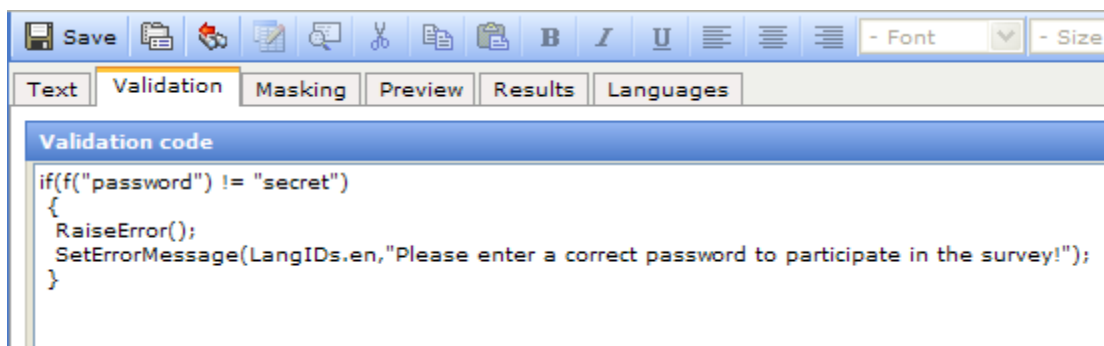
instructs the interview engine to use this error message when the language is English. These language codes, known as combidents, are listed in Appendix C.

Password Check

Let us say you need to password-protect an open survey. Then you can start the survey with a question asking for a password that will be the same for all respondents. This can be set up as an open text question with the "Password" property, so that *s are displayed instead of the text the respondent writes.

To check that the password is correct, you can insert code similar to that shown below in the validation code field of the open question (in this example the question ID is password):

```
if(f("password") != "secret")
{ RaiseError(); SetErrorMessage(LangIDs.en,"Incorrect password. Please
enter the correct password to participate in the survey."); }
```



2.5. Script Nodes

Script nodes typically contain code for:

- Internal programming purposes.
- Defining functions used in code masks, conditions, text substitution, other script nodes or validation code.
- Assigning values to different variables.
- Performing actions such as sending an email, redirecting the respondent to a different URL, etc.

Setting complete status before the end of the survey

Sometimes you want the "complete" status to be set before the last question (e.g. an open text "Other comments"-question), so that a respondent will be treated as a complete even though the last question(s) has not been answered. This can be done using the SetStatus function (see GetStatus and SetStatus on page 87 for more information), in a script node:

```
SetStatus("complete");
```

The screenshot shows a software interface with a 'Save' button and a red arrow icon. Below this is a 'Script settings' section containing a 'Script Name' field with the text 'Set complete status' and a 'Deleted' checkbox which is currently unchecked. Underneath is a 'Script code' section with a text area containing the code: `setStatus("complete");`

2.6. Dynamic Questions

This functionality allows you to use logic within a page, and enables parts of a page to be updated based on responses to one or more questions on the same page. This can enable you to, for example, cause additional questions to appear on the page once the respondent has answered the first question. The functionality is based on the Ajax technology, and uses one (or more) questions as a trigger to activate logic in subsequent questions.

Note: Dynamic Questions only functions within page objects, and the trigger question(s) and the question(s) to be triggered, must be on the same page in the survey.

The following questionnaire logic can be used within pages and will update based on the triggers:

- Text substitution/response piping.
- Question masking.
- Column masking.
- Code masking.
- Scale masking.

Inside the question that you want to be dependent of responses to one or more questions on the same page, you can specify those other questions as “triggers”. This means that for every change to one of the trigger questions, the question will be updated with questionnaire logic like for example masking being reevaluated.

Note that this is only supported within the “Page” object, so the “Triggers” tab will only be available on questions within a page.

The screenshot shows a tabbed interface with tabs for 'Text', 'Validation', 'Masking', 'Triggers', 'Preview', 'Results', and 'Languages'. The 'Triggers' tab is selected and active. It contains a table with two rows: the first row has a checkbox and the text 'Question ID', and the second row has a checkbox and the text 'q9'. Below the table are two buttons: 'Delete' and 'Add Trigger'.

Note: The Dynamic Questions functionality is not supported in the CAPI/Kiosk console. Dynamic Questions is supported in IE8+ (Windows), Firefox 10+ Google Chrome 26+ and Safari 5.1+ (Mac only). The functionality is only available in surveys using Survey Layouts.

Unlike Advanced WI features, Dynamic Questions have no automatic alternative way of presenting the page if Dynamic Questions is not supported. A function `DynamicQuestionsEnabled` (see [DynamicQuestionsEnabled](#) on page 80 for more information) is provided to either screen or provide an alternative routing to respondents whose browser does not support Dynamic Questions.

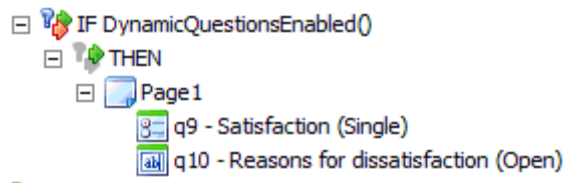
Displaying a Dynamic Follow-Up Question in the same Page

If for example you want a rating question to be followed by an open text question if a negative response has been given, you can use the Dynamic Questions functionality to have that appear on the same page when the negative response is given.

If you place a single question q9 asking people to respond on a 5-point scale, and you have an open text question q10 that should be displayed when q9 is answered with "1" or "2", you can use a question mask as shown below on the open text question:

```
f("q9")=="1" || f("q9")=="2"
```

If you want these questions to appear on the same page, you can place them inside a "Page" object as shown below:



If you set "q9" as a trigger for q10, then q10 will be displayed automatically when a response is given on q9.

The DynamicQuestionsEnabled() function in the condition is used to ensure the page is only displayed to respondents who are answering in a browser that supports the functionality.

2.7. Script Execution when Respondent Moves Backwards

Script code will be executed both when the respondent moves forwards and backwards through the survey (except for validation code scripts - validation code is only executed when going forwards in the questionnaire).

This is important to bear in mind if your survey has a **Back** button. If for example you include a SendMail script, you might not want an email to be triggered both when the respondent goes forwards and backwards. If your scripts are used to set hidden variables based on certain conditions, you may also consider whether you need to remove the values that were set when going backwards, instead of resetting them. There is a function called "Forward()" (see Forward on page 88 for more information) which can be used for this purpose, to distinguish between actions taken when respondents move forwards and backwards.

2.8. The Syntax Highlighter

The Syntax Highlighter functionality means that while scripting you no longer need to remember the functions, or look up which properties belong to which classes and which parameters the various methods accept. Instead, all these are available at the touch of a button. The highlighter automatically color-codes key words, and provides lists of selectable options under specific conditions while scripting.

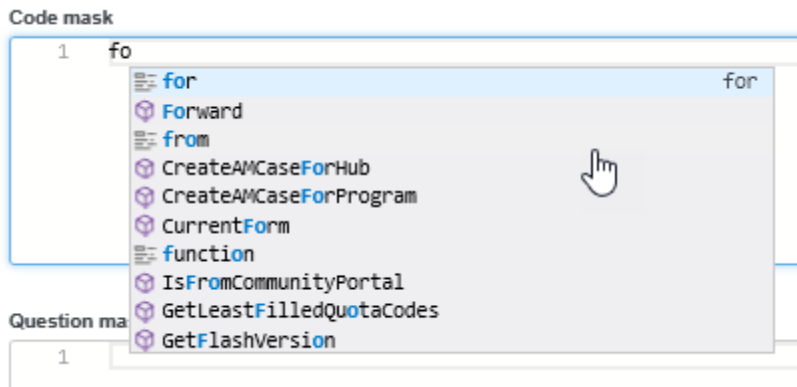
The Syntax Highlighter functionality is on by default for a survey, but you can switch it off in Survey Designer's **Item Editor** menu (refer to the separate Survey Designer user guide for further details).

The following script editing areas support the highlighter capabilities:

- Script nodes in Survey Designer.
- Validation and masking of questions.
- Reportal scripting.
- Data Processing scripting.
- JavaScript editors.

To use the highlighter, start typing into the scripting area the function you wish to use. A drop-down list of all the functions corresponding to the text string you have typed, opens.

The figure below shows the Syntax Highlighter in action:



Refer to the separate Survey Designer user guide for further information on the Syntax Highlighter and code completion functionality.

2.8.1. Using the Syntax Highlighter

When writing code, you can automatically get a list displayed with classes, functions, methods or properties relevant to the context you are in, covering both Forsta-specific and general JScript.NET constructions. To display the list:

1. Press **CTRL+space** to display the list.
If you have already started typing, the list will be filtered according to the typed string. After the name of a class or variable, the list will appear automatically when you type period (.).
2. Type more characters to reduce the number of items in the list and jump directly to a member in the list. Use the arrow buttons to move up and down in the list.
3. Press **Enter** to select an item.

On functions and methods, a parameters list will automatically pop up to give you information about the number, names and types of parameters required by a function, template, or attribute. The parameter in bold indicates the next parameter that is required as you type the function. Where there are different versions of the function with different parameter lists, you can select which parameter list you wish to view.

The screenshot shows a 'Script code' window with a dropdown menu set to '--- Select predefined script ---'. The main text area contains the following code:

```
1 GetRespondentUrl("q1", false)
```

Below the code area, a list of function signatures is displayed:

```
GetRespondentUrl(id: String, isCallBlock: Boolean, userParameters: String, params: String[])
GetRespondentUrl(questionId: String, params: String[])
GetRespondentUrl(questionId: String, isCallBlock: Boolean)
GetRespondentUrl()
```

To view parameter information:

1. After the name of a function or method, type an open parenthesis (as you normally would) to open the Parameters list.

The declaration for the function will pop up under the insertion point. The first parameter in the list appears in bold. To switch among functions, use the UP or DOWN arrow keys. As you type the function parameters, the bold changes to reflect the next parameter that you need to enter.

2. Press **ESC** at any time to close the list.

Use **Tab** to indent lines of code. Lines of code within curly brackets, { and }, will automatically be indented. To indent several lines of code in one operation, mark all the code you want to indent and press **Tab**. To un-indent, press **Shift+Tab**.

2.8.2. Syntax Highlighter Limitations

The Syntax Highlighter has some limitations. No autocompletions are available for implicitly typed objects (objects returned by functions etc.) so

Typing:

```
f()
```

will not result in an autocomplete suggestion.

Typing:

```
var d = new Date();
d.
```

will not result in an autocomplete suggestion.

Typing:

```
var myDate: Date;
myDate.
```

will result in an autocomplete suggestion.

3. Comments

Comments are text added in your scripts that are ignored when the script is run, but may be used to explain aspects of the code. In JScript .NET you can add comments in two ways:

- `//` is used to mark the rest of the line as a comment:

```
//This is a comment on one line.
```

- `/*` are placed in front and `*/` after a comment that runs over several lines.

```
/* This is a comment on  
two lines */
```

Multi-line comments cannot be nested, because everything after `/*` will be interpreted as comments, and when the first `*/` appears, it will be interpreted as the end of the comment. So any text following the first `*/` will be treated as JScript code:

```
/* This is an example of a  
nested comment.  
  /* Here is the second comment, inside the first.  
     Both of these comments will terminate here ->*/  
  This line will be treated as JScript code and result in errors. */
```

It is recommended that you add a lot of comments in your scripts, to explain to yourself and to others what your script is supposed to do and what it can be used for. However, as you may later want to comment out large parts of your scripts, including comments, and it is not possible to nest comments, it is recommended that you always use the single line comments, as shown below:

```
// This is a comment on  
// two lines
```

This will make it easy to use `/*` and `*/` to comment out large sections of the script later without the nesting problems.

4. Types, Variables and Constants

If you need to calculate a value and save it for online reporting, for data exports or for use in the survey logic, you can store it in a hidden question. A **hidden question** is an ordinary survey question with the hidden property set. This will not be displayed to the respondent, but can be referenced like any other question.

If you need to store temporary values e.g. as part of a calculation in a script, use a JScript **variable** or **constant**. The scope of a JScript variable or constant used in Forsta is limited. It can only be accessed within the script node or validation code where it is defined. So if you need to access it later in the questionnaire, use a hidden question. A hidden question can be accessed from anywhere in the questionnaire.

4.1. Naming

Variable and constant names in JScript .NET and **question IDs** in Forsta begin with an upper- or lowercase letter (a-z, A-Z) or an underscore (_) and continue with letters (a-z, A-Z), digits (0-9) or underscore (_).

Examples of variable names:

```
countermakeMoreMoneycar123_tempiThinkThisIsReallyBoring
```

Note: Variable names are case sensitive, so makeMoreMoney and MakeMoreMoney are not the same variable. This is a very common mistake.

Even though variable and constant names can start with uppercase letters, it is recommended to follow the convention of **always starting variable and constant names with a lowercase letter**. This to easily distinguish it from for example functions, where the convention is to start with an uppercase letter. Variable and constant names should be made as descriptive as possible. For example instead of using names like *x* and *y*, you should try to describe what they refer to, e.g. `sumOfAllElements` or `code`. When a variable or constant name consists of several words, each new word is usually started with an uppercase letter.

There are some reserved words that cannot be used as question IDs in Forsta, and some that cannot be used as variable or constant names in JScript .NET. See the Authoring or Survey Designer User Guide and a JScript .NET reference manual. In addition, you cannot use names of functions (either the Forsta-provided functions described in this manual, or functions you define yourself in script nodes (see Functions on page 72 for more information).

4.2. Data Declaration

A JScript program must specify the name of each **variable** that the program will use. In addition, the program may specify what **data type** each variable will store. Both of these tasks are accomplished with the `var` statement.

```
var counter : int;
```

This will declare a variable `counter` to be of type integer (see Null on page 17 for more information). Here it is not given an initial value, and will assume the default value for integers which is 0. You can also assign an initial value to it like this:

```
var counter : int = 1;
```

Constants are declared in the same way, with the keyword `const`, but must be initialized. A constant's value cannot be changed, whereas the value of a variable can.

```
const maxSelected : int = 100;
```

When you declare a variable or constant of a specific type, the value you assign to it must be valid for that type. You cannot declare an integer variable and try to assign a string value like "This is a string" to it.

You can make several declarations in the same row by listing them separated by commas:

```
var counter : int = 1, sumOfAllAnswer : int = 0;
```

This will give code that is harder to read so it is recommended to separate them on several lines instead:

```
var counter : int = 1; var sumOfAllAnswer : int = 0;
```

Another reason for doing this is because it prevents you from doing errors that are hard to spot. Type annotation applies only to the variable that immediately precedes it. In the following code, `x` is an Object because that is the default type and `x` does not specify a type, while `y` is an int.

```
var x, y : int;
```

You do not need to use typed variables, but scripts that use untyped variables are slower and more prone to errors.

```
var counter;
```

Without a specified data type, the default type for a variable or constant is `Object`. Without an assigned value, the default value of the variable is `undefined`.

You can give a variable an initial value without declaring its type:

```
var counter = 0;
```

Untyped constants are defined in the same way:

```
const maxSelected = 100;
```

4.3. Undefined Values

A variable that is declared without assigning a value to it, will, if the data type is declared, assume the default value for that type. For example, the default value for a numeric type is zero, and the default for the `String` data type is the empty string. However, a variable without a specified data type has an initial value of `undefined` and a data type of `undefined`.

To determine if a variable or object property exists, you can compare it to the keyword `undefined` (which will work only for a declared variable or property):

```
var x;if(x == undefined) { <some code> }
```

You can also check if its type is `"undefined"` (which will work even for an undeclared variable or property):

```
if(typeof(x) == "undefined") { <some code> }
```

4.4. Null

`null` is used as "no value" or "no object". In other words, it holds no valid number, string, Boolean, array, or object (array and objects are complex data types we will get back to later). You can erase the contents of a variable (without deleting the variable) by assigning it the `null` value. Note that the value `undefined` and `null` compare as equal using the equality (`==`) operator.

In JScript, `null` does not compare as equal to 0 using the equality operator. This behavior is different from other languages, such as C and C++.

Removing an Answer in a Single or Grid Question

You can use `null` to "remove" an answer to a question with a radio button (i.e. single or grid questions). Say you have a page with two single questions, `present1` and `present2`, at the end of the survey. The respondent should answer just one of the questions, where the respondent can choose between two lists with incentives (for example wine or CD):

Wine

Please select your gift - either from this list of wines...

- Gran Lurton Cabernet Sauvignon Reserva 1997
- Medalla Real Cabernet Sauvignon 1999
- Santa Carolina Cabernet Sauvignon Reservado 2000
- Ch. Panet 1997

CDs

...or from this list of CDs

- Come Away with Me, Norah Jones
- The Divine Secrets of the Ya-Ya Sisterhood, Various Artists
- The Eminem Show, Eminem
- O Brother, Where Art Thou?, Various Artists - Soundtrack
- Down the Road, Van Morrison

You must set the "Not required" property on both questions. It is quite easy to write validation code to give an error message when both questions are answered (as in the figure above), but the respondent cannot de-select the answers since this is not possible with radio-buttons. Then you must remove the answers to the questions in the validation code, i.e. setting them to the null value:

```

if(f("present1").toBoolean() && f("present2").toBoolean()) //both
questions answered
{
    //Remove answers on both questions:
    f("present1").set(null);
    f("present2").set(null);
    //Provide error message
    RaiseError();
    SetErrorMessage(LangIDs.en,"Please select either a bottle of wine or a
CD.");
}

```

`toBoolean` is used to check if there is an answer on a question (see `toBoolean` on page 25 for more information).
`set` is used to set the value of a question (see `get` and `set` on page 42 for more information).

This validation code will give this result when trying to move to the next page after selecting an answer on both questions:

Please select either a bottle of wine or a CD.

Wine

Please select you gift - either from this list of wines....

- Gran Lurton Cabernet Sauvignon Reserva 1997
- Medalla Real Cabernet Sauvignon 1999
- Santa Carolina Cabernet Sauvignon Reservado 2000
- Ch. Panet 1997

CDs

...or from this list of CDs

- Come Away with Me, Norah Jones
- The Divine Secrets of the Ya-Ya Sisterhood, Various Artists
- The Eminem Show, Eminem
- O Brother, Where Art Thou?, Various Artists - Soundtrack
- Down the Road, Van Morrison

4.5. Types

A **data type** specifies the type of value that a variable, constant, or function can accept. Type annotation of variables, constants, and functions helps reduce programming errors by making sure data that is assigned has the right types. Furthermore, type annotation also produces faster, more efficient code.

There are several primitive types of values in JScript .NET. In the following chapters we will present these types. We have grouped them as **numeric**, **Boolean** and **string** values.

Primitive types are types that can be assigned a single literal value. We will be looking at more complex types later.

4.5.1. Numeric

There are two main types of numeric data in JScript:

- Integers.
- Floating-point data.

4.5.1.1. Integers

Positive whole numbers, negative whole numbers, and the number zero are integers. They can be represented in base 10 (decimal), base 8 (octal), and base 16 (hexadecimal). Most numbers in JScript are written in decimal. Octal and hexadecimal rarely have any practical purpose in scripting; however, you should be aware of their denotation – particularly for octals, since it may cause unexpected results when a number is interpreted as an octal when it was supposed to be decimal.

You denote octal integers by prefixing them with a leading 0 (zero). They can only contain digits 0 through 7. Any number with a leading 0 will be interpreted as an octal, as long as it is not containing the digits 8 and/or 9, in which case it is interpreted as a decimal number.

You denote hexadecimal (hex) integers by prefixing them with a leading "0x" (zero and x or X). They can contain digits 0 through 9, and letters A through F (either uppercase or lowercase) only.

Both octal and hexadecimal numbers can be negative, but they cannot have a decimal portion and cannot be written in scientific (exponential) notation.

JScript .NET supports the following integral data types: `byte`, `ushort`, `uint`, `ulong`, `sbyte`, `short`, `int`, `long`. Variables of any integral data type can represent only a finite range of numbers. If you attempt to assign a numeric literal that is too large or too small to an integral data type, a type-mismatch error will be generated at compile time.

| JScript value type | Range |
|--|---------------------------------------|
| <code>byte</code> (unsigned) | 0 to 255 |
| <code>ushort</code> (unsigned short integer) | 0 to 65,535 |
| <code>uint</code> (unsigned integer) | 0 to 4,294,967,295 |
| <code>ulong</code> (unsigned extended integer) | 0 to approximately 10^{20} |
| <code>sbyte</code> (signed) | -128 to 127 |
| <code>short</code> (signed short integer) | -32,768 to 32,767 |
| <code>int</code> (signed integer) | -2,147,483,648 to 2,147,483,647 |
| <code>long</code> (signed extended integer) | Approximately -10^{19} to 10^{19} |

4.5.1.2. Floating-point Data

Floating-point values are whole numbers with a decimal portion. They can either be represented with digits followed by a decimal point. ("period"/"dot") and more digits (e.g. `1.29384`), or they can be expressed in scientific notation; that is, an uppercase or lowercase letter e is used to represent "times ten to the power of" (e.g. `7.64e3`). A number that begins with a single 0 and contains a decimal point is interpreted as a decimal floating-point literal and not an octal literal (see Integers on page 19 for more information).

Additionally, floating-point numbers in JScript can represent special numerical values that integral data types cannot. These are:

- `NaN`(not a number). This is used when a mathematical operation is performed on inappropriate data, such as strings or the `undefined` value.
- `Infinity`. This is used when a positive number is too large to represent in JScript.
- `-Infinity` (negative Infinity). This is used when the magnitude of a negative number is too large to represent in JScript.
- `Positive` and `Negative 0`. JScript differentiates between positive and negative zero.

JScript supports the following floating-point data types:

| JScript value type | Range |
|--------------------|-------|
|--------------------|-------|

| | |
|---|---|
| <code>float</code> (single-precision floating-point) | <p>The <code>float</code> type can represent numbers as large as 10^{38} (positive or negative) with an accuracy of about seven digits, and as small as 10^{-44}. The <code>float</code> type can also represent <code>NaN</code> (Not a Number), positive and negative infinity, and positive and negative zero.</p> <p>This type is useful for large numbers where you do not need precise accuracy. If you require very accurate numbers, consider using the <code>Decimal</code> data type.</p> |
| <code>Number</code> , <code>double</code> (double-precision floating-point) | <p>The <code>Number</code> or <code>double</code> type can represent numbers as large as 10^{308} (positive or negative) with an accuracy of about 15 digits, and as small as 10^{-323}. The <code>Number</code> type can also represent <code>NaN</code> (Not a Number), positive and negative infinity, and positive and negative zero.</p> <p>This type is useful when you need large numbers but do not need precise accuracy. If you require very accurate numbers, consider using the <code>Decimal</code> data type.</p> |
| <code>decimal</code> | <p>The <code>decimal</code> type can accurately represent very large or very precise decimal numbers. Numbers as large as 10^{28} (positive or negative) and with as many as 28 significant digits can be stored as a decimal type without loss of precision. This type is useful when rounding errors must be avoided.</p> <p>The decimal data type cannot represent <code>NaN</code>, positive Infinity, or negative Infinity.</p> |

4.5.2. Boolean

The Boolean data type can only have two values. They are the literals

```
true
```

and

```
false
```

representing logical values. They are used in conditions. The THEN branch is executed when the expression evaluates to the Boolean value `true`, the ELSE branch when the expression evaluates to the Boolean value `false`.

JScript .NET automatically converts `true` and `false` into 1 and 0 when they are used in numerical expressions. When numbers are used in Boolean expressions, 0 is interpreted as `false` and any other number as `true`.

4.5.3. Characters and Strings

The `char` data type can store a single character.

A `string` value is a chain of zero or more characters (letters, digits, and punctuation marks) strung together. You use the `string` data type to represent text in JScript.

String and `char` values are enclosed in single (') or double (") quotation marks. You may use any of these marks, but always close with the same type of quotation mark as you opened it with. This is very convenient for example in strings such as:

```
"I can't stand this anymore""This is too much for me", he said.'
```

Note: When you write JScript .NET code, you can have as many line breaks and blanks as you like in your code, but never have a line break inside a string. If you have a line break inside a string, you will get an error message.

However, there are codes you can insert for special formatting characters. E.g. for a line break use `\n`:

```
"I need a line break here\n and want to continue on the next line"
```

For apostrophe, use \':

```
'I can\'t stand this anymore'
```

Below is a table describing the special formatting characters:

| Character | Meaning |
|-----------|-----------------|
| \' | Single quote |
| \" | Double quote |
| \\ | Backslash |
| \n | New line |
| \r | Carriage return |
| \t | Horizontal tab |
| \b | Backspace |

A string that contains zero characters ("") is an empty (zero-length) string.

There is a significant difference between the string "123" and the number 123. The number 2 will be a smaller value than the number 123. But the string "2" is larger than the string "123", because the first character in the string is compared first, and the character 2 is larger than the character 1 (the same system as is used in alphabetical listings such as dictionaries and telephone directories). All values are stored as strings in the survey questions, so you must convert them to numbers if you want them to be evaluated as numbers. See the next section in this Scripting guide.

4.5.3.1. Unicode

Jscript.NET supports Unicode characters in strings. They can be used like any other characters, but note that the encoding of the survey pages will be set according to the settings for the active language, so that for example for English, which by default will be set to have encoding "Western European (ISO)", Unicode characters will not be displayed correctly on the survey page. Only Unicode languages will display Unicode characters correctly. You should also ensure you set the right codepage (Unicode - 65001) if using Unicode characters in SendMail and SendMailMultiPart scripts.

4.6. Conversion between Types/Conversion Functions

Type conversion is the process of changing a value from one type to another. For example, you can convert the string, "1234" to the number 1234. Data of any type can be converted to the String type. Some type conversions will never succeed because the types are too different.

Some types of conversions, such as from a string to a number, are time-consuming. The fewer conversions your program uses, the more efficient it will be.

In JScript .NET you can either have *implicit* or *explicit* conversion.

Explicit conversion is done by using the data type identifier (see Types on page 19 for more information). To explicitly convert an expression to a particular data type, use the data type identifier followed by the expression to convert in parentheses. Explicit conversions require more typing than implicit conversions, but you can be more certain of the result.

Here is a small example showing first how the number 1234 (integer) can be converted to the string “1234” and then to a double.

```
var i : int = 1234; var d : double;  
var s : String; s = String(i);
```

Now the variable `s` holds the string “1234”. This type of conversion is called *widening*, since all possible integer values can be converted to string and string can also hold other values. Let us continue the example:

```
d = double(s);
```

Now the variable `d` holds the double 1234. This type of conversion is called *narrowing* since there are a lot of possible string values that cannot be converted to double (for example the string “Forsta”). Explicit narrowing conversions will usually work, but with loss of information. The string “Forsta” converted to a double will give NaN (not a number). But some types are incompatible and will throw an error, and for some values there is not sensible value to convert to.

Implicit conversion occurs automatically when values are assigned to variable of a certain type. The data type of the variable determines the target data type of the expression conversion.

Here is a similar example to the one above showing first how the number 1234 (integer) can be converted to the string “1234” and then to a double.

```
var i : int = 1234;  
var d : double;  
var s : String; s = i;
```

Now the variable `s` holds the string “1234”. It was converted to string since the receiving variable where of type string. This is an example of widening implicit conversion. Let us continue the example:

```
d = s;
```

Now the variable `d` holds the double 1234. This is an example of a narrowing conversion.

When this code is compiled, compile-time warnings may state that the narrowing conversions may fail or are slow. Implicit narrowing conversions may not work if the conversion requires a loss of information.

4.6.1. Conversion Methods in JScript .NET

4.6.1.1. *parseInt*

`parseInt` is used to convert a string value into an integer. It returns the first integer contained in the string or NaN (Not a Number) if the string does not begin with an integer. It is a method of the Global Object. The Global Object has no syntax, so its methods can be called directly. The expression

```
parseInt(string, radix)
```

parses the string as an integer of base *radix*. *radix* is optional and is a value between 2 and 36 indicating the base of the number contained in *string*. If not supplied, strings with a prefix of '0x' are considered hexadecimal and strings with a prefix of '0' are considered octal. All other strings are considered decimal... Usually you want numbers to be treated as decimals, and since a leading zero would indicate that the number is an octal number (see Numeric on page 19 for more information), it is a good idea to always include the base 10 when using `parseInt`.

The function will read numbers from the beginning of the string and will stop when the first non-digit is reached:

```
parseInt("123xyz", 10)
```

returns 123

```
parseInt("xyz123", 10)
```

returns NaN (not a number) since the first character is not a number.

4.6.1.2. *parseFloat*

`parseFloat` returns a floating-point number converted from a string. It is a method of the Global Object. The Global Object has no syntax, so its methods can be called directly:

```
parseFloat(numString)
```

The required *numString* argument is a string that contains a floating-point number. The function will read numbers from the beginning of the string and will stop at the first character that cannot be interpreted as part of a floating-point number. If the string does not begin with a floating-point number, NaN will be returned.

```
parseFloat("2.1e4xyz")
```

returns 21000 (2.1 * 10⁴).

4.6.1.3. isNaN

The *isNaN* method returns *true* if the value is NaN, and *false* otherwise. It is a method of the Global Object. The Global Object has no syntax, so its methods can be called directly: You typically use this function to test return values from the *parseInt* and *parseFloat* methods.

```
isNaN(num)
```

num is a numeric value to test.

4.6.1.4. isFinite

The *isFinite* method returns *true* if the value is any other value than NaN, negative infinity or positive infinity. If it is any of those three, it returns *false*. It is a method of the Global Object. The Global Object has no syntax, so its methods can be called directly:

```
isFinite(num)
```

num is a numeric value to test.

4.6.1.5. toString

toString is a method of the Object object, which means it is available in any other JScript .NET object. It is used to convert a variable into a string. Sometimes this must be done to a variable before inserting it in a question with the *set* method (see *get* and *set* on page 42 for more information).

4.6.1.6. valueOf

valueOf is a method of the Object object, which means it is available in any other JScript .NET object. It returns the primitive value of the specified object, i.e. the numeric value of a number, the string value of a string etc.

4.6.2. Conversion Methods in Forsta

There are also some methods available in Forsta to convert values.

4.6.2.1. toNumber

toNumber is a method you can use to convert the value of a question from a string into a Number (double) (see Floating-point Data on page 20 for more information):

```
f(qID).toNumber()
```

qID is the question ID.

Note: The *toNumber* method requires that the question is answered, and that the value stored for the question can be converted to a number. If not, it will return NaN (not a number).

4.6.2.2. toInt

toInt is a method you can use to convert the value of a question from a string into an integer (see Integers on page 19 for more information):

```
f(qID).toInt()
```

qID is the question ID.

Note: The `toInt` method requires that the question is answered, and that the value stored for the question can be converted to an integer. If not, it will fail, terminate the interview with an “Internal server error” and send an error report to the “Email address to receive emails triggered by scripting errors in interview”. The method should either only be used when you know that there will always be a valid response to the question, or you should check that the response is numeric before using `toInt` (for example using `IsInteger`).

4.6.2.3. *toDecimal*

`toDecimal` is a method you can use to convert the value of a question from a string into a decimal (see Floating-point Data on page 20 for more information):

```
f(qID).toDecimal()
```

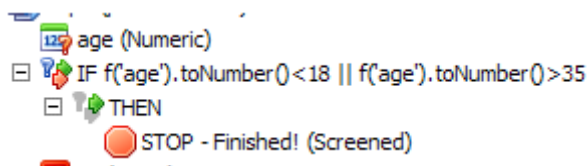
`qID` is the question ID.

Note: The `toDecimal` method requires that the question is answered, and that the value stored for the question can be converted to a Decimal. If not, it will fail, terminate the interview with an “Internal server error” and send an error report to the “Email address to receive emails triggered by scripting errors in interview”. The method should either only be used when you know that there will always be a valid response to the question, or you should check that the response is numeric before using `toDecimal` (for example using `IsNumeric`).

Screening on a Numeric Question

Let us say you have a survey with an initial numeric question `age`. In this question you ask for the respondent's `age`. For this survey you have defined a target: Persons between 18 and 35. To make a condition for your screening, you have to use `toNumber` to convert the answer from a string into a number. You may then make an expression like this in the condition:

```
f("age").toNumber() < 18 || f("age").toNumber() > 35
```



Note: Always use `toNumber`, `toInt` or `toDecimal` when you use expressions involving the operators `<`, `<=`, `>=` or `>`, or when doing arithmetic operations on the answers.

4.6.2.4. *toBoolean*

`toBoolean` is a method that converts the variable into a Boolean (`true/false`). It can be used to check if a question has been answered, or for a single question with the Boolean property, if it has been answered with the true or false answer alternative.

Note: The Boolean question property mentioned in the last sentence above is only available in surveys using the Optimized Database format.

```
f(qID).toBoolean()
```

If the respondent has answered the question with question ID `qID`, the expression will yield `true`, if not, `false`. Or, if `qID` is a Boolean question, the expression will yield `true` if the respondent has chosen the answer corresponding to `true` (1), and `false` if the respondent has chosen the answer corresponding to `false` (0)

You have already seen `toBoolean` used in the Removing an Answer in a Single or Grid Question example.

4.6.2.5. *toDate*

`toDate` can be used on date questions to return a .NET structure representing the selected date value. Note that this is **not** the same as a JScript Date object. JScript supports the use of .NET structures, but not the declaration of new ones, so sometimes it may be easier to create a JScript Date object instead for scripting purposes. See The Date Object (chapter 14.1).

```
f(qID).toDate()
```

returns a strongly-typed Nullable DateTime object representing the date answered.

4.6.2.6. *day*

`day` can be used on date questions to get the day part of the specified date.

```
f(qID).day()
```

returns the integer value (1 - 31) representing the "day" part of the specified date. 0 is returned if no date is specified.

4.6.2.7. *month*

`month` can be used on date questions to get the month part of the specified date.

```
f(qID).month()
```

returns the integer value representing month part of the date specified, 0 if no date is specified. Conventional numbering of months is used (1 = January, 2 = February etc.).

4.6.2.8. *year*

`year` can be used on date questions to get the year part of the specified date.

```
f(qID).year()
```

returns the integer value representing year part of the date specified, 0 if no date is specified.

4.6.2.9. *datestring*

`datestring` can be used on date questions to get a textual representation of the specified date.

```
f(qID).datestring()
```

returns the textual representation of the chosen date in accordance to the current language setting (for example, English gives "Friday, April 25, 2010"). The same result will be achieved (a textual representation of the date in accordance with the current language setting) when performing response piping on a date question.

Note: The date question type is only available in surveys using the "Optimized database format".

5. Operators and Expressions

5.1. Terminology

An **operator** is used to transform one or more values into a single resultant value. The values to which the operator applies are referred to as **operands**. The combination of an operator and its operands is referred to as an **expression**.

For example, in the expression

```
2 + 3
```

the operator + is used to transform the operands 2 and 3 into the resultant value 5.

Some operators result in a value being assigned to a variable, e.g. the assignment operator = in

```
x = 0;
```

Others produce a value that may be used in other expressions, like

```
2 + 3
```

For some operators the order of the operands does not matter:

```
2*3
```

is 6, the same is

```
3*2
```

Other operators give different results for different orderings:

```
3-2
```

is 1.

```
2-3
```

is -1.

Some operators are used only with one operand. They are called **unary** as opposed to **binary** operators, which have two operands. Examples of unary operands: ! (logical not) and - (unary negation, as in -4 (negative numbers)).

You can combine several operators and operands to make complex expressions. To evaluate complex expressions, you must use rules of order of **precedence** to know which expressions to evaluate first.

In the following we will go through the most common JScript .NET operators. Some operators that are seldom used in Forsta scripts are left out. For a full overview, refer to a JScript .NET language reference manual.

5.2. Arithmetic Operators

| Operator | Description |
|----------|--|
| + | Addition |
| - | Subtraction or unary negation |
| * | Multiplication |
| / | Division |
| % | Modulus (the remainder of dividing two integers). |
| ++ | Increment and then return value (or return value and then increment) |

| | |
|----|--|
| -- | Decrement and then return value (or return value and then decrement) |
|----|--|

Some of these may need some explanation:

Modulus gives the remainder of dividing two integers. Examples:

```
7%2
```

gives 1 because $7/2 = 3$ with a remainder of 1.

```
6%2
```

gives 0 because $6/3=2$ with no remainder.

++ and --:

x++ and ++x both result in 1 being added to the value of x. x-- and --x both results in 1 being subtracted from x. They differ in what value is returned - the value before or after the increment/decrement. ++x and --x return the value after the increment/decrement. x++ and x-- return the value before the increment/decrement.

The distinction between x++ and ++x is illustrated in these two coding examples:

| | |
|--------------------------|--------------------------|
| <pre>x = 3 y = ++x</pre> | <pre>x = 3 y = x++</pre> |
| Result: x = 4 and y = 4 | Result: x = 4 and y = 3 |

In the first example, x is increased by 1 before the value is returned and stored in y. In the second the value of x is returned and stored in y first, and then x is increased by 1. We recommend that you be very careful when using these operators.

5.3. Logical Operators

| Operator | Description |
|----------|--------------------|
| && | logical and |
| | logical or |
| ! | logical not |

5.4. Comparison Operators

| Operator | Description |
|----------|--|
| == | Equal |
| === | Strictly equal (without type conversion) |
| != | Not equal |

| | |
|-----|--|
| !== | Strictly not equal (without type conversion) |
| < | Less than |
| <= | Less than or equal |
| > | Greater than |
| >= | Greater than or equal |

Expressions with comparison operators evaluate to true or false.

The difference between equal and strictly equal (==/===): When using == JScript .NET automatically does a type conversion according to the types' order of precedence. For example, in the expression `x == y`, where `x` is the string '1' and `y` is the number 1, the value of `y` will be converted to the string '1' and the expression will return true. However, in the expression `x === y` (`x` strictly equal to `y`) this conversion will not be done, hence the expression will return false, because the operands have different types.

The same applies to not equal/strictly not equal (`!=/!==`).

5.5. String Operators

| Operator | Description |
|----------|----------------------|
| + | String concatenation |

Strings can be joined with the string concatenation operator `+`:

```
"For" + "sta"
```

will return

```
"Forsta"
```

5.6. Assignment Operators

| Operator | Description |
|----------|--|
| = | Sets the variable on the left of the = operator to the value of the expression on its right. |
| += | Increments the variable on the left of the += operator by the value of the expression on its right. When used with strings, the value to the right of the += operator is appended to the value of the variable on the left of the += operator. |
| -= | Decrements the variable on the left of the -= operator by the value of the expression on its right. |

| | |
|--------|--|
| *= | Multiplies the variable on the left of the *= operator by the value of the expression on its right. |
| /= | Divides the variable on the left of the /= operator by the value of the expression on its right. |
| %= | Takes the modulus of the variable on the left of the %= operator using the value of the expression on its right. |

The following table explains the operators +=, -=, *=, /= and %=.

| Operator | Equivalent to |
|----------|---------------|
| x += y | x = x+y |
| x -= y | x = x-y |
| x *= y | x = x*y |
| x /= y | x = x/y |
| x %= y | x = x%y |

+= can be used for text concatenation as well as arithmetic addition:

```
x = "Confirm";
x += "it";
```

will result in x being equal to "Confirmit".

5.7. new

new is used to create new objects. Its use is described in Arrays, Objects, Working with Sets and Predefined JScript .NET Objects.

5.8. The Conditional Expression Ternary Operator

This operator takes three operands (that is why it is called ternary):

```
condition ? value1 : value2
```

The first item is a condition that evaluates to either true or false. If the condition evaluates to true, value1 is returned. If the condition evaluates to false, value2 is returned.

Response Piping from a Single Question with Other Specify

If you have text substitution in Forsta and want to pipe in the response to a single question with an item with the "Other" property set, you probably want to pipe in the response in the "Other" text box instead of the answer text (which might be something like "Other, please specify:").

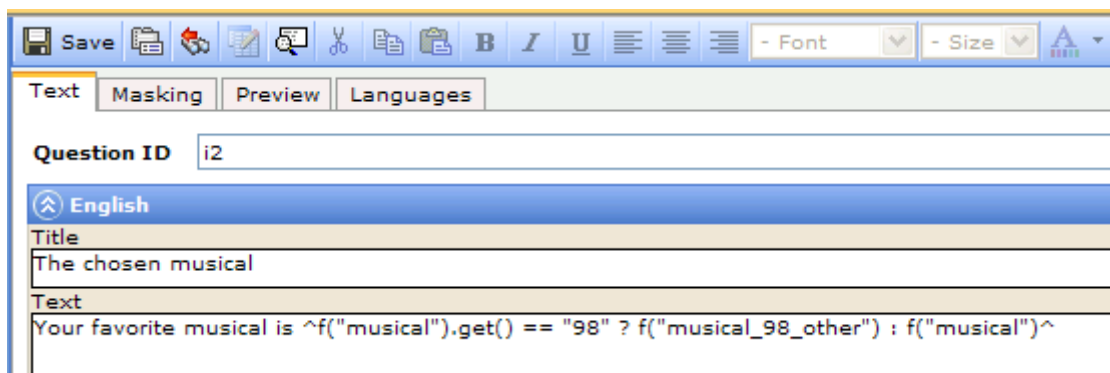
Say you want to pipe in the response to the single question musical where there is one item in the answer list with code 98 that has the "Other" property set.

| English | Code | Score | RdgSingle% | BgColor | Style | KeepPos | Other |
|-----------------------|------|-------|------------|---------|--------------------------|--------------------------|-------------------------------------|
| Song & Dance | 1 | | | | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| The Sound of Music | 2 | | | | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| South Pacific | 3 | | | | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Starlight Express | 4 | | | | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Sunset Boulevard | 5 | | | | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Sweeney Todd | 6 | | | | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Tommy | 7 | | | | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| West Side Story | 8 | | | | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Other, please specify | 98 | | | | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |

In the text field of the question or info where you want to pipe in the response to the musical question, you can use this code:

```
^f("musical").get() == "98" ? f("musical_98_other") : f("musical")^
```

f("musical").get() will return the code of the answer to musical (see get and set on page 42 for more information). If this is equal to 98, the answer from the "Other" text box should be piped in (f("musical_98_other")). If not, use normal text substitution with f("musical") so that the answer text will be piped in.



Replacing "NO RESPONSE" in Response Piping

When there is no answer to a question, text substitution will give the text "NO RESPONSE" (different texts in other languages than English). So if the respondent for example does not answer on a not required single question income, response piping with

```
Income: ^f("income")^
```

will give this result:



If you instead want an empty string (i.e. no text at all) to appear when the question is not answered, use this expression in the question where you want to pipe in the answer:

```
Income: ^f("income").toBoolean() ? f("income") : ""^
```

If there is an answer to income, `f("income").toBoolean()` will return true and `f("income")` will be used for text substitution. If there is no answer, an empty string will be returned.



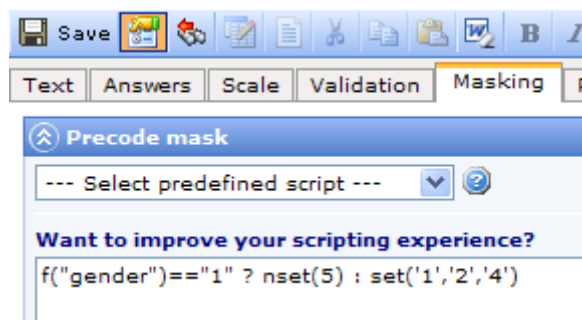
Note: Expressions inside ^ (carets) in question text fields, title fields and answer/scale lists in Forsta must always return strings. You cannot run JScript .NET statements inside ^'s, however you can call a function that returns a string.

Conditional Code Masking

It is also possible to use this operator in a code mask so a different code mask can be used dependent on a condition. For example, if you want males (code 1) to be given different answer alternatives than women (code 2), you can base the code mask on the "gender" question like this:

```
f("gender")=="1" ? nset(5) : set('1','2','4')
```

If the condition is evaluated as true (=male) then a code mask of 1-5 would be used; if the condition is evaluated as false (=female) then a code mask of 1, 2 and 4 would be used.



5.9. Coercion

You can set up JScript expressions that involve values of different types without the compiler raising an exception. Instead, one of the types will automatically be changed (coerced) to that of the other before performing the operation. The compiler will allow all coercions unless it can prove that the coercion will always fail. Any coercion that may fail generates a warning at compile time, and many produce a runtime error if the coercion fails.

For example, if you add a string "Forsta" and the number 8.5, the number will be converted to a string so that the expression

```
"Forsta"+8.5
```

will give the string "Confirmit8.5", the concatenation of the strings "Forsta" and "8.5".

In JScript :NET you can also force what type a value should be coerced to by using the target type name (see Types on page 19 for more information).

The table below shows what the result will be when using the operator + between values of different types. It illustrates what the order of precedence within the types. If a string is involved, the other types are converted to string. For numbers it will give the number as a string, the Boolean value `false` will give the string "false" and `true` the string "true". `null` will be converted to the string "null". An int is converted to a float in an expression with a float value. Boolean true will be converted 1 and false to 0 when used in an expression with a numeric value. `null` will be converted to 0 when used in an expression with a numeric value.

| | | | | | | |
|------------------|-------------------|---------|------------|-----------------|------------------|----------|
| row + column | string "12.34" | int 123 | float .123 | logical true | logical false | null |
| string "test" | test12.34 | test123 | test0.123 | testtrue | testfalse | testnull |
| int 123 | 12312.34 | 246 | 123.123 | 124 | 123 | 123 |
| float .123 | 0.12312.3 4 | 123.123 | 0.246 | 1.123 | 0.123 | 0.123 |
| logical true | true12.34 | 124 | 1.123 | 2 | 1 | 1 |
| logical false | false12.34 | 123 | 0.123 | 1 | 0 | 0 |
| null | null12.34 | 123 | 0.123 | 1 | 0 | 0 |

As all values returned from questions in Forsta are strings, and strings have precedence over all other types, you may have to use some sort of conversion function to change the type before using the value from a question in your scripts.

Exercise 1:

Find the result of this expression.

(As will be shown in the next chapter, expressions within brackets will be calculated separately before the resultant value is concatenated with the other strings, so e.g. $192+15=207$ is the resultant value from the first part that is brought into the string.)

```
(192+15)+" is not the same as "+(true+206)+" , but this isn't really
"+true
```

See the answer in APPENDIX A Answers to Exercises.

5.10. Operator Precedence

The **precedence** of the operators determines which operators are evaluated before others in complex expressions where several operators are involved.

For operators on the same level of precedence, JScript .NET reads and evaluates expressions from left to right. The table below lists the order of precedence for the operators in JScript .NET, from highest to lowest.

| | Operator |
|---|-------------------|
| 1 | () |
| 2 | !, --, ++, -, new |
| 3 | *, /, % |
| 4 | +, - |
| 5 | <, <=, >, >= |

| | |
|----|-----------------------|
| 6 | ==, !=, ===, !== |
| 7 | && |
| 8 | |
| 9 | ?: |
| 10 | =, +=, -=, *=, /=, %= |

The minus (-) in 2 is the unary negation operator, not subtraction.

Note that parentheses are at the top of the table, so by using parentheses you can always control in what order the expressions are calculated. It is highly recommended to use parentheses, also because it makes the expressions easier to understand.

Here is an example showing how the order of precedence decides how an expression is calculated:

```
3 + 4 * 2
    |
3 + 8
    |
11
```

Exercise 2:

This is a piece of code from a script. For each one of these assignments, find the value of x, y and z after the line has been executed:

```
x = 4; y=0; z=0;
y = 5*2+1-(x++ == 4 ? 2 : 8) //ex. a
z = ((x+4)%3)*900+8 //ex. b
y+= --x*8-(z>3 ? z : ++z) //ex. c
x = (z == 8 && (z % 3 == 0) || ++y < 6*5) ? --z : ++y //ex. d
```

See the answers in APPENDIX A Answers to Exercises.

5.11. Short Circuit Evaluation

In expressions involving the logical operators and (&&) and or (||), code will execute faster if you use a feature called **short circuit evaluation**. When JScript evaluates a logical expression, it only evaluates as many sub-expressions as required to get a result.

The logical and (&&) operator evaluates the left expression passed to it first. If that expression converts to *false*, then the result of the logical and operator cannot be *true* regardless of the value of the right expression. Therefore, the right expression is not evaluated.

Similarly, the logical or operator (||) evaluates the left expression first and if it converts to *true*, the right expression is not evaluated.

So to make a script run most efficiently, place the conditions most likely to be *true* first for the logical or operator. For the logical and operator, place the conditions most likely to be *false* first.

This is particularly helpful in expressions involving function calls.

6. Simple Statements

A **statement** is an instruction that makes a program perform some action.

Statements are separated either with a line break or a semicolon (;)

More than one statement may occur on a single line of text, provided that they are separated by semicolons.

A semicolon is not needed between statements that occur on separate lines, however it is recommended to use it anyway in case the line breaks are removed later.

A statement may be written over multiple lines of text. However, do not use line break inside string constants as this will give a script error. If you need a line break inside a string, you must use `\n` (see Characters and Strings on page 21 for more information). Also, postfix increment and decrement operators must appear on the same line as their argument (e.g. `i++` and `i--`, (see Arithmetic Operators on page 27 for more information), `continue` and `break` keywords must appear on the same line as their label (see The break Statement on page 67 for more information), and `return` must appear on the same line as its expression (see The return Statement on page 163 for more information).

A group of JScript statements surrounded by curly brackets (`{}`) is called a **block**. Statements within a block can generally be treated as a single statement. They are used to group a set of statements inside branches of a condition, or inside loops and functions.

6.1. Declarations

We have used this to declare JScript .NET variables and constants.

```
var variableName { : type } { = expression };
```

or

```
const constantName { : type } = expression;
```

as for example in

```
var x : int = 12;
```

which both identifies the variable `x` and causes it to be implicitly **declared** as a variable of type `int` and initialized to the value `12`.

Variables and constants may or may not be bound to a specific data type.

```
var x = 12;
```

Variables may not be initialized to any value. Constants have to be initialized.

```
var x;
```

6.2. Assignment Statements

```
variableName assignmentOperator expression;
```

The **assignment** statement updates the value of a variable based upon an assignment operator and an expression (and for `+=`, `--`, `*=`, `/=` and `%=` also the current value of the variable). For example

```
var x : int = 12;  
var y : int;  
y = x - 2;
```

assigns the value `10` to `y` (if `x` is `12` as in the previous example).

6.3. The if Statement

You can use an `if` statement to control the flow of your code based on a logical expression. If the expression gives the Boolean value `true`, the statements are executed, whereas if the expression gives the Boolean value `false` they are skipped. If you use an `else` branch, the statements inside the `else` branch are executed if the expression gives the value `false`.

6.3.1. if

```
if( condition )
{
    statements }
```

If the expression inside the parenthesis is true, the statements inside the curly brackets, { and }, are executed. If the condition is false, then the statements are skipped and execution continues on the next program line.

Note that the parentheses around the condition are required.

If-then conditions are often used when creating scripts in Forsta, especially for validation code.

We have used if conditions several times already. See the examples in Validation Code, Null and toBoolean for more information.

6.3.2. if-else

```
if( condition )
{
    statements }
else
{
    statements }
```

If the condition inside the parenthesis is true, then the first set of statements is executed. If the condition is false, then the second set of statements is executed.

Exercise 3:

What values will x and y have after running these two code samples (separately):

```
//Code sample 1
if(x<y)
{
    x++;
}
else
{
    y++;
}

//Code sample 2
if(x<y)
{
    x++;
}
y++;
```

...when x and y are declared as

```
var x : int = 4;var y : int = 5;
```

...when x and y are declared as

```
var x : int = 5;var y : int = 4;
```

See the answers in APPENDIX A Answers to Exercises.

6.3.3. Using Curly Brackets in if Statements

Curly brackets are used to group a set of statements. If you have just one statement that should be executed inside an if statement, you may omit the curly brackets {}. The following is equivalent to sample 1 above:

```
if (x<y)
  x++;
else
  y++;
```

However, it is easy to make mistakes when you do not use the brackets.

```
if (x<y)
  x++;
  y++;
```

is equivalent to sample 2 in the previous exercise, but that might be hard to spot. So it is recommended to always use the curly brackets, both for clarity and also to simplify later modifications such as adding another statement within a branch in the `if` statement.

6.4. The switch Statement

The `switch` statement is used when you want different statements to run for different values of a variable. Instead of writing a lot of `if` statements with conditions for each of the values you want to check, you can use `switch`. The syntax for the `switch` statement is like this:

```
switch (expression)
{
  case value1:
    statements1
    break
  .
  .
  .
  case valuen:
    statementsn
    break
  default:
    statementsx
}
```

You may have more than one statement between each `case` and `break`, and do not need to have curly brackets in front and after them, since for each `case` all the following statements will be executed until the `break` statement.

`switch` evaluates the expression and looks at the values one by one until a match is found in one of the `case` statements. When a match is found, the accompanying statements are executed until a `break` statement is encountered or the `switch` statement ends. If you omit the `break` statement before the next `case`, the following statements will also be executed until a `break` is reached or you get to the end of the `switch` statement.

Use the `default` clause to provide a statement to be executed if none of the values matches the expression.

If no value matches the value of `expression`, and a `default` case is not supplied, no statements are executed.

The `switch` statement above will be equivalent to this code:

```
if (expression == value1)
{ statements1 }
...else if (expression == valuen)
{
  statementsn
}
else
{
  statementsx
}
```

Using switch to set Values for each of the Answer Alternatives on a Single

Let us say we have a single question where the respondent picks from a list of different concepts. Each of these has a price, and we want to set the price in a hidden numeric question based on which of the concepts the respondent has picked. The value in the hidden numeric question may e.g. be used in calculations later in the questionnaire. The single question has question ID "*concept*" and the numeric question has question ID "*price*".

Here are two different ways of scripting this; the first using if and the second using switch. As you see, switch gives more compact code that is easier to read:

```
//using if:
if(f("concept")==="1")
{
  f("price").set(234);
}
else if(f("concept") == "2")
{
  f("price").set(249);
}
else if(f("concept") == "3")
{
  f("price").set(244);
}
else if(f("concept") == "4")
{
  f("price").set(229);
}
else
{
  f("price").set(271);
}

//using switch:
switch(f("concept").get())
{
  case "1":
    f("price").set(234);
    break
  case "2":
    f("price").set(249);
    break
  case "3":
    f("price").set(244);
    break
  case "4":
    f("price").set(229);
    break
  default:
    f("price").set(271);
}
```

7. Arrays

Arrays are a special type of JavaScript object. An object is referred to as a complex data type because it is built from primitive types (see The Array Object on page 215 for more information).

Arrays are objects that are capable of storing a sequence of values in one variable. A single index number (for a one-dimensional array) or several index numbers (for an array of arrays, or a multidimensional array) references the data in the array. You can refer to an individual element of an array with the array identifier followed with the array index in square brackets (`[]`). The indexes are numbered from 0 to 1 less than the number of elements in the array. To refer to the array as a whole, use the array identifier.

There are two types of arrays in JScript, **JScript arrays (the Array object)**, and **typed arrays**. While the two types of arrays are similar, there are a few differences. JScript arrays and typed arrays can interoperate with each other. Consequently, a JScript Array object can call the methods and properties of any typed array, and typed arrays can call many of the methods and properties of the Array object. Furthermore, functions that accept typed arrays accept Array objects, and vice-versa.

7.1. Typed Arrays

In typed arrays (also called native arrays) you define a data type which all of the elements have to comply with. (You can define a typed array of type Object to store data of any type.)

Also, you must define the number of elements. The only way to change the number of elements is by recreating the array. Trying to access elements outside the range of the indexes, will generate an error. Typed arrays, are **dense**, that is, every index in the allowed range refers to an element.

Use of typed arrays provides type safety and performance improvements compared to JScript Arrays.

7.1.1. Declaring Typed Arrays

Typed arrays can be declared in three different ways. We will look at these by declaring and initializing the same typed array consisting of string values that holds the name of the days of the week in English.

The data type of the elements in a typed array is defined with the name of the data type (see Types on page 19 for more information) followed by square brackets (`[]`).

One way of declaring a typed array is to list the elements separated by commas within square brackets (this is called an **array literal**) :

```
var weekday : String[] =  
["Monday", "Tuesday", "Wednesday", "Thursday", "Friday", "Saturday", "Sunday"]
```

You can also declare an empty array, and then use the `new` operator to define the size of it: Use normal assignments

```
var weekday : String[];  
weekday = new String[7];
```

This can also be done in one operation:

```
var weekday : new String[7];
```

To assign values to the elements of the array after declaring it as in either of the last two examples, you can use normal assignments, referring to each of the elements of the array:

```
weekday[0] = "Monday";  
weekday[1] = "Tuesday";  
weekday[2] = "Wednesday";  
weekday[3] = "Thursday";  
weekday[4] = "Friday";  
weekday[5] = "Saturday";  
weekday[6] = "Sunday";
```

It is also possible to declare multidimensional typed arrays and arrays of typed arrays. Refer to a JScript .NET reference for more information.

7.2. JScript Arrays

A JScript Array object provides more flexibility than a typed array. It can store data of any type, which makes it easy to quickly write scripts that use arrays without considering type conflicts. Scripts can dynamically add elements to or remove elements from JScript arrays. To add an array element, assign a value to the element. The `delete` operator can remove elements.

A JScript array is **sparse**. That is, if an array has three elements that are numbered 0, 1, and 2, element 50 can exist without the presence of elements 3 through 49. Each JScript array has a `length` property that is automatically updated when an element is added. In the previous example, the addition of element 50 causes the value of the `length` variable to change to 51 rather than to 4.

7.2.1. Declaring JScript Arrays

We will demonstrate the different ways of declaring and initializing JScript arrays using the same example as in the previous chapters: An array containing the names of the seven weekdays in English.

First, declaring it using an array literal, listing the elements within square brackets, separated by commas:

```
var weekday =
  ["Monday", "Tuesday", "Wednesday", "Thursday", "Friday", "Saturday", "Sunday"]
```

Another way is to use the `new` operator to create a new Array object by using the `new` operator, the object name (Array) and then listing the elements of the array:

```
var weekday = new
Array("Monday", "Tuesday", "Wednesday", "Thursday", "Friday", "Saturday", "Sunday");
```

You can also define an empty array:

```
var weekday = new Array();
```

or an array with size 7:

```
var weekday = new Array(7);
```

and then assign values to the elements:

```
weekday[0] = "Monday";
weekday[1] = "Tuesday";
weekday[2] = "Wednesday";
weekday[3] = "Thursday";
weekday[4] = "Friday";
weekday[5] = "Saturday";
weekday[6] = "Sunday";
```

The difference between declaring the array as a JScript array instead of as a typed array (see Declaring Typed Arrays on page 39 for more information) is that when it is defined as a typed array, all elements in the array must be of that type.

Also, in a JScript array you can insert elements of any type, including complex types such as other arrays or objects.

Another difference is that in a JScript array you can at any time add new elements, for example another weekday. This can be done no matter how the JScript array is defined, even when defined with the length specified, as in the example with `new Array(7)`.

```
weekday[7] = "Lastday";
```

(this would be a good idea to be able to at least occasionally finish projects before deadlines). The array has now 8 elements (0-7). In typed arrays, you cannot add new elements to the array, just modify existing elements.

And finally, in a JScript array you can have "holes". You can for example add a 50th element (with index 49):

```
weekday[49] = "Extremelyoverdueday";
```

without defining all the elements in between. The size of the array will be 50, even though elements with index 8,...,48 have not been defined.

7.3. length

The **length** of an array is its size, i.e. the number of elements in it. length is the index of the last element+1.

When we declared the weekday array previously, we declared an array of length 7:

```
var weekday = new Array(7);
```

The array could have been declared without specifying length:

```
var weekday = new Array();
```

Initially, the length would then have been 0, but the length would increase as elements were added. And as explained in the previous chapter, the length will always be 1 more than the last index of the array, as the indexes start with 0. This is true even if there are empty elements in it.

It is also possible to declare multidimensional JScript arrays and arrays of JScript arrays. Refer to a JScript .NET reference for more information.

7.4. The length Property

As previously mentioned, JScript .NET arrays are implemented as objects. Objects are a complex data type with collections of data that have properties and may be accessed via methods. A property returns a value that identifies an aspect of the state of an object. Methods are used to read or modify the data contained in an object.

We will get back to objects in general in Objects, and also the methods supported by the array object (see The Array Object on page 215 for more information).

The **length** of an array is a property of an array. Properties of JScript .NET objects are accessed by appending a period and the name of the property to the name of the object:

```
objectName.propertyName
```

The length of an array is determined as follows:

```
arrayName.length
```

So if we used this in the weekday example (before adding "Lastday"),

```
weekday.length
```

would return 7.

8. Methods of the Form Objects

The `f` function used in Forsta returns objects that have a lot of different useful methods depending on the question type. These methods can be used to reference the values, titles and answers to Forsta questions. Some of these return strings and some return arrays of strings. Using these methods, you are able to write all sorts of scripts that access survey variables, modify them etc. For each of the methods described, examples are given in Applying the Methods on Different Types of Questions.

See also The `f` Function for further details.

8.1. get and set

```
f(qID).get()
f(qID).set(value)
```

We have seen these earlier. Used on a question `q1`,

```
f("q1").get()
```

will return the value stored in the database for that object. For an **open text** question this will be the answer the respondent has typed in the text box, for a **single** question this will be the code of the answer the respondent has selected.

```
f("q1").set("1");
```

With this statement the question `q1` can be set to a specific answer. If it is a single question, it is the code value that is set, in this case the answer with code "1". An open text question will be set to the value "1" (string) with this statement.

For **multi** questions and other question types with several answers (grid, ranking, open text list and numeric list questions), `get` is not supported. You can use `get` on individual elements of these question types though (see Referencing the Elements of a Multi, Ranking, Open Text List, Numeric List or Grid on page 57 for more information). `set` can be used to set multi, grid, ranking, open text list and numeric list questions. For multi questions the method will take the codes of the answers that should be set as input as a set, an array or as a dictionary.

```
f("q1").set(["1", "3", "4"]);
```

would set answers with code 1, 3 and 4 in a multi `q1` as "selected", and all other answers as "not selected".

It is also possible to set a multi based on the responses to another multi:

```
f("q2").set(f("q1"));
```

For grid, ranking, numeric list and open text list, the method will take a dictionary as input, with a collection of key/value pairs (the code of the answer and the value you want to set).

For **date** questions, `get` will return the chosen date formatted as YYYY-MM-DD, or an empty string if no date is set. `set` can either take a string as parameter (format: YYYY-MM-DD) or a JScript Date object (for example `f("q1").set(new Date())` to set current date).

Note: The Date question type is only available when using the Optimized Database format.

8.2. label

```
f(qID).label()
```

This method is used to access the question title of a question. This method is available on **open text**, **single**, **multi**, **numeric**, **date**, **ranking**, **open text list**, **numeric list** and **grid** questions.

```
f("q1").label()
```

will return the title of the question `q1`.

8.3. text

```
f(qID).text()
```

This method is used to access the question text of a question. This method is available on **open text**, **single**, **multi**, **numeric**, **date**, **ranking**, **open text list**, **numeric list** and **grid** questions.

```
f("q1").text()
```

will return the question text of the question q1.

8.4. instruction

```
f(qID).instruction()
```

This method is used to access the question instruction of a question. This method is available on **open text**, **single**, **multi**, **numeric**, **date**, **ranking**, **open text list**, **numeric list** and **grid** questions.

```
f("q1").instruction()
```

will return the question instruction of the question q1.

8.5. value

```
f(qID).value()
```

`value` can be used on **single** questions to access the code of the answer to the single question (similar to `get` on a single question).

8.6. valueLabel

```
f(qID).valueLabel()
```

Use this method on a **single** question to access the label of the answer to the single question in the current language.

8.7. domainValues

```
f(qID).domainValues()
```

This will return an array with all codes from the answer list of a **single**, **multi**, **ranking**, **open text list**, **numeric list** or **grid** question, headers excluded.

This method is subject to masking, so if a code mask is used to filter the answer list then this will only return the codes of the answers that are displayed to the respondent.

The method is also subject to randomization. That is, if the answer list is randomized, then the array will be returned randomized.

8.8. domainLabels

```
f(qID).domainLabels()
```

This method will give an array with all the labels (answer texts) on the question, headers excluded. This is the corresponding answer texts to the codes returned with `domainValues`. They will be in the current language. The method will give all possible answer texts from the answer list of a **single**, **multi**, **ranking**, **open text list**, **numeric list** or **grid** question. This is also subject to masking.

The method is also subject to randomization. That is, if the answer list is randomized, then the array will be returned randomized.

8.9. categories

```
f(qID).categories()
```

`categories` will return an array with the codes of the items that have been answered on a **multi**, **ranking**, **open text list**, **numeric list** or **grid** question. For a multi question, this will be the codes of the answers that have been selected, for a grid this will be the codes of the answers that have an answer. Usually a grid is required, so `categories` will be equal to `domainValues` for a grid. But if the grid is not required, they may differ.

Note: If a code mask is used to filter the answer list, then this will only return the codes of those answers that are displayed to the respondent. The f() will not return the results of a combination of answers selected by the respondent and answers added by script.

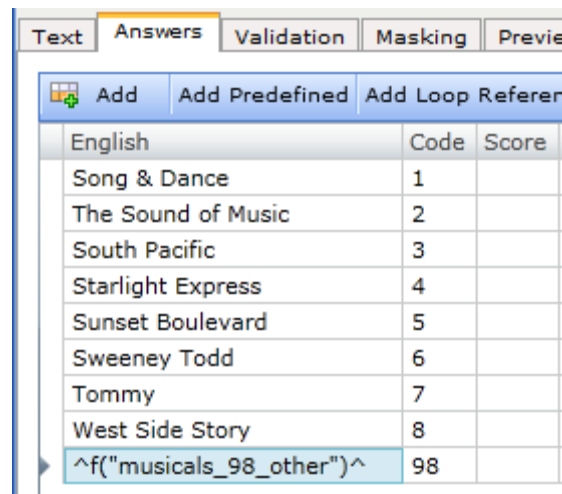
Copying a Multi to do Response Piping with "Other, specify"

In the example in The Conditional Expression Ternary Operator, we saw how you could pipe in the answer in the text box of an "other, specify" option on a single question. However, you cannot use the same approach on a multi question because there "other, specify" can be answered in combination with any of the other alternatives.

A way of solving this for a multi question is to copy the answer of the multi question into another hidden multi question with the same answer list, except that for "other, specify" you pipe in the response from the text box into the answer list instead.

So if you have a multi question *musicals* with an "other, specify" alternative with code 98 and the "Other" property set to yes, you can set up a second multi question *musicals_hidden* with the "hidden" property, where the answer from the "other, specify" text box is piped in with the syntax

```
^f("musicals_98_other")^
```



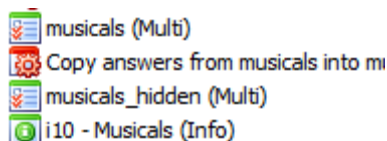
| English | Code | Score |
|--------------------------|------|-------|
| Song & Dance | 1 | |
| The Sound of Music | 2 | |
| South Pacific | 3 | |
| Starlight Express | 4 | |
| Sunset Boulevard | 5 | |
| Sweeney Todd | 6 | |
| Tommy | 7 | |
| West Side Story | 8 | |
| ^f("musicals_98_other")^ | 98 | |

Then you need a script node to copy the response from *musicals* into *musicals_hidden*. Copying answers from one question to another hidden question can also be something you need to do for example to have different, shorter answer texts in response piping in a later question, or to have different texts for reporting.

```
f("musicals_hidden").set(f("musicals").categories());
```

For this script to work, *musicals* and *musicals_hidden* need to be of the same question type and have exactly the same answer lists (same number of items and same codes).

The script is to be placed after the *musicals* question:



In the info node you may now refer to the *musicals_hidden* question in your response piping:

```
You have seen these musicals: ^f("musicals_hidden")^
```

If the respondent for example answers like this:

Musicals

Which musicals have you seen?

| | |
|---|---|
| <input checked="" type="checkbox"/> Annie | <input type="checkbox"/> Little Shop of Horrors |
| <input type="checkbox"/> Anything Goes | <input type="checkbox"/> Miss Saigon |
| <input type="checkbox"/> Beauty and the Beast | <input type="checkbox"/> The Music Man |
| <input type="checkbox"/> Cats | <input type="checkbox"/> My Fair Lady |
| <input type="checkbox"/> Chess | <input type="checkbox"/> Oklahoma! |
| <input type="checkbox"/> Chicago | <input type="checkbox"/> Oliver! |
| <input type="checkbox"/> A Chorus Line | <input type="checkbox"/> The Phantom of the Opera |
| <input checked="" type="checkbox"/> Evita | <input type="checkbox"/> Rent |
| <input type="checkbox"/> Fiddler On the Roof | <input type="checkbox"/> Show Boat |
| <input type="checkbox"/> Godspell | <input type="checkbox"/> Song & Dance |
| <input type="checkbox"/> Grease! | <input type="checkbox"/> The Sound of Music |
| <input type="checkbox"/> Guys and Dolls | <input checked="" type="checkbox"/> South Pacific |
| <input type="checkbox"/> Hair | <input type="checkbox"/> Starlight Express |
| <input type="checkbox"/> Hello, Dolly! | <input type="checkbox"/> Sunset Boulevard |
| <input type="checkbox"/> The King and I | <input type="checkbox"/> Sweeney Todd |
| <input type="checkbox"/> La Cage Aux Folles | <input type="checkbox"/> Tommy |
| <input type="checkbox"/> Les Miserables | <input type="checkbox"/> West Side Story |
| <input type="checkbox"/> The Lion King | <input checked="" type="checkbox"/> Other, please specify <input style="width: 100px;" type="text" value="Abba"/> |

the result of the piping will be:

Musicals

You have seen these musicals: Annie, Evita, South Pacific and Abba

8.10. categoryLabels

```
f(qID).categoryLabels()
```

This method will return an array with the labels of the items that have been answered on a **multi**, **ranking**, **open text list**, **numeric list** or **grid** question in the current language, i.e. the texts from the answer list corresponding to the codes returned from categories.

8.11. values

```
f(qID).values()
```

`values` will return an array with the answers stored in the database for a **grid**, **multi**, **ranking**, **open text list** or **numeric list** question.

- For a **grid** question this will be the codes of the answers to the questions (from the scale).
- For **ranking**, **open text list** or **numeric list** questions it will be the numbers or texts answered for each item in the answer list.

- For a **multi** question this will be 1 (selected) and 0 (not selected).

Note: If the multi question is hidden, then the return will be 1 (selected) and null/blank (not selected).

8.12. getType

```
f(qID).getType()
```

getType will return the type of the question. The result returned for the various question types are:

- Open text question - OPEN
- Numeric question - NUMERIC
- Single question - CODED
- Multi, ranking, open text list, numeric list and grid questions - COMPOUND
- Other specify - OPEN
- 3D-grid and multi grid - 3DGRID
- Date - DATE
- Image upload - PHOTO
- Audio upload - AUDIO_CAPTURE
- Video upload - VIDEO_CAPTURE
- Geolocation - GEO
- Boolean (property on single question) - BOOL
- A question referring to an external answer list in database designer - EXTERNAL

The getType method can be used to determine the type of question in a general purpose script for example for validation.

Note: You cannot set the value for an Image Upload, Audio or Video Capture question.

8.13. GetAdditionalColumnValue

This is a survey engine scripting method used to retrieve data from an additional column or columns associated with a specific table inside of a table lookup list.

```
f('qid').GetAdditionalColumnValue(code, additionalColumnName)
```

where:

code is the id to query from the lookup table.

additionalColumnName is the name of the additional column from which data is returned.

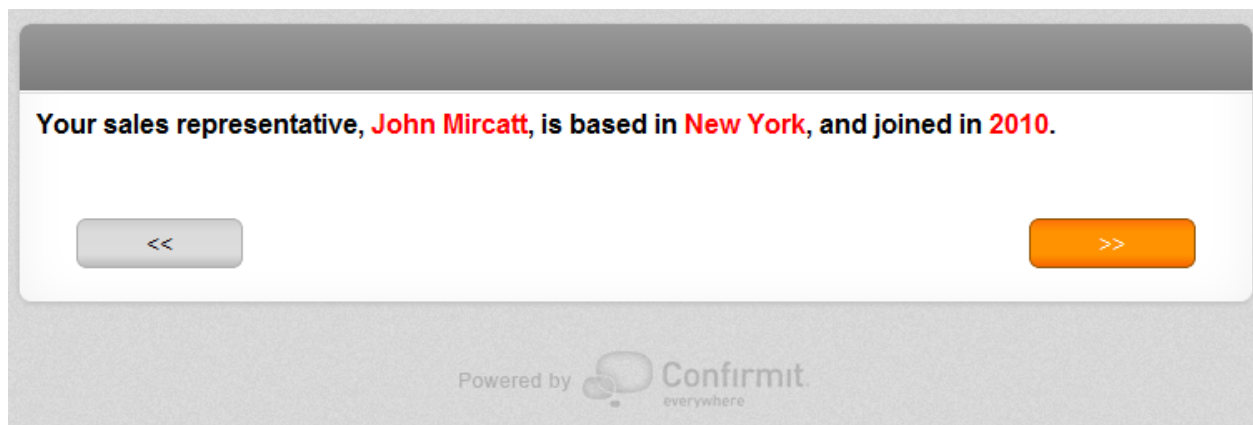
This will return the data in the specified additional column name in the table lookup for the question "qid" for the code supplied, in the same language the interview is being completed in.

In this example where there is a single question "sales_rep" based on a database lookup "car_rep":

sales_rep (Single)
salesRepDetails (Info)

| Text | Answers | Validation | Masking | JavaScript | Preview |
|-------------|---------|------------|---------|------------|---------|
| Schema name | | car_rep | | | |
| Table | | reps | | | |

The “salesRepDetails” info node contains the following piping of the additional columns “office” and “joined_year”:



This is achieved using the following syntax:

```
Your sales representative, ^f('sales_rep')^, is based in
^f('sales_rep').GetAdditionalColumnValue(f('sales_rep').get(),"office")^,
and
joined in
^f('sales_rep').GetAdditionalColumnValue(f('sales_rep').get(),"joined_yea
r")^.
```

Note: In most cases the code value supplied in the method will refer to the `f('qid').get()` for the question that the lookup is based on.

You can perform a test to check whether the code exists in the table used as qid's answerlist. If the code doesn't exist in the table lookup then the method will return "undefined".

To test if the code exists in the table lookup, and display an error message if not, add the following:

```
if(f('qid').GetAdditionalColumnValue(code,additionalColumnName)==undefine
d)
{
  RaiseError();
  SetQuestionErrorMessage(LangIDs.en,"Error - that code doesn't exist in
the lookup table");
}
```

Note: The `GetDBColumnValue` function is described here (see `GetDBColumnValue` on page 98 for more information).

8.14. any

```
f(qID).any(code1, ..., coden)
```

`any` will return true if any of the codes listed is answered on a **single** or **multi** question, or if any of the items for these codes have a response on a **grid**, **multi**, **ranking**, **open text list** or **numeric list** question, or false if none of these items has a response. The method is for example useful in conditions.

8.15. all

```
f(qID).all(code1, ..., coden)
```

`all` will return true if all of the codes listed is answered on a **multi** question, or if all of the items for these codes has a response on a **grid**, **multi**, **ranking**, **open text list** or **numeric list** question, or false if none of these items has a response. The method is for example useful in conditions.

8.16. none

```
f(qID).none(code1, ..., coden)
```

`none` will return true if none of the codes listed is answered on a **single** or **multi** question, or if none of the items for these codes has a response on a **grid**, **multi**, **ranking**, **open text list** or **numeric list** question, or false if either of these items has a response. The method is for example useful in conditions.

8.17. between

```
f(qID).between(from, to)
```

`between` will return true if the answer to a **numeric** question or an item of a **numeric list** question is between the from value and the to value, or false if not. This means the value answered is higher than or equal to the from value and lower than or equal to the to value. The method is for example useful in conditions.

8.18. isNearBy

```
f(qID).isNearBy(latitude, longitude, distance)
```

`isNearBy` can be used on Geolocation questions, and will return true if the position recorded in the question is within a given distance in meters from the position defined by the latitude and longitude. Latitude, longitude and distance are all numeric (double).

8.19. latitude and longitude

```
f(qID).latitude()
```

```
f(qID).longitude()
```


Latitude and longitude can be used on Geolocation questions, and will return the latitude and longitude of the position recorded in the question.

8.20. Applying the Methods on Different Types of Questions

The examples below show these methods applied on an open text, date, single, single with Boolean property set, multi, open text list, and grid question. Each question is followed by an info node that is set up with response piping using the different methods.

Text Masking Preview Languages

Text-Mode Wysiyg Html

Question ID  i5

English

Title

Open text

Text

```
f("name").get(): ^f("name").get()^
f("name").label(): ^f("name").label()^
f("name").text(): ^f("name").text()^
f("name").instruction(): ^f("name").instruction()^
```

8.20.1. Open Text Question

Question ID: "name".

Name

Please specify your name

Required

John Doe

Open text

```
f("name").get(): John Doe
f("name").label(): Name
f("name").text(): Please specify your name
f("name").instruction(): Required
f("name").getType(): OPEN
```


8.20.2. Date

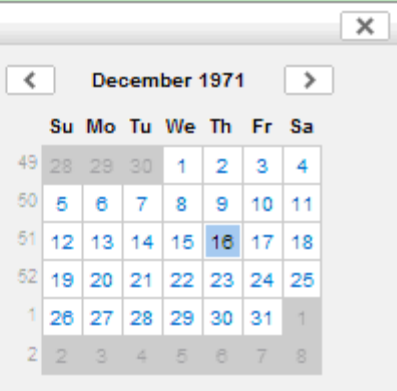
Question ID: "birthday".

Date of birth

Please specify your date of birth

You can either type the date in the text box or click the calendar icon to select in a calendar.

12/16/1971 



Open text with Date Property Set

```
f("birthday").get():
f("birthday").label(): Date of birth
f("birthday").text(): Please specify your date of birth
f("birthday").instruction(): You can either type the date in the text box or click the calendar
icon to select in a calendar.
f("birthday").value():
f("birthday").getType(): DATE
```

The date format will depend on survey language.

Note: The Date question property is only available when using the Optimized Database format.

8.20.3. Single Question

Question ID: "gender". Codes: M (Male) and F (Female).

Gender

Please specify your gender:

Required

Male

Female

Single:

```
f("gender").get(): M
f("gender").label(): Gender
f("gender").text(): Please specify your gender:
f("gender").instruction(): Required
f("gender").value(): M
f("gender").valueLabel(): Male
f("gender").domainValues(): M,F
f("gender").domainLabels(): Male,Female
f("gender").getType(): CODED
```

8.20.4. Single Question with Boolean Property Set

Question ID: "license". Single questions with the Boolean property set will be fixed to having two answers in the answerlists with code 1 (true) and 0 (false).

Driver's license

Do you have a driver's license?

Required

Yes

No

Single with Boolean Property Set:

```
f("license").get(): True
f("license").label(): Driver's license
f("license").text(): Do you have a driver's license?
f("license").instruction(): Required
f("license").value(): 1
f("license").valueLabel(): Yes
f("license").domainValues(): 1,0
f("license").domainLabels(): Yes,No
f("license").getType(): BOOL
```

Note: The Boolean question property is only available when using the Optimized Database format.

8.20.5. Multi Question

Question ID: "cars". Codes: "1","2","3","4","5","6","7".

Cars Test Driven

Which of the following cars have you ever test driven?

If you haven't test driven any, please leave question blank and move on to next page.

- Toyota
- Honda
- BMW
- Ford
- Mercedes
- Saab
- Volkswagen

Multi

```
f("cars").label(): Cars Test Driven
f("cars").text(): Which of the following cars have you ever test driven?
f("cars").instruction(): If you haven't test driven any, please leave question blank and move on
to next page.
f("cars").values(): 1,0,1,1,0,0,0
f("cars").categories(): 1,3,4
f("cars").categoryLabels(): Toyota,BMW,Ford
f("cars").domainValues(): 1,2,3,4,5,6,7
f("cars").domainLabels(): Toyota,Honda,BMW,Ford,Mercedes,Saab,Volkswagen
f("cars").getType(): COMPOUND
```

8.20.6. Open Text List

Question ID: "carscharacteristics". Codes: "1","2","3","4","5","6","7".

Characteristics

What are the top of mind characteristics of these different car brands.

Please type in the first characteristics that you can think of for each car. You may leave the text field blank for cars you do not want to comment.

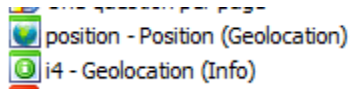
| | |
|------------|---|
| Toyota | <input type="text" value="Environmental friendly"/> |
| Honda | <input type="text" value="Reliable"/> |
| BMW | <input type="text" value="Innovative"/> |
| Ford | <input type="text" value="Smart"/> |
| Mercedes | <input type="text" value="Quality"/> |
| Saab | <input type="text" value="Safety"/> |
| Volkswagen | <input type="text" value="Value for money"/> |

Multi open text

```
f("carscharacteristics").label(): Characteristics
f("carscharacteristics").text(): What are the top of mind characteristics of these different car brands.
f("carscharacteristics").instruction(): Please type in the first characteristics that you can think of for each car. You may leave the text field blank for cars you do not want to comment.
f("carscharacteristics").values(): Environmental friendly,Reliable,Innovative,Smart,Quality,Safety,Value for money
f("carscharacteristics").categories(): 1,2,3,4,5,6,7
f("carscharacteristics").categoryLabels(): Toyota,Honda,BMW,Ford,Mercedes,Saab,Volkswagen
f("carscharacteristics").domainValues(): 1,2,3,4,5,6,7
f("carscharacteristics").domainLabels(): Toyota,Honda,BMW,Ford,Mercedes,Saab,Volkswagen
f("carscharacteristics").getType(): COMPOUND
```

8.20.7. Geolocation Question

Question ID: "position"



Geolocation

```
f("position").toBoolean: True
f("position").get(): 59.9213025 10.6767571
f("position").label(): Position
f("position").text(): The respondent's position
f("position").value(): 59.9213025 10.6767571
f("position").getType(): GEO
f("position").isNearBy(57.6301, 39.865631, 2000000): True
f("position").latitude(): 59.9213025
f("position").longitude(): 10.6767571
```

8.20.8. Grid Question

Question ID: "importance". Codes in answer list: "1","2","3","4","5","6","7". Code in scale: "1","2","3","4".

Areas of Importance

Please indicate how important the following areas are to you when you are considering purchasing a new car.

Required. Please rate the importance on a scale from not important to very important.

| | Not important | Somewhat Important | Important | Very Important |
|------------|-----------------------|----------------------------------|----------------------------------|----------------------------------|
| Comfort | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input checked="" type="radio"/> |
| Design | <input type="radio"/> | <input type="radio"/> | <input checked="" type="radio"/> | <input type="radio"/> |
| Color | <input type="radio"/> | <input checked="" type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Safety | <input type="radio"/> | <input type="radio"/> | <input checked="" type="radio"/> | <input type="radio"/> |
| Stereo | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input checked="" type="radio"/> |
| Horsepower | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input checked="" type="radio"/> |
| Options | <input type="radio"/> | <input type="radio"/> | <input checked="" type="radio"/> | <input type="radio"/> |

Grid

```
f("importance").label(): Areas of Importance
f("importance").text(): Please indicate how important the following areas are to you when you
are considering purchasing a new car.
f("importance").instruction(): Required. Please rate the importance on a scale from not
important to very important.
f("importance").values(): 4,3,2,3,4,4,3
f("importance").categories(): 1,2,3,4,5,6,7
f("importance").categoryLabels(): Comfort,Design,Color,Safety,Stereo,Horsepower,Options
f("importance").domainValues(): 1,2,3,4,5,6,7
f("importance").domainLabels(): Comfort,Design,Color,Safety,Stereo,Horsepower,Options
f("importance").getType(): COMPOUND
```

8.20.9. Other Specify Items

Single, Multi, Numeric Lists, Open Text Lists, Ranking, Grid and 3D Grid questions can all have elements in the answer list with the "Other" property set. This means the answer alternative will be presented with a text box such that the respondent can specify an "other" answer alternative.

You refer to this response with the id `qID_code_other`, for example `q1_98_other` for the other text box for answer alternative with code 98 on question q1. Here, for the other, specify alternative on a multi question cars:

Cars Test Driven

Which of the following cars have you ever test driven?

If you haven't test driven any, please leave question blank and move on to next page.

Toyota

Honda

BMW

Ford

Mercedes

Saab

Volkswagen

Other, specify

Other specify

```
f("cars_98_other").get(): Volvo
f("cars_98_other").getType(): OPEN
```

8.20.10. Referencing the Elements of a Multi, Ranking, Open Text List, Numeric List or Grid

Each item in the answer list of a multi, ranking, open text list, numeric list or grid can be referenced with syntax quite similar to the syntax for referencing the items in an array. But instead of a numeric index starting at zero, you refer to the elements of a multi or a grid by using the code of the element. The code is a string. For example

```
f("q1")["3"]
```

will be the item with code "3" in the multi or grid *q1*.

When you use this syntax to access an element of a grid or a multi, you can use the following methods:

- `get`, `set`, `label` and `getType` for the elements of a **multi, ranking, open text list** or **numeric list** question. `label` will then give the label of the answer in the current language. `getType` will return "DICHOTOMY" if it is a multi, "NUMERIC" if it is a numeric list, and "OPEN" if it is any of the other types.
- `get`, `set`, `label`, `value`, `valueLabel`, `domainValues`, `domainLabels` for the elements of a **grid** question. `label` will then give the label of the answer (from the answer list) in the current language. `value` will return the code of the answer (from the scale) to that element of the grid. `valueLabel` will return the corresponding answer text (from the scale) in the current language. `domainValues` and `domainLabels` will respectively return all possible codes from the scale and the corresponding labels (answers) from the scale in the current language. `getType` will return "CODED".

Using the same multi and grid from the previous example, the examples below show methods that can be used on the single elements of a multi or a grid.

8.20.10.1. Element of a Grid Question

Grid:

```
f("importance")["3"].get(): 2
f("importance")["3"].label(): Color
f("importance")["3"].value(): 2
f("importance")["3"].valueLabel(): Somewhat Important
f("importance")["3"].domainValues(): 1,2,3,4
f("importance")["3"].domainLabels(): Not important,Somewhat Important,Important,Very Important
f("importance")["3"].getType(): CODED
```

8.20.10.2. Element of a Multi Question

Multi:

```
f("cars")["3"].get(): 1
f("cars")["3"].label(): BMW
f("cars")["3"].getType(): DICHOTOMY
```

8.20.10.3. Element of an Open Text List Question

Multi open text:

```
f("carscharacteristics")["3"].get(): Innovative
f("carscharacteristics")["3"].label(): BMW
f("carscharacteristics")["3"].getType(): OPEN
```

8.20.11. Loops

The same methods may be used on a loop node as on a single question. They return the same items as the single, except for `label`, which will return the loop's ID (not the loop's title, which is only used in reporting).

General Masking Titles

Loop ID

| English | Code | Style |
|-----------|------|-------|
| Monday | 1 | |
| Tuesday | 2 | |
| Wednesday | 3 | |
| Thursday | 4 | |
| Friday | 5 | |
| Saturday | 6 | |
| Sunday | 7 | |

Below are the results from the first iteration of the loop:

```

Loop (from inside the loop)
f("weekdays").get(): 1
f("weekdays").label(): Weekdays
f("weekdays").value(): 1
f("weekdays").valueLabel(): Monday
f("weekdays").domainValues(): 1,2,3,4,5,6,7
f("weekdays").domainLabels(): Monday,Tuesday,Wednesday,Thursday,Friday,Saturday,Sunday
f("weekdays").getType(): CODED

```

The first four methods (`get`, `label`, `value` and `valueLabel`) can only be used inside the loop and will give results for the current iteration. `domainValues` and `domainLabels` can also be used outside of the loop.

8.20.12. 3D Grid

None of the methods apply directly to 3D grids. Instead, refer to the questions contained in the 3D grid by their question IDs.

An other specify item on a 3D grid can be accessed in a similar way to other specify on other questions:

```
f("qid_code_other").get()
```

qid would then be the question id of the 3D grid, and code would be the code of the answer with other specify.

8.20.13. Implicit Conversion of Arrays to Strings

The arrays in the previous examples are all presented in a string context (text substitution with `^`) so they are converted into strings. When an array (the result from applying `categories`, `categoryLabels`, `values`, `domainValues` or `domainLabels`) is converted into a string, the elements are presented separated by commas.

Exercise 4:

In this grid, where the default codes ("1","2","3",...) are used both in answers and in scale, what methods do you have to use on

```
f("importance")["2"]
```

to get the label

1. "Important"

2. "Design"

Areas of Importance

Please indicate how important the following areas are to you when you are considering purchasing a new car.

Required. Please rate the importance on a scale from not important to very important.

| | Not important | Somewhat Important | Important | Very Important |
|------------|-----------------------|----------------------------------|----------------------------------|----------------------------------|
| Comfort | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input checked="" type="radio"/> |
| Design | <input type="radio"/> | <input type="radio"/> | <input checked="" type="radio"/> | <input type="radio"/> |
| Color | <input type="radio"/> | <input checked="" type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Safety | <input type="radio"/> | <input type="radio"/> | <input checked="" type="radio"/> | <input type="radio"/> |
| Stereo | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input checked="" type="radio"/> |
| Horsepower | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input checked="" type="radio"/> |
| Options | <input type="radio"/> | <input type="radio"/> | <input checked="" type="radio"/> | <input type="radio"/> |

The answers are given in APPENDIX A Answers to Exercises.

8.21. Overview – Methods of Basic Variable Objects in Forsta

| | | Open text | Date | Numeric | Single | Multi | Open Text List | Numeric List | Ranking | Grid | Geolocation | Element of multi, open text list, numeric list, ranking | Element of grid | Loop |
|--------|--------------------|-----------|------|---------|--------|-------|----------------|--------------|---------|------|-------------|---|-----------------|------|
| String | .get () | X | X | X | X | | | | | | X | X | X | X |
| | .set () | X | X | X | X | X | X | X | X | X | X | X | X | X |
| | .label () | X | X | X | X | X | X | X | X | X | X | X | X | X |
| | .text () | X | X | X | X | X | X | X | X | X | X | | | |
| | .instruction () | X | X | X | X | X | X | X | X | X | | | | |
| | .value () | | X | X | X | | | | | | X | | X | X |
| | .valueLabel () | | | | X | | | | | | | | X | X |
| | .getType | X | X | X | X | X | X | X | X | X | X | X | X | X |
| Array | .domainValues () | | | | X | X | X | X | X | X | | | X | X |
| | .domainLabels () | | | | X | X | X | X | X | X | | | X | X |
| | .categories () | | | | | X | X | X | X | X | | | | |
| | .categoryLabels () | | | | | X | X | X | X | X | | | | |
| | .values () | | | | | X | X | X | X | X | | | | |
| | .any() | | | | X | X | X | X | X | X | | | | |

| | | | | | | | | | | | | | | |
|---------|--------------|--|--|---|---|---|---|---|---|---|---|----------------|--|--|
| Boolean | .all() | | | | | X | X | X | X | X | | | | |
| | .none() | | | | X | X | X | X | X | X | | | | |
| | .between() | | | X | | | | | | | | X ¹ | | |
| | .isNearBy() | | | | | | | | | | X | | | |
| Double | .latitude() | | | | | | | | | | X | | | |
| | .longitude() | | | | | | | | | | X | | | |

¹ numeric list item only.

9. Loop Statements

Loop statements are used to repeat the execution of a set of statements as long as a particular condition is true. There are three types of loop statements in JScript .NET: the `while` statement, the `do while` statement and the `for` statement. The loop statements in JScript .NET are similar to the loop construct in Forsta, but there is a difference: In a loop in Forsta, a set of questions is repeated for the items in the loop list (subject to masking). In a JScript .NET loop, a set of statements is repeated until a condition is evaluated to `false`.

9.1. The while Statement

```
while ( condition )
{
    statements
}
```

The `while` statement evaluates the condition, and if the condition evaluates to `true`, executes the statements enclosed within brackets. When the condition evaluates to `false`, it transfers control to the statement following the `while` statement.

Validating Sums in a 3D Grid Using a while Loop

In the following example, the `while` statement is used in the validation code of a 3D grid to check that the sum for each row is 24:

Please make sure that the total number of hours for each day equals 24. Currently the sum for Wednesday is 25.

| Time spent | | | |
|---|---------------------------------|---------------------------------|---------------------------------|
| Please specify approximately how many hours you spent working, sleeping and on leisure last week: | | | |
| | Sleep | Work | Leisure |
| Monday | <input type="text" value="7"/> | <input type="text" value="8"/> | <input type="text" value="9"/> |
| Tuesday | <input type="text" value="7"/> | <input type="text" value="11"/> | <input type="text" value="6"/> |
| Wednesday | <input type="text" value="8"/> | <input type="text" value="9"/> | <input type="text" value="8"/> |
| Thursday | <input type="text" value="5"/> | <input type="text" value="12"/> | <input type="text" value="7"/> |
| Friday | <input type="text" value="7"/> | <input type="text" value="7"/> | <input type="text" value="10"/> |
| Saturday | <input type="text" value="12"/> | <input type="text" value="2"/> | <input type="text" value="10"/> |
| Sunday | <input type="text" value="10"/> | <input type="text" value="0"/> | <input type="text" value="14"/> |

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>>

The 3D grid contains 3 numeric list questions: `q2` (sleep), `q3` (work) and `q4` (leisure).

The following code is entered in the validation code field to evaluate the respondent's answers:

```

var codes = f("q2").domainValues(); //array with all codes
var i : int = 0;
var correctSum : Boolean = true; //Boolean variable. Will be set to false
when a sum is not correct
while(i<codes.length && correctSum)
{
  var code = codes[i]; //current code
  //calculate the sum for one row:
  var sum : int =

f("q2")[code].toNumber()+f("q3")[code].toNumber()+f("q4")[code].toNumber(
);
  if(sum != 24)
  {
    correctSum = false;
  }
  i++;
}
if(!correctSum)
{
  RaiseError();
  SetQuestionErrorMessage(LangIDs.en,"Please make sure that the total
number of hours for each day equals 24. Currently the sum for
"+f("q2")[code].label()+" is "+sum+".");
}

```

Let us see what actually happens here when the question is answered as in the picture above.

The first statement,

```
var codes = f("q2").domainValues();
```

declares an array called `codes`, which contains all the codes from the answer list of `q2`. (Since `q2`, `q3` and `q4` are all inside the same 3D grid, they share the same answer list, so we could have used any of these questions to populate the array.) We have used the default codes ("1","2","3","4","5","6","7") in this answer list, so the first statement declares an array of length 7 where the items have the following values:

```

codes[0] = "1"
codes[1] = "2"
codes[2] = "3"
codes[3] = "4"
codes[4] = "5"
codes[5] = "6"
codes[6] = "7"

```

The main advantage with using `domainValues` here is that we can do any changes we like to this answer list (including adding/removing items and changing the codes) without having to change the script.

Then in the next statement we declare a new variable `i` as an integer with the initial value 0 (zero). This will be used to index the array. After that the Boolean `correctSum` is declared with the initial value `true`.

```

var i : int = 0;
var correctSum : Boolean = true;

```

So, when we enter the `while` loop the first time, the condition will evaluate to `true` because `i` is 0, which is less than the length of the array `codes` (which is 7), and `correctSum` is `true`.

```
while(i<codes.length && correctSum)
```

With `i` equal to 0, the first statement

```
var code = codes[i];
```

will set `code` to the first code, "1".

A variable `sum` is then set in the statement

```
var sum : int =
    f("q2")[code].toNumber()+f("q3")[code].toNumber()+f("q4")[code].toNumber(
);
```

to 7+8+9, which is 24. (This is the numbers entered for Monday in the 3D grid, see screenshot above.)

The condition in the following `if` statement will evaluate to `false`, so the statement inside the curly brackets will not be executed. Consequently, `correctSum` will remain `true`:

```
if(sum != 24)
{
    correctSum = false;
}
```

At the end of the loop `i` is increased by 1:

```
i++;
```

That completes the first iteration of the `while` statement. The next time the condition in the `while` statement is evaluated, `i` is 1. 1 is less than 7, and `correctSum` is still `true`, so the condition still evaluates to `true`, and the statements are to be run a second time.

```
while(i<codes.length && correctSum)
```

With `i` equal to 1, the first statement

```
var code = codes[i];
```

will set `code` to the second code, "2".

The sum will now be 7+11+6 (Tuesday), which is 24.

```
var sum : int =
    f("q2")[code].toNumber()+f("q3")[code].toNumber()+f("q4")[code].toNumber(
);
```

The condition in the `if` statement will again evaluate to `false` (so `correctSum` will not be changed), and `i` is increased by 1 at the end of the loop:

```
if(sum != 24)
{
    correctSum = false;
}
i++;
```

The third time the condition in the `while` statement is evaluated, `i` is 2. 2 is less than 7, and `correctSum` is `true`. The condition evaluates to `true`, and the statements are to be run a third time.

```
while(i<codes.length && correctSum)
```

`i` is now 2, and `code` will be set to the third code, "3":

```
var code = codes[i];
```

The sum will now be 8+9+8 (Wednesday), which is 25.

```
var sum : int =
    f("q2")[code].toNumber()+f("q3")[code].toNumber()+f("q4")[code].toNumber(
);
```

Now the condition in the `if` statement will yield `true` because 25 is not equal to 24. So this time `correctSum` will be set to `false`.

```
if(sum != 24)
{
    correctSum = false;
}
```

Then at the end `i` is increased to 3.

```
i++;
```

The fourth time the condition in the `while` statement is evaluated, the first part will be `true` because 3 is less than 7, but `correctSum` is now `false`, so the entire expression will give `false`. So this time the execution of the loop will end.

```
while(i<codes.length && correctSum)
```

Since `correctSum` is now `false`, the condition in the following `if` statement will evaluate to `true` and the two statements inside will be executed. The statements are calling functions to identify this as an error situation, and to display an error message. We will get back to functions later, also showing a function that would make it easier to calculate the sum.

```
if(!correctSum)
{
    RaiseError();
    SetQuestionErrorMessage(LangIDs.en,"Please make sure that the total
number of hours for each day equals 24. Currently the sum for
"+f("q2")[code].label()+" is "+sum+".");
}
```

9.2. The do while Statement

The `do while` statement is similar to the `while` statement. The only difference is that the looping condition is checked at the end of the loop, instead of at the beginning. This means that the enclosed statements are executed at least once. The condition is not evaluated before after the statements are executed the first time.

```
do
{
    statements
}
while (condition);
```

This may be used for example when the condition uses variables that aren't introduced before inside the loop. In the example below the variable `correctSum` is not introduced before inside the loop.

Validating Sums in a 3D Grid Using a do while Loop

Using the same example as in *Validating Sums in a 3D Grid Using a while Loop*, this code would give the same validation of the 3D grid:

```
var codes = f("q2a").domainValues(); //array with all codes
var i : int = 0;
do
{
    var code = codes[i]; //current code
    //calculate the sum for one row:
    var sum : int =

f("q2a")[code].toNumber()+f("q3a")[code].toNumber()+f("q4a")[code].toNumb
er(); var correctSum : Boolean = (sum == 24); //false if sum not 24,
true if sum is 24
    i++;
}
while(i<codes.length && correctSum)

if(!correctSum)
{
    RaiseError();
    SetQuestionErrorMessage(LangIDs.en,"Please make sure that the total
number of hours for each day equals 24. Currently the sum for
"+f("q2a")[code].label()+" is "+sum+".");
}
```

9.3. The for Statement

The `for` statement is similar to the `while` statement in that it repeatedly executes a set of statements while a condition is `true`. The difference is that the syntax of the `for` loop includes both an initialization statement and an update statement in its syntax:

```
for (initializationStatement; condition; updateStatement)
{
  statements }


```

The initialization statement is executed at the beginning of the loop execution. Then the condition is tested, and if it is `true`, the statements enclosed within brackets are executed. If the condition is `false`, the loop is terminated and the statement following the `for` statement is executed. If the statements enclosed within the brackets of the `for` statement are executed, the update statement is also executed, and then the condition is reevaluated. So the enclosed statements and the update statement are repeatedly executed until the condition becomes `false`.

Typically the initialization statement declares an integer with an initial value, and the update statement increases or decreases this integer. The condition then usually defines the limit.

Validating Sums in a 3D Grid Using a for Loop

In the previous examples, we stopped validating sums as soon as we found the first error. Here is an example using the `for` statement where we validate all rows and provide an error message listing all rows with errors.

 Please review your responses on this page. One or more questions require further input.

Please specify approximately how many hours you spent working, sleeping and on leisure last week:

(Same as the previous, but using `do while` for validation).

Please make sure that the total number of hours for each day equals 24. Please correct for the following rows: Wednesday, Thursday, Sunday.

| | Sleep | Work | Leisure |
|-----------|---------------------------------|---------------------------------|---------------------------------|
| Monday | <input type="text" value="7"/> | <input type="text" value="8"/> | <input type="text" value="9"/> |
| Tuesday | <input type="text" value="7"/> | <input type="text" value="11"/> | <input type="text" value="6"/> |
| Wednesday | <input type="text" value="8"/> | <input type="text" value="9"/> | <input type="text" value="8"/> |
| Thursday | <input type="text" value="5"/> | <input type="text" value="12"/> | <input type="text" value="6"/> |
| Friday | <input type="text" value="7"/> | <input type="text" value="7"/> | <input type="text" value="10"/> |
| Saturday | <input type="text" value="12"/> | <input type="text" value="2"/> | <input type="text" value="10"/> |
| Sunday | <input type="text" value="10"/> | <input type="text" value="1"/> | <input type="text" value="14"/> |

The 3D grid contains 3 numeric list questions: q2 (sleep), q3 (work) and q4 (leisure). In addition we have a hidden multi question `error_rows` which is used to set which rows have incorrect sums.

The following code is entered in the validation code field to evaluate the respondent's answers:

```

var precodes = f("q2").domainValues(); //array with all precodes
var error_rows = new Array();
for(var i = 0;i<precodes.length;i++)
{
var code = precodes[i]; //current precode
//calculate the sum for the row:
var sum : int =
f("q2")[code].toNumber()+f("q3")[code].toNumber()+f("q4")[code].toNumber(
);
if (sum != 24)
error_rows.push(precodes[i]);
}
if(error_rows.length>0)
{
f("error_rows").set(error_rows);
RaiseError();
SetQuestionErrorMessage(LangIDs.en,"Please make sure that the total
number of hours for each day equals 24. Please correct for the following
rows: "+f("error_rows").categoryLabels()+".");
}

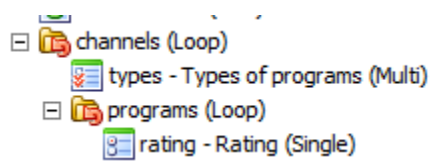
```

(The push method is used to add elements to an array (see Removing and Adding Elements on page 216 for more information)).

9.4. Loop Nodes

You can build loops in Forsta if you want to ask the same question(s) for different elements. The loops can be nested. For example, we can have a loop that iterates through some TV channels asking a question for each TV channel about what kind of programs the respondent watches on the different channels. Then, for those program types there is another loop inside the first one in which they are asked to rate those programs for each channel.

The inner loop is called *programs* and is placed inside the loop called *channels*. In the inner loop we have a single question called *rating* in which we want to ask the respondent about the program types he/she has specified in *types* (the multi question in the outer loop). So the *programs* loop uses the same list of program types as the *types* question, and the loop is filtered with a code mask based on the types question, `f("types")`. So the loop will only iterate through the program types answered for a specific channel.



In scripts inside the loops you can refer to the questions as usual, e.g. `f("types")`. This will refer to that question in the current iteration of the loop. However, if you need to refer to questions in the loops from scripts outside of the loops, you have to specify which iteration you refer to.

For example, `f("types", "1")` refers to the question called *types* in the iteration with code 1 within this loop. With nested loops (like we have here), you specify the innermost iteration first, so `f("rating", "3", "1")` refers to the *rating* question from the iteration with code "3" of the inner loop *programs*. For the outer loop *channels* it is the iteration with code "1".

9.5. The break Statement

```
break;
```

Sometimes you want to terminate the execution of the loop before it is finished (before the condition in the loop statement evaluates to `false`). Then you may use the `break` statement. The `break` statement will terminate execution of the loop and transfer control to the statement following the loop.

Validating Sums in a 3D Grid Using a for Loop and break

The example we used for the `while` loop can be programmed using a `for` loop and a `break` like this:

```
var codes = f("q2b").domainValues(); //array with all codes
for(var i : int = 0; i<codes.length; i++)
{
    var code = codes[i]; //current code
    //calculate the sum for one row:
    var sum : int =
f("q2b")[code].toNumber()+f("q3b")[code].toNumber()+f("q4b")[code].toNumber();
    if(sum != 24)
    {
        RaiseError();
        SetQuestionErrorMessage(LangIDs.en,"Please make sure that the total
number of hours for each day equals 24. Currently the sum for
"+f("q2b")[code].label()+" is "+sum+".");
        break; //terminate execution of the loop when an error is found
    }
}
```

When a row for which the sum is not equal to 24 is found, the loop will terminate without going through the last iterations.

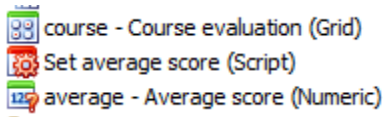
9.6. The continue Statement

```
continue;
```

The `continue` statement is similar to the `break` statement, but instead of transferring control to the statement after the loop it terminates the execution of the current iteration and skips to the next iteration of the loop (after checking the loop condition).

Calculating Averages in a Grid

We have a grid question *course*, and for reporting we want to calculate an average of the answers to the grid and store it in a hidden numeric question called *average*. The grid uses a 5 points scale (and 6 as a value for "Don't know"). Obviously, we want the average to be calculated based on the questions with answers 1-5. The "Don't know"s (6) should not be included in the calculation.



```

var codes = f("course").domainValues(); //all codes of the rows in the
grid
var sum : int = 0; //this will hold the sum of the scores
var count : int = 0; //this will hold the number of items
for(var i : int = 0;i<codes.length;i++) //iterate through the rows in
the grid
{
  var code = codes[i]; //current code
  if(f("course")[code].get() == "6") //don't know
  {
    continue; //skip directly to next iteration
  }
  //here we know that the answer isn't don't know
  sum += f("course")[code].toNumber(); //add current score to sum
  count++; //increase counter with one
}
if(count>0) //prevent division with zero
{
  f("average").set(sum/count); //calculate average
}
else
{
  f("average").set(null); //set null value if answered "don't know" on
all
}

```

If the respondent has answered "don't know" (code 6) on one of the questions, the last two assignment statements are skipped because of the `continue`, so `sum` and `count` will not be updated for "Don't know" answers.

9.7. The label Statement/Nested Loops

Sometimes you need to specify exactly where execution is to continue after a `break` or a `continue` is used. Especially when you have nested loops (loops in loops). To specify which loop you want the `break` or `continue` to apply to, you can specify a label and refer to that in your `break` or `continue` statement. The names of labels follow the same rules as variable names (see Naming on page 16 for more information).

Specifying a label:

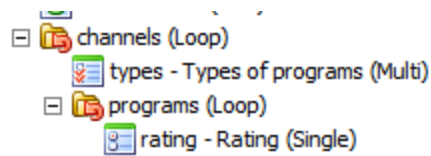
```
label:
```

Referring to a label:

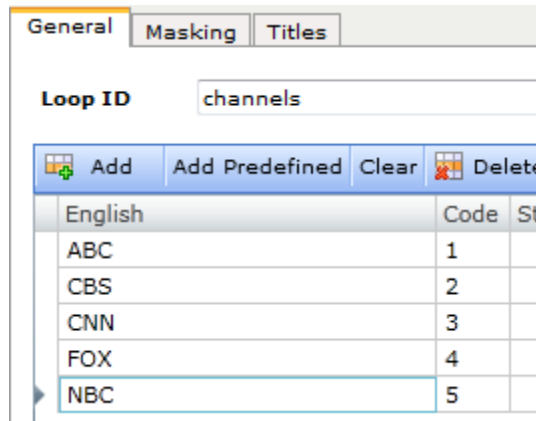
```
break label;continue label;
```

Calculating Averages on a Single Question in a Loop

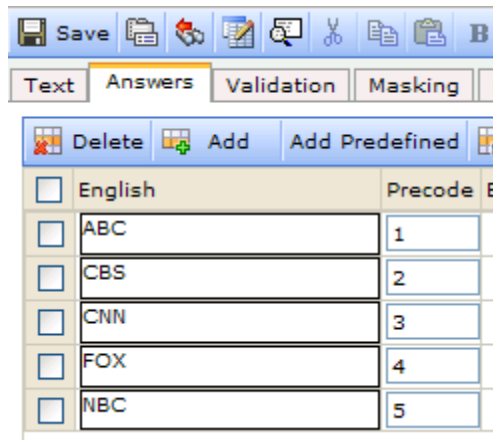
Referring back to the example with two nested loops in Forsta (see Loop Nodes on page 67 for more information), One iterating through some TV channels, and the other iterating through some types of programs:



For each channel, the respondent answer what type of programs they watch on that channel, and then give a rating for each program type for that channel in the *rating* question. Now we want to write a script that calculates an average of these ratings for each channel. Here is the list of iterations in the channels question:



We set up a hidden numeric list question `avg` with the same list:



Now, after the loop we insert a script node to calculate these averages.

- [-] channels (Loop)
 - [-] types - Types of programs (Multi)
 - [-] programs (Loop)
 - [-] rating - Rating (Single)
 - [-] Set averages in avg (Script)
 - [-] avg (Numeric List)

This script must run through all the items in the `channels` loop, and for each of them run through all the ratings given in the `programs` loop:

```

var ccodes = f("channels").domainValues(); //all codes of the channels
loop
Outer:
for(var i : int = 0;i<ccodes.length;i++) //iterate through channels
{
  var ccode = ccodes[i]; //code of current channel
  //initialize the counter and sum for this channel:
  var sum : int = 0, count : int = 0;

  //the codes of the program types for this channel:
  var pcodes = f("types",ccode).categories();
  Inner:
  for(var j : int = 0;j<pcodes.length;j++) //run through the codes in the
  programs loop
  {
    var pcode = pcodes[j]; //code of current program type
    //check rating for this program type for this channel:
    if(f("rating",pcode,ccode).get() == "6")
    {
      continue Inner; //go to next program type
    }
    sum += f("rating",pcode,ccode).toNumber(); //add score to sum
    count++; //increase counter with one
  }
  //set average score for this channel:
  if(count>0)
  {
    f("avg") [ccode].set(sum/count);
  }
  else
  {
    f("avg") [ccode].set(null);
  }
}
}

```

This example uses nested loops (loops in loops), i.e. one outer loop that iterates through the *channels* loop and one inner loop that iterates through the answers in the *programs* loop. We have used the labels `Inner` and `Outer` in the script to make sure that it is the iteration of the inner loop that is terminated with the `continue`, not the iteration of the outer loop. (We do not actually refer to the label `Outer` anywhere in the script, but we have included the label for clarity.)

Exercise 5:

Write a script that presets a grid question q2, which has a scale from 1 to 5, so that the first time the respondent comes to that question, all rows in the grid have been set to the middle value 3. Make sure that the values are not reset if the respondent reopens the questionnaire or uses the back button.

The answer is given in APPENDIX A Answers to Exercises.

10. Functions

Usually, when using scripts you reuse a lot of code. Instead of copying the entire code, you can define a function with that code and call it when you need it.

Functions combine several operations under one name. This lets you streamline your code. You can write out a set of statements and define the block of statements as a function and give it a name. Then the entire block of statements can be executed by calling the function and passing in any information the function needs. If a function is given a name that describes what it does, it will be easier to read and understand the code. It will hide details and make your scripts more modularized.

You pass information to a function by enclosing the information in parentheses after the name of the function. Pieces of information that are passed to a function are called **arguments** or **parameters**. Some functions do not take any arguments at all while others take one or more arguments. In some functions, the number of arguments depends on how you are using the function.

A function call is a statement used to invoke a function. Use the function name followed by parentheses containing the arguments, if any, to do a function call:

```
FunctionName ( p1, p2, . . . , pn )
```

You always have to use the parentheses, even if a function contains no arguments:

```
FunctionName ( )
```

A function may or may not return a value.

10.1. Built-in Functions

Let us start by looking at the functions provided in Forsta.

10.1.1. Arithmetic Functions

10.1.1.1. *Sum*

```
Sum ( arguments )
```

Sum returns the sum of its arguments. Valid argument types are numbers, strings, arrays or any kind of object. Use comma to separate the arguments.

Validating Sum on a Numeric List Question

Here is an example of a numeric list question, in which the respondents are asked to apply percentages that should sum up to 100. You can use the "Auto sum" property to have the sum calculated and displayed directly below the respondent's answers.

Your numbers add up to 130. Please make sure that the numbers add up to 100.

Please indicate the percentage of soft drink purchases your household would do on each of these soft drinks. Answer with integers between 0 and 100 and make sure that the sum is 100.

| | |
|------------------------|---------------------------------|
| 7 Up | <input type="text" value="10"/> |
| Cherry Coke | <input type="text" value="0"/> |
| Coca-Cola | <input type="text" value="25"/> |
| Coca-Cola Classic | <input type="text" value="10"/> |
| Diet Coke | <input type="text" value="25"/> |
| Dr Pepper | <input type="text" value="0"/> |
| Fanta | <input type="text" value="0"/> |
| Pepsi One | <input type="text" value="15"/> |
| Pepsi-Cola | <input type="text" value="20"/> |
| Schweppes | <input type="text" value="10"/> |
| Sprite | <input type="text" value="15"/> |
| TAB | <input type="text" value="0"/> |
| TAB Clear | <input type="text" value="0"/> |
| Wild Cherry Pepsi-Cola | <input type="text" value="0"/> |
| = | 130 |

The question id of the numeric list question is *percentage*. In properties total digits is set to 3, scale to 0, and lower and upper limit to 0 and 100, so that the system provided validation makes sure that only integers between 0 and 100 is allowed. To validate that the answer is equal to 100, you can use the **Force sum of answers** setting in the question properties, or use the following code in the validation code field of the question:

```
var sum : int = Sum(f("percentage").values());

if(sum!=100)
{
RaiseError();
SetQuestionErrorMessage(LangIDs.en, "Your numbers add up to " + sum + ".
Please make sure that the numbers add up to 100.")
}
```

Validating Sums in a 3D Grid with the Sum Function

Let us go back to the example with the validation script that checked that the respondent answered a total of 24 hours for each day (see the examples in The While Statement, The Do While Statement, and The Break Statement for details).

Please make sure that the total number of hours for each day equals 24. Currently the sum for Wednesday is 25.

Time spent

Please specify approximately how many hours you spent working, sleeping and on leisure last week:

| | Sleep | Work | Leisure |
|-----------|---------------------------------|---------------------------------|---------------------------------|
| Monday | <input type="text" value="7"/> | <input type="text" value="8"/> | <input type="text" value="9"/> |
| Tuesday | <input type="text" value="7"/> | <input type="text" value="11"/> | <input type="text" value="6"/> |
| Wednesday | <input type="text" value="8"/> | <input type="text" value="9"/> | <input type="text" value="8"/> |
| Thursday | <input type="text" value="5"/> | <input type="text" value="12"/> | <input type="text" value="7"/> |
| Friday | <input type="text" value="7"/> | <input type="text" value="7"/> | <input type="text" value="10"/> |
| Saturday | <input type="text" value="12"/> | <input type="text" value="2"/> | <input type="text" value="10"/> |
| Sunday | <input type="text" value="10"/> | <input type="text" value="0"/> | <input type="text" value="14"/> |

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>>

In the code of that example we used the expression

```
sum =
f("q2")[code].toNumber()+f("q3")[code].toNumber()+f("q4")[code].toNumber(
);
```

to add up the number of hours. Instead we could use the *Sum* function, like this

```
sum = Sum(f("q2")[code],f("q3")[code],f("q4")[code]);
```

Notice that the *Sum* function automatically converts the values to numeric, so we do not need to use the `toNumber` method.

Then the entire validation code will look like this, if we use the solution with the `while` loop:

```
var codes = f("q2").domainValues(); //array with all codes
var i : int = 0;
var correctSum : Boolean = true; //Boolean variable. Will be set to false
when a sum is not correct
while(i<codes.length && correctSum)
{
  var code = codes[i]; //current code
  //calculate the sum for one row:
  var sum : int = Sum(f("q2")[code],f("q3")[code],f("q4")[code]);
  if(sum != 24)
  {
    correctSum = false;
  }
  i++;
}
if(!correctSum)
{
  RaiseError();
  SetQuestionErrorMessage(LangIDs.en,"Please make sure that the total
number of hours for each day equals 24. Currently the sum for
"+f("q2")[code].label()+" is "+sum+".");
}
```

10.1.1.2. Count

```
Count( arguments )
```

Count returns the number of arguments. Valid argument types are numbers, strings, arrays or any kind of object. Use comma to separate the arguments. An array will be split into its elements, so used on an array Count will return the number of elements in the array.

Finding the Number of Answers on Three Multi Questions

We have three multi questions; *officesa*, *officesb* and *officesc*. This could for example be a question in an employee survey for an international company with offices all around the world, where we want to split the list of offices on three different questions on three different pages.

Offices

Which of these offices have you been in contact with?

USA

New York

Los Angeles

Chicago

Offices

Which of these offices have you been in contact with?

Europe

London

Paris

Rome

Offices

Which of these offices have you been in contact with?

Asia/Pasific

Kuala Lumpur

Singapore

Sydney

Hong Kong

If you want to find the number of items answered on all three questions combined, for example for use in a condition to ask some further question(s) only if the respondent has answered more than one office, you can use the `Count` function:

```
Count(f("officesa").categories(), f("officesb").categories(), f("officesc").categories()) > 1
```

If the respondent has picked 2 offices on *q1*, 1 office on *q2* and 3 offices on *q3*, the result of this function call will be the value 6 (2+1+3).

10.1.1.3. Average

```
Average( arguments )
```

`Average` returns the average (mean) of its arguments. Valid argument types are numbers, strings, arrays or any kind of object. Use comma to separate the arguments.

Calculating Averages on 3 Numeric List Questions in a 3D Grid

Again referring to the example with the hours and the weekdays, let us say we want to set three hidden numeric questions *sleep*, *work* and *leisure* with the daily average for each of them.

We use the `Average` function:

```
f("sleep").set(Average(f("q2").values()))
f("work").set(Average(f("q3").values()))
f("leisure").set(Average(f("q4").values()))
```

(The 3D grid consisted of three numeric list questions, *q2* for sleep, *q3* for work and *q4* for leisure). The hidden question sleep for instance, will here be set to 8 since 56/7 is 8 (see Sum on page 72 for more information).

10.1.1.4. Max and Min

```
Max( arguments )
Min( arguments )
```

`Max` returns the maximum (the largest value) of its arguments. `Min` returns the minimum (the smallest value) of its arguments. Valid argument types are numbers, strings, arrays or any kind of object. Use comma to separate the arguments.

Finding Maximum and Minimum Values on Numeric List Questions

Once again, referring to the "hours and weekdays" (see Sum on page 72 for more information), let us say we want the maximum number of work hours in the week (stored in a hidden question *maxwork*) and the minimum number of hours sleep in the week (stored in a hidden question *minsleep*):

```
f("maxwork").set(Max(f("q3").values()))
f("minsleep").set(Min(f("q2").values()))
```

In the example (see Sum on page 72 for more information), *maxwork* will get the value 12 and *minsleep* the value 5.

10.1.2. Range

Range has two alternatives:

```
InRange( arg, min, max )
```

`InRange` returns true if *arg* is within the range (*min*, *max*) (inclusive).

```
InRangeExcl( arg, min, max )
```

`InRangeExcl` returns true if *arg* is within the range (*min*, *max*) (exclusive).

Building a Condition on a Range of Codes

You may need your conditions to work for several codes within a range. For example, you may have an *age* question where this is a part of the answer list:

| English | Code | So |
|---------|------|----|
| -15 | 1 | |
| 16-20 | 2 | |
| 21-25 | 3 | |
| 26-30 | 4 | |
| 31-35 | 5 | |
| 36-40 | 6 | |
| 41-45 | 7 | |
| 46-50 | 8 | |
| 51-55 | 9 | |

If you wanted some questions to be sent only to people between the ages of 26 and 50, you could use a condition with an expression as follows:

```
f("age").toNumber() >= 4 && f("age").toNumber() <= 8
```

but in this case it will be easier to use the `InRange` function:

```
InRange(f("age"), 4, 8)
```

10.1.3. Context Information

10.1.3.1. *GetSurveyChannel*

```
GetSurveyChannel()
```

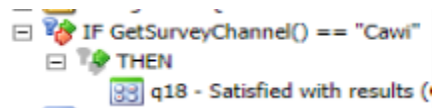
`GetSurveyChannel` is used to show which channel the survey is being executed on. A String value indicates the channel type as listed below:

| String returned | Description |
|----------------------|---|
| Capi | CAPI interview |
| Cati | CATI interview |
| Cawi | Web interview |
| RandomDataGeneration | Response is generated using Random Data Generator |
| SDK | Mobile App SDK survey |
| SelfCompletionSurvey | Self completion interview (via AskMe app) |

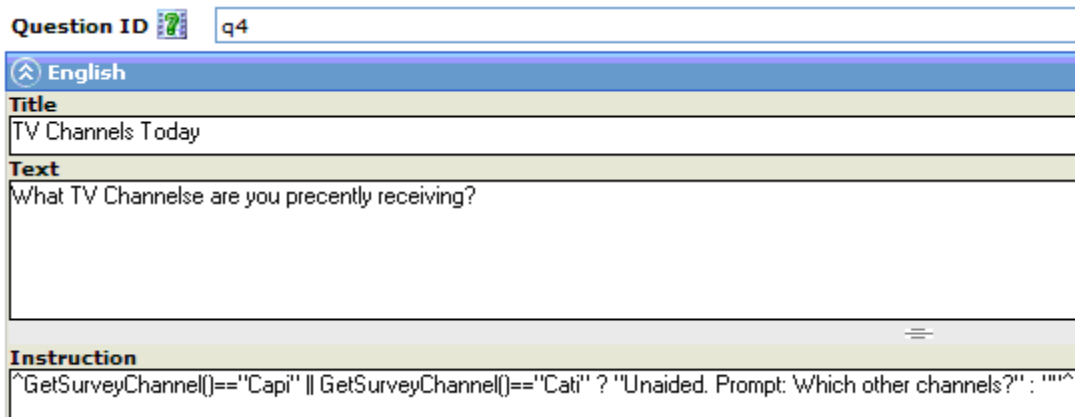
This function can for example be used to store the channel in a hidden single question `channel` by setting it in a script node:

```
f("channel").set(GetSurveyChannel())
```

Another example is to use it inside a condition to ask certain questions only to web respondents:



A third example is to use it to display certain texts only when the interview is performed by an interviewer (CAPI or CATI):



10.1.3.2. IsInProductionMode

```
IsInProductionMode()
```

IsInProductionMode() can be used to distinguish between running surveys in production mode or in quick test/external quick test/test mode. It will return one of the following values:

| | |
|-------|--|
| true | Production mode |
| false | Quick Test/External Quick Test/Test mode |

10.1.3.3. GetRenderingMode

```
GetRenderingMode()
```

GetRenderingMode() can be used to determine whether desktop rendering, one of the mobile rendering modes (touch or generic), is currently active in the survey. This function can for example be used in a condition if you would like certain questions only to be presented in the desktop version of the survey. If responsive rendering is activated, GetRenderingMode will return "responsive".

To get the mobile rendering modes (touch and generic), these modes must be active on the survey.

| | |
|------------|-----------------------------------|
| desktop | Desktop rendering (PC/Mac/tablet) |
| responsive | Responsive rendering mode |
| touch | iPhone/iPod touch/Android phones |
| generic | All other mobile phones |

If you for example want to provide some questions only to users accessing a survey through the desktop rendering, you can use the following expression in a condition, and then place those questions inside the Then branch:

```
GetRenderingMode() == "desktop"
```

10.1.3.4. GetContentType

```
GetContentType()
```

GetContentType() can be used to distinguish between surveys run as regular Web surveys or through a Flex extension using the Survey Front End extension point, such as iPhone, Android and SMS surveys. It will return one of the following values:

| | |
|------|--|
| Html | Run as a regular web survey |
| Json | Run using the Flex Survey Front End extension point using Json |
| Xml | Run using the Flex Survey Front End extension point using Xml |

10.1.3.5. *AdvancedWIFeaturesEnabled*

```
AdvancedWIFeaturesEnabled()
```

AdvancedWIFeaturesEnabled() is used to determine whether the respondent's browser supports Advanced WI Features that require client side scripts, such as sliders, drag-n-drop ranking, images instead of radio-buttons/check-boxes etc. It will return true if the respondent's browser supports the advanced WI features, or false if not. It can for example be used to display a different instruction text depending on whether or not respondents will have a question displayed with the advanced WI interface.

This function is optimistic with regards to checking whether JavaScript is turned on or off in the browser. In other words it will return true unless it is determined that JavaScript is turned off.

Note: This state can only be determined once the respondent has opened the first page of the survey. This function must therefore be executed after the first page of the survey.

Displaying different instruction if Advanced WI feature is being used

If you have a question using the drag-n-drop ranking feature, you may present two different instruction to respondents: One for respondents that have a browser supporting the drag-n-drop interface, and another one to respondents that do not have a browser supporting these. The latter will then get the question with ordinary input boxes where they can rank with numbers.

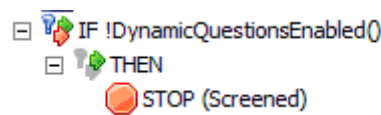
This can be done by using a ternary conditional expression with the AdvancedWIFeaturesEnabled function in the instruction text field of the questionnaire.

```
^AdvancedWIFeaturesEnabled() ? "Please rank the cars by dragging them over to the right hand side, the first indicating the one your are most likely to buy and so on" : "Please rank the cars by entering numbers in the text boxes. 1 for the car your are most likely to buy, 2 for the second most likely and so on"^^
```

10.1.3.6. *DynamicQuestionsEnabled*

```
DynamicQuestionsEnabled()
```

DynamicQuestionsEnabled() is used to determine whether the respondent's browser supports AJAX so that the "Dynamic Questions" functionality can be used (see Dynamic Questions on page 11 for more information). It will return true if the respondent's browser supports AJAX, or false if not. It can for example be used for screening respondents from a survey that have extensive usage of .this, or in a condition to provide an alternative path for respondents, if they have a browser that does not support it. Unlike "Advanced WI Features", no fallback (i.e. alternative interface) exists for this functionality.



10.1.3.7. *IsDynamicQuestionCallback*

```
IsDynamicQuestionCallback()
```

IsDynamicQuestionCallback is used to determine whether the code is currently executed during a Dynamic Question Callback, i.e. an Ajax update of one or more Dynamic Questions. This will be true if used within a question that has a trigger, when one or more of the trigger questions is updated.

10.1.3.8. *IsInlineSurveyCallback*

```
IsInlineSurveyCallback()
```

IsInlineSurveyCallback is used to determine whether the survey is currently run as an inline survey.

The screenshot shows the 'Web Options' tab in the Forsta configuration tool. It includes several sections:

- General Options:**
 - Override browser back button to behave as survey back button
 - Set focus to first control on page (requires JavaScript)
- Limited survey options:**
 - Include a link that, upon re-entry, allows respondents to continue where they left off (Use in combination with primitive ^CLINK^ "Continue link" visual component in Theme in Survey Layout)
 - Allow respondents to change their original answers
 - Allow respondents to re-enter a completed interview and change their answers
- Survey type:**
 - Open survey (Gives you a general link to the interview, which e.g. can be used as hyperlink on your website)
 - Inline survey (Generates a script tag which can be included on any web-page, to display the survey inline or as an overlay)
- Display options:**
 - Display survey to every visitor to the webpage.
- Cookie options:**
 - Dropdown menu: No cookie
 - Name: , expires in days.
- Window options:**
 - Width:
 - Show as overlay

For "regular" surveys, the response record is created when the respondent opens the first page of the survey (this is the default). However for inline surveys, the response record is created when the respondent submits the first page of the survey. This is done to reduce the amount of empty data records, since an inline survey may be placed within high volume sites where only a small percentage of the visitors will submit a response.

It is therefore not possible to use the .set() method in a script within the first page to store responses when the survey is running inline, because the data cannot be stored in the database since the database record does not yet exist. Such scripts can only be run from the second page onwards.

If you need to retrieve values from the query string using Request (see Request on page 228 for more information) and store in the database, you will have to do this on the second page. In inline mode the query string is preserved when moving from the first to the second page.

If the survey is accessed both in inline mode and as a regular survey link, you do have to treat these modes differently, and the IsInlineSurveyCallback function can be used for this. Let's say you send in a value site=1. At the start of the survey you can add this script to fetch the value when the regular survey link is opened:

```
if(Request("site")!=null &&!IsInlineSurveyCallback())
{
f("site").set(Request("site"));
}
```

Before the second page, you can insert the following script to fetch the value when the survey is inline:

```
if(Request("site")!=null &&IsInlineSurveyCallback())
{
f("site").set(Request("site"));
}
```

10.1.3.9. *CurrentForm*

```
CurrentForm()
```

`CurrentForm` is used in validation code, masking and in response piping in a question's text fields (or in functions called from validation code, masking and response piping) and returns the question ID (string) of the current question. Used inside the validation code field of one of the questions inside a 3D grid, it will give the question id of that question instead of the id of the 3D grid itself.

You can use this to write generic code that can be reused without having to change the question ID.

Note: For questions within a 3D-grid, `CurrentForm` works only in validation code scripts. For piping or other scripts within a 3D-grid the evaluation depends on the execution context, so `CurrentForm` will not function correctly.

10.1.3.10. `GetRespondentUrl`

```
GetRespondentUrl()
GetRespondentUrl(string qid)
GetRespondentUrl(string qid, params string[] loopQual)
GetRespondentUrl(string id, bool isCallBlock)
GetRespondentUrl(string id, bool isCallBlock, string parameters)
GetRespondentUrl(string id, bool isCallBlock, string parameters, params
string[] loopQual)
```

Where:

`qid` is a question id.

`id` is either a question id or a callback id.

`isCallBlock` denotes whether the id is a question id or a callback id.

`parameters` is a string to be passed into the survey in the url; the string can contain one or more parameters; where more than one parameter is being used a semi-colon should be used as a separator.

`loopQual` is only applicable when the question id exists within one or more loops and the url is being used to direct the respondent to a particular iteration.

`GetRespondentUrl` returns a URL that will allow the current interview to be entered at a specific point.

All of the parameters are optional. If they are not used the URL will, depending on the Survey Settings, take the user either to the beginning of the interview or to the last question where they left off. But when they are used, they can provide the following capabilities:

1. The respondent can be directed to the page of a particular question, and, if the question is inside one or more loops, a particular loop iteration or iterations. The interview will then continue from that point.
2. The respondent can be directed to a particular callback which, upon completion of the callback, will finish the interview.
3. The function can securely pass a text value or several text values into the start of the interview, that will then be accessible via the `UserParameters` function.

`GetRespondentUrl` can be used for example to send an email to the respondent to allow him/her to re-access the survey, or it can be presented inside the survey so that the respondent can copy it to return to the survey later.

To follow are some examples of different combinations of the optional parameters, and cases where they may be used.

In this example,

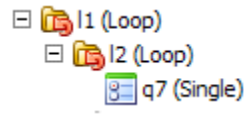
```
GetRespondentUrl("q9")
```

will give a link that when opened, will open the survey for the current respondent on the page with q9, and then continue through the interview. This could also be written as:

```
GetRespondentUrl("q9", false)
```

which will have the exact same effect.

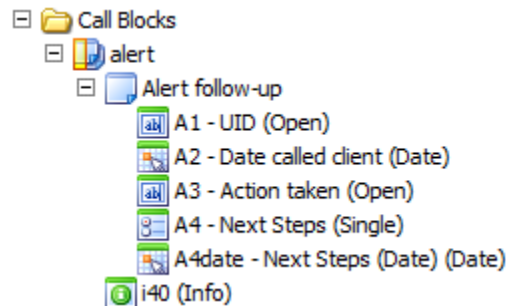
In this example,



```
GetRespondentUrl("q7", "3", "2")
```

will give a link that when opened, will open the survey for the current respondent on the page with q7 for the iteration with code "3" of I2 and the iteration with code "2" of I1.

In this example,



```
GetRespondentUrl("alert", true)
```

will give a link that when opened, will open the survey for the current respondent at the start of the call block named "alert". When the respondent finishes the callblock, after submitting the i40 info node, the interview will finish.

In this example,

```
GetRespondentUrl("q12", false, "alert=true")
```

will give a link that when opened, will open the survey for the current respondent on the page with q12, passing the encrypted parameter named alert with a value of "true" (see the UserParameters function for details regarding accessing the parameter).

In this example,

```
GetRespondentUrl("", false, "alert=true;state=red")
```

will give a link that when opened, will start from the beginning of the survey, passing the encrypted parameters named "alert" and "state" with the values of "true" and "red" (see the UserParameters function for details regarding accessing the parameter).

Note: When using GetRespondentUrl to pass several text values into the start of the interview, a semicolon ; is used as a separator. If a ; is required as part of the parameter, it must be encoded. The plus sign + must also be encoded if used as a parameter.

In this example,

```
GetRespondentUrl("cb1", true, "alert=true")
```

will give a link that when opened, will open the survey for the current respondent at the start of the call block named "cb1", passing the encrypted parameter named alert with a value of "true" (see the UserParameters function for details regarding accessing the parameter). When the respondent finishes the callblock, the interview will finish.

Note: When GetRespondentUrl is used to access a callblock, the interview_start, interview_end and interview status values are not updated during the callblock interviewing session. However, if the callblock contains a STOP node then interview_end and interview status will be updated.

Important

GetRespondentUrl should not be used to start the interview at a question contained within a callback as the interview will fail when the respondent reaches the end of the callback.

GetRespondentUrl access to a callback will cause the interview to finish when the callback is completed. It is not designed to act as a scripted way to access a callback.

GetRespondentUrl must not be used with CATI; use GetCatiRespondentUrl (see GetCatiRespondentUrl on page 119 for more information).

Building a Cryptic URL to be displayed in an info node

Even for the respondents who answer open surveys (for example pop-ups), a unique URL can be used to reenter the survey.

So if you want respondents to an open survey such as for example a pop-up survey to be able to quit in the middle of the survey, close their browser and then continue later, they just need to have the correct link with the respondent-specific parameter. They will then be able to enter their own survey with previous answers intact. Without this link, they will have to start on a new survey.

To achieve this, one solution is to display the respondent-specific URL in the interview, instructing the respondent to copy that exact URL if they want to pause and continue later, for example:

Reentry url:

If you want to leave the survey and continue later, please copy this url and use it to reenter:

http://survey.confirmit.com/wix/p88137536.aspx?__sid__=W4ZsSMbcZ8mNxd-QxewcvwJIU7eVIKwOaE5GQmKZQZ1qTNJMhBArbwHhbw3g1NDJ0

In the example above, the survey setting “Encrypt System Request Parameters” is set. If this is disabled, the link will have r=respId&s=sid instead of __sid__. GetRespondentUrl supports either option for respondent-specific URLs.

You can insert the respondent-specific URL in the text area of an info node as follows:

```
^GetRespondentUrl () ^
```

The same functions can be used to email a personal link to a respondent (see SendMail on page 150 for more information).

10.1.3.11. RedirectToRespondentUrl

```
RedirectToRespondentUrl ()
```

Calling this function will result in an internal redirect to a specific location within the survey. This is similar to Redirect(GetRespondentUrl()), but without resulting in seeing the new URL.

- If this function is used in an offline survey channel (not Web or CATI), it will be equivalent to calling Redirect(GetRespondentUrl(...), true).
- The function has the same signature as GetRespondentUrl and all its features (such as redirect to CallBlock and passing custom parameters) are supported (see GetRespondentUrl on page 82 for more information).

Note that a parameter must be passed. No parameters, that is RedirectToRespondentUrl() on its own, is not supported.

10.1.3.12. CurrentID

```
CurrentID()
```

CurrentID returns the respid of the current respondent. Note that this does not necessarily apply to CAPI interviews; CurrentID on the CAPI Console returns the CAPI local respondent ID.

Using modulus to route respondents to different parts of the questionnaire

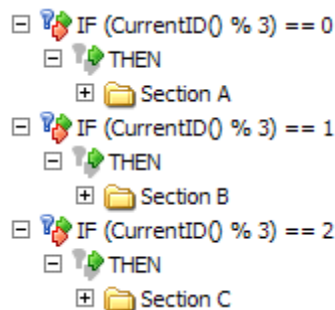
You can use the remainder of respid divided by a number x to route respondents to x different parts of the questionnaire in rotation. For example, if you have three sections A, B and C, you can create a pattern as:

respondent 1 would complete section B,
 respondent 2 would complete section C,
 respondent 3 would complete section A,
 respondent 4 would complete section B,
 respondent 5 would complete section C,
 respondent 6 would complete section A,
 etc.

This can be done by using the CurrentID() function and modulus / remainder. Depending on the result of

```
CurrentID() % 3
```

the respondent is routed to the appropriate part of the questionnaire.



See also GetResponseID() (see GetResponseId on page 93 for more information).

10.1.3.13. CurrentLang

```
CurrentLang()
```

CurrentLang returns the language code of the current language used (e.g. 9 for English). This can be used e.g. in conditions if you want different routing for different languages. You can also use it to set hidden questions to use in reporting if you want to report on the different languages.

10.1.3.14. CurrentPID

```
CurrentPID()
```

CurrentPID returns the project number of the survey (a number prefixed by p). This can for example be set in a hidden variable to be used in data exports if you export from several surveys into a common format.

10.1.3.15. CurrentLoops

```
CurrentLoops()
```

CurrentLoops is used in validation code, masking and in response piping in a question's text fields (or in functions called from validation code, masking and response piping) and returns the IDs of all loops that the current question is located in. Calling CurrentLoops() as a function returns an array of strings containing the loop IDs, with the first (or outer) loop at the start of the list. It will also return a list with one element in it so it is possible to get the loop ID with CurrentLoops()[0] or CurrentLoops().ToString().

10.1.3.16. GetRespondentValue and SetRespondentValue

Sometimes you may want to be able to modify values from the respondent list. Through the "background variable" property in survey questions, values can be fetched from the respondent list and set in the survey data. However you cannot use these to update the respondent list; it is one-way only.

One scenario where it would be beneficial to update the respondent list is if you have a survey which the respondents continuously update, and you want to keep sending new reminders to the respondents. If they change their email address in the survey, you would like the respondent list updated with the new email address so that new reminders are sent to the new email address.

```
GetRespondentValue(fieldname)
```

will return the value uploaded in the *fieldname* (string) column in the respondent list for the current respondent. If the *fieldname* does not exist, null will be returned.

```
SetRespondentValue(fieldname,value)
```

will set *fieldname* (string) in the respondent list to *value* (string) for the current respondent. If *fieldname* does not exist, nothing will happen. There are three system fields that can not be updated: *rid*, *sid* and *rowguid*. Attempting to update any of these will give a script error.

Calculating the number of days elapsed since a record was uploaded

The following script works out the number of days passed since a record was uploaded in the respondents database.

```
f('UploadDate').set(GetRespondentValue("CreatedDate"))
//where UploadDate is a date type question

var created = new Date(GetRespondentValue('CreatedDate'));
var d = created.getDate();
var m = created.getMonth() + 1;
var y = created.getFullYear();
var start : DateTime = new DateTime(y,m,d);
var now = new Date();
var end : DateTime = new DateTime(now.getFullYear(), now.getMonth() + 1,
now.getDate());
var span : TimeSpan = end - start;
var days = span.TotalDays;
f('nodays').set(days)
```

10.1.3.17. InterviewStart, InterviewEnd, SetInterviewStart and SetInterviewEnd

When a respondent opens a Forsta survey, an SQL variable called *interview_start* is set with the exact time and date. When the respondent reaches a stop node or the end of the interview, an SQL variable called *interview_end* is set. These variables can be used in reporting and are included in data exports. Reporting on time series is for example based on *interview_start*.

Note: If a respondent re-enters the interview, *interview_start* is re-set, and similarly, if she or he reaches a stop node or the end of the interview after re-entering a completed interview, the variable *interview_end* is also re-set.

Two functions can be used to get the values of these timestamps in scripts

```
InterviewStart()
```

InterviewStart returns the respondent's interview start time.

```
SetInterviewStart(date)
```

SetInterviewStart sets the respondent's interview. The parameter *date* is optional. If it is not included, *interview_start* will be set to current server time and date. If *date* is included, it can either be a JScript.NET Date object or a .NET DateTime object.

```
InterviewEnd()
```

InterviewEnd returns the respondent's interview end time.

We will return to examples on how to use these functions later in the documentation (see *InterviewStart* and *InterviewEnd* on page 188 for more information) where they are used together with the Date object.

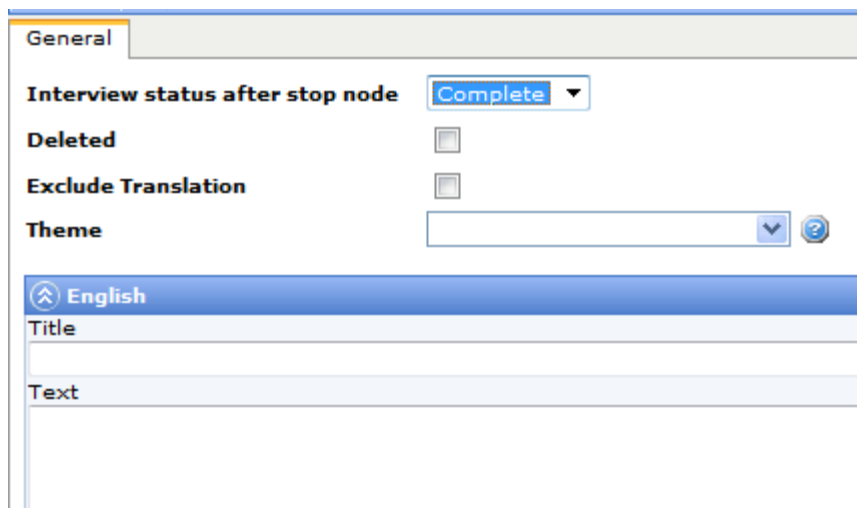
There are also two functions available to set these timestamps. `SetInterviewStart` can be used for example when you want interview start to be set after the screening questions of a survey instead of at the beginning of the survey, and `SetInterviewEnd` can be used to set the interview end timestamp when a stop node is never reached because of a redirect at the end of the survey (see `Redirect` on page 156 for more information).

`SetInterviewStart()` - sets the respondent's interview start time to current server time and date.

`SetInterviewEnd()` - sets the respondent's interview end time to current server time and date.

10.1.3.18. *GetStatus and SetStatus*

When the respondent reaches a stop node, *status* is set according to the status defined for that stop node. When the respondent reaches the end of the interview, *status* is set to "complete".



Currently Forsta recognizes the following status settings:

| Status | Code |
|------------|-----------|
| Complete | complete |
| Screened | screened |
| Quota Full | quotafull |
| Error | error |

If *status* is `null`, it means that the interview is incomplete. The "error" status is set if the interview terminates because of an error in a script.

There are two functions that operate on status:

`GetStatus()`

`GetStatus` returns the current interview status.

`SetStatus(status)`

`SetStatus` can be used in a script to set the interview status, e.g. if you want respondents who have answered the questionnaire up to a certain point to count as complete interviews, even though they do not answer all the remaining questions. `status` is a string with the status value you want to set, i.e. "complete", "screened" or "quotafull". `SetStatus` is very often used in combination with the Redirect function (see Redirect on page 156 for more information).

The `SetStatus` function will just set the interview status, not the `interview_end` time stamp. `interview_end` is just set when the end of the interview or a stop node is reached.

Note: The use of redirects, quotas, status-screened or other solutions with the principle purpose of avoiding the survey "complete" status being reached by a respondent having offered a reasonable amount of responses, is prohibited and will be regarded as an attempt to avoid transaction fee obligations to Forsta.

Setting Interview Status Before End of Survey

If you want to set the status of the interview to "complete" before the last questions (which e.g. could be questions about personal details on where to send incentives etc.), you can include a script node with the following code where you want the status to be set:

```
SetStatus("complete");
```

If you do this, even respondents that do not answer those last questions with personal details will still count as completes for reporting etc.

10.1.3.19. Forward

```
Forward()
```

`Forward` returns `true` if the respondent is moving forward through the questionnaire (has clicked on the forward button), and `false` if the respondent is moving backward (has clicked on the back button). This can be used for code that you only want to execute when the respondent moves in a particular direction.

There is no point in using this function in validation code, because validation code is only run when the respondent moves forward in the questionnaire.

10.1.3.20. IsInRdgMode

```
IsInRdgMode()
```

`IsInRdgMode` returns `true` if the scripts are executed during a Random Data Generator run, `false` otherwise. You may use this function to prevent some script code from being run when testing the surveys with the RDG.

10.1.3.21. SetRandomCategories

```
SetRandomCategories(number, qid)
```

`SetRandomCategories` can be used to randomly switch on the specified number of categories of the specified question ID. Typically this would be used to randomly turn on number categories of a specific hidden qid. In the example below, two categories of the hidden question q2 would be switched on.

```
SetRandomCategories(2, 'q2')
```

This function is only applicable for standard multi questions. It does not apply to multi questions with the Capture Order property set.

(see Random on page 195 for more information)

10.1.3.22. TerminateLoop

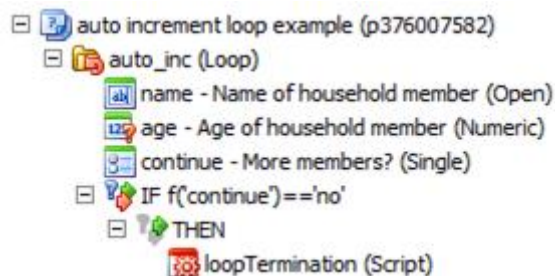
```
TerminateLoop()
```

`TerminateLoop` is used inside of auto-increment loops. Auto-increment loops are only available for optimized database projects. A `TerminateLoop` call is required to stop further iterations of the loop being created. Without this, the loop will continuously create new loop iterations, and the respondent will never be able to finish the loop.

A script node containing a `TerminateLoop` function call is a mandatory requirement for an auto-increment loop because an auto increment loop iteration requires some interactive content for the respondent (question, info node etc.). If the loop contains nothing interactive, the interview will be terminated with an error status and an error notification will be sent via email.

Note that the `TerminateLoop` function call must be placed at the end of the loop to have any effect.

In the following example the `loopTermination` script node contains the single function call `TerminateLoop` and is used to prevent further iterations of the auto-increment loop based on the answer to the "continue" question.



`TerminateLoop` calls are only applicable to auto-increment loops; they are not applicable to, and have no effect on loops based on normal answer lists or those based on table lookups.

10.1.3.23. *IsAccessibleMode and SetAccessibleMode*

```
IsAccessibleMode()
```

`IsAccessibleMode` returns true if the current Survey Layout Theme is a theme in Accessible mode. The function is useful if you some respondents are responding in accessible mode and some not, and you would like different content in the two modes.

```
SetAccessibleMode(bool)
```

`SetAccessibleMode` can be used to either set the survey in accessible mode (i.e. switch to a Survey Layout Theme that is set as Accessible):

```
SetAccessibleMode(true)
```

or to set the survey not to be in accessible mode (i.e. switch to a Survey Layout Theme that is not set as Accessible):

```
SetAccessibleMode(false)
```

10.1.3.24. *UserParameters*

```
UserParameters[paramName]
```

`UserParameters` can be used to access texts that are passed to the start of the interview using the `GetRespondentURL()` function.

In this example,

```
UserParameters["alert"]
```

will give the value that the parameter named "alert" was set to when `GetRespondentUrl` was used to access the survey.

Note: `UserParameters` can only be used on the first page that the respondent is directed to via `GetRespondentUrl`. `UserParmeters` will return empty values if used later in the survey.

To access all parameter information `UserParameters.Keys` can be used. The `Keys` function returns a `NameValueCollection` which can be iterated through.

In this example, a script function "ShowKeys()" has been created to display all parameter information:

```
function ShowKeys()
{
  var str = "";
  for(var x = new Enumerator(UserParameters.Keys); !x.atEnd();
  x.moveNext())
  {
    var y = x.item();
    str += "<br />" + y + " = " + UserParameters(y);
  }
  return str;
}
```

When piping the result of this function, for example using ^ShowKeys() in an interview initiated via GetRespondentUrl("", false, "alert=true;state=red") the following will be displayed:



alert = true
state = red

Note: Survey links in hitlists can have parameters added to the link. Two functions are available to receive the value from the link; UserParameters and Request (see Request on page 228 for more information). The function you must use depends on the link's "Link type" setting. UserParameters will only be able to retrieve the value from the hitlist link when "Link type" in the Hitlist Field Properties page is set to "Encrypted URL parameters". Refer to the separate Reportal User Guide for further details.

10.1.3.25. GetDeviceInfo

```
GetDeviceInfo()
```

GetDeviceInfo() is a scripting function that returns an object containing a variety of information regarding the type of device that is being used by the respondent.

Note: The information returned is dependent on the rendering modes enabled for the survey. For example, if mobile rendering channel is not enabled in Survey Settings then IsTablet will return False.

The object returned contains the properties described in the following table:

| Property Name | Type | Value | Meaning |
|---------------|---------|---------------|--|
| IsGeneric | Boolean | true or false | Returns true if the respondent is using a generic mobile device. |
| IsDesktop | Boolean | true or false | Returns true if the respondent is using a desktop device. |
| IsTouch | Boolean | true or false | Returns true if the respondent is using a touch mobile phone device, for example an iPhone or Android phone (not iPad; this returns false - see the Important note below). |
| IsTablet | Boolean | true or false | Returns true if the respondent is using a tablet device. Note that iPad returns false. |
| IsMobile | Boolean | true or false | Returns true if the respondent is using a mobile device (phone or tablet). Note that iPad returns false. |

| | | | |
|-----------------------|--------|-------------------------------|--|
| ScreenResolution | String | "600 400" or "0 0" | The screen resolution of the device being used width height or "0 0" if unknown. |
| DeviceType | String | "Desktop", "Touch", "Generic" | The device type in use. |
| DeviceType.toString() | String | "Desktop", "Touch", "Generic" | The device type in use. |

For example, an info node containing the following:

```
The results of the function calls are:
GetDeviceInfo().IsDesktop: ^GetDeviceInfo().IsDesktop^
GetDeviceInfo().IsTouch: ^GetDeviceInfo().IsTouch^
GetDeviceInfo().IsTablet: ^GetDeviceInfo().IsTablet^
GetDeviceInfo().IsGeneric: ^GetDeviceInfo().IsGeneric^
GetDeviceInfo().IsMobile: ^GetDeviceInfo().IsMobile^
GetDeviceInfo().ScreenResolution: ^GetDeviceInfo().ScreenResolution^
GetDeviceInfo().DeviceType: ^GetDeviceInfo().DeviceType^
GetDeviceInfo().DeviceType.toString():
^GetDeviceInfo().DeviceType.toString()^
```

Will return the following information on an iPhone 4:



Note: ScreenResolution will only be available if Smartphone rendering mode is enabled and the device is either a touch or tablet device.

Note: The definition of "Tablet" is a device with a user agent string conforming to the UserAgentRegExTouchDevice expression from System Configuration that also has at least one screen dimension exceeding 650px.

When only Desktop mode is enabled, the screen resolution check is not performed so IsTablet will always return false.

Important

Screen dimension is often considered to be the actual screen resolution that is advertised on a phone's specification sheet (i.e. the screen.width and screen.height * the device pixel ratio). If you are using and relying on the GetDeviceInfo().ScreenResolution information in your survey, be aware that Forsta uses the viewport's width and height (that is window.innerWidth and window.innerHeight). Forsta also uses the CSS Interpretation (the resolution / the device pixel ratio) divided again by the device pixel ratio. These are the numbers that are returned for GetDeviceInfo().ScreenResolution, and the numbers used to determine tablet.

Important

Be aware that although iPad is classified as a tablet device, iPad is included in the desktop regex (the `UserAgentRegExDesktop` expression from System Configuration) that is configured for Forsta. Therefore if a respondent is taking a survey on an iPad device, `IsTablet` and `IsTouch` will never return true; it only gets as far as the first check (the user agent string) and returns false.

10.1.3.26. GetQuestionIds

`GetQuestionIds` is used to return a string array of question IDs based on specific filters provided.

```
GetQuestionIds(questionTypes: String[], variableTypes: String[], loopId: String)
GetQuestionIds(includeInteractiveQuestions: Boolean,
includeNonInteractiveQuestions: Boolean, loopId: String)
```

Where:

`questionTypes` is a string array that filters and lists questions which are of a specific type only. The types are (case insensitive): "single", "multi", "grid", "ranking", "open text list", "numeric list", "open", "numeric", "date", "geolocation", "imageupload", "multigrid" and "3dgrid".

`variableTypes` is a string array which filters and lists questions which are of a variable type, the types are (case insensitive): "normal", "panelvisible", "hidden", "background", "recoded" and "recoding".

`loopId` filters and lists questions inside the specified loop only (not recursive).

`includeInteractiveQuestions` if set true will filter and list all questions that have normal or panel visible variable types.

`includeNonInteractiveQuestions` if set true will filter and list all questions that have hidden, background, recoded and recoding variable types.

Note that only root nodes of multigrids and 3dgrids are listed. It is possible to get title, text and instruction of a multigrid or a 3dgrid using `f(g1).text()` or `.label()` or `.instruction()`.

In this example,

```
GetQuestionIds(true, false)
```

will return a string array of all interactive questions in the survey.

In this example,

```
var questionTypesIncluded : String[] = ["open", "numeric"];
f("myQuestions").set(GetQuestionIds(questionTypesIncluded).toString());
```

will set the "myQuestions" answer to be a comma-separated list of all open text and numeric questions in the survey.

10.1.3.27. Get3DGridQuestionIds

`Get3DGridQuestionIds` is used to return a string array of the questions inside a specific 3DGrid, and will also return the row question ids of a multigrid when the multigrid id is used as the function argument.

```
Get3DGridQuestionIds(gridId: String)
```

Where:

`gridId` is the question ID of a 3Dgrid.

In this example,

```
Get3DGridQuestionIds("g1").toString()
```

will return a comma-separated list of all question IDs inside the 3DGrid "g1".

As a Multigrid object is a transposed 3D Grid, this function can also be used to retrieve the Question (row) ids of a multigrid.

Note: When the Multigrid or 3D Grid contains an Other - Specify answer option then the form name will be returned in the array as the first element.

10.1.3.28. *GetSurveyPackageVersion*

```
GetSurveyPackageVersion()
```

The `GetSurveyPackageVersion` function can be used to return the internal survey package number for the survey currently being used. This information can be useful when ensuring that a specific version of the survey is being used.

10.1.3.29. *GetCompanyId*

```
GetCompanyId()
```

`GetCompanyId` can be used to get the ID of the company that this survey belongs to. The `CompanyId` is an int.

10.1.3.30. *GetSurveyName*

```
GetSurveyName()
```

`GetSurveyName` can be used to get the name of the current survey, as a string value.

10.1.3.31. *GetResponseId*

```
GetResponseId()
```

This gives the response ID of the current interview record. Use example: The text below could be added to a text field.

The Response ID allocated to this interview is: `^GetResponseId()`

This function can also be used in scripting.

See also `CurrentID()` (see `CurrentID` on page 84 for more information).

10.1.3.32. *GetLanguageCodes*

```
GetLanguageCodes()
```

`GetLanguageCodes()` can be used to return a set of language IDs that exist for the current survey. This can be used to check if a specific language code/s is valid in a survey, or it can be used as a mask on a question, based on the available languages. In the example below the function is used to return a set of available languages, then based on the language codes and the answer codes, the answer list will be filtered to only display the languages available in this survey.

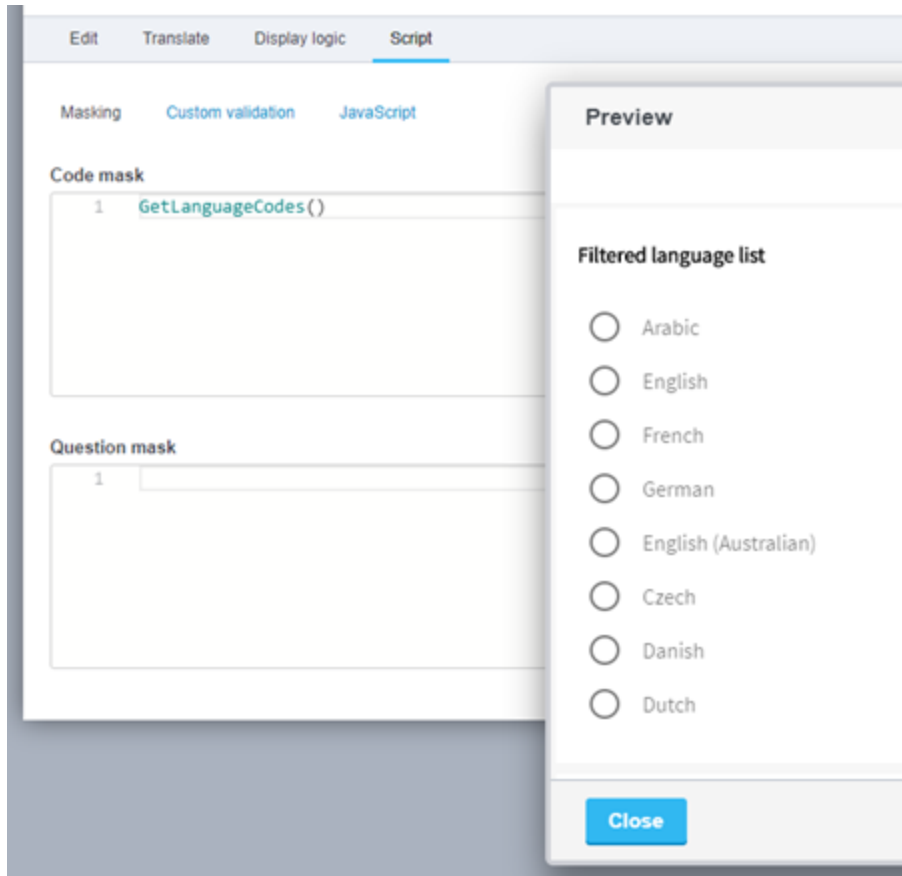


Figure 1 Example of the `GetLanguageCodes` function in use

10.1.3.33. *FormExists*

```
FormExists(string qid)
```

`FormExists()` is used to check if a specific form exists in the current survey. The function returns true if the form exists in the survey, false if it does not. For example the script below checks if q1 exists:

```
var qid = "q1";
var questionExists = FormExists(qid);
```

This can be used in scripting to ensure that a form actually exists, before referencing it.

10.1.4. Browser Information

10.1.4.1. *BrowserType*, *BrowserVersion* and *trapBrowser*

```
BrowserType()
```

`BrowserType` returns the browser type (e.g. "IE" for Internet Explorer), as detected by the `MSWC.BrowserType` component.

```
BrowserVersion()
```

`BrowserVersion` returns the browser version (e.g. "6.0"), as detected by the `MSWC.BrowserType` component.

You can use these two functions to set hidden variables to report on what browser versions your respondents use:

Recording the Respondent's Browser Type and Version

To set browser type and version in the hidden open text questions *browsertype* and *browserversion* you can use this code in a script node:

```
f("browsertype").set(BrowserType());
f("browserversion").set(BrowserVersion());
```

trapBrowser can be used to set browser type and browser version as a combined string into a question:

```
trapBrowser(qID)
```

qID is the question ID of the opentext question in which the browser type and browser version is to be stored.

10.1.4.2. RequestIP

```
RequestIP()
```

Returns the IP address of the respondent as a string on quad IP form. This can for example be used to set the IP address of a respondent in an open text question.

Note: Recording the respondents' IP addresses may be in conflict with respondents' privacy. Responsibility for ensuring respondents' privacy resides with the Forsta clients. Forsta recommends following ESOMAR guidelines, see www.esomar.org.

If you have an open survey, but want to limit the respondents from answering more than once, you might want to record the IP address and remove responses from repeat IP addresses. However, this probably will not give the desired effect, because:

- respondents inside a firewall will have the same IP address
- internet providers may use dynamic IP addresses

So to make sure that each respondent answers only once, the best option is to upload a respondent list and email links with r and s, or to upload username and password and use a login page in the survey.

One useful way of using `RequestIP` is to use it in combination with the `IsNet` function to screen respondents from a particular domain (see `IsNet` on page 150 for more information).

10.1.5. Ranking Questions and Capture Order Multis

The functions described in this section can be used on ranking questions and multi questions with the "Capture Order" property set. These questions will, for each answer list item, store an integer which represents the rank it was given (for example ranked as number 1) or in which order it was selected (selected 1st). A few functions are provided to easily retrieve the element that was selected first etc.

| Properties | |
|-----------------------|--------------------------|
| Multi Question - (q9) | |
| General | Advanced WI Features |
| List rows | <input type="text"/> |
| List columns | <input type="text"/> |
| Field width | <input type="text"/> |
| Other box rows | <input type="text"/> |
| Other box columns | <input type="text"/> |
| Capture Order | <input type="checkbox"/> |

Note: The Capture Order property is only available in surveys using the Optimized database.

10.1.5.1. First

This function is used to return the first category selected for multi choice questions with the capture order property, or the category ranked as 1st for a ranking question.

```
First(qid)
```

First returns the code or label, depending on the context, of the first selected or ranked as number 1 answer category for the specified question ID qid. Label will be returned in text piping mode (within ^s), code elsewhere.

This function can only be used on ranking questions and multi's that have the capture order property enabled. It is not applicable to other multis.

Question ID i2

English

Title
TV Channels Today

Text
The first channel selected was ^First('channels')^.

Instruction

What TV channels are you presently receiving?

- BBC1
- BBC2
- ITV1
- Channel 4
- Channel 5
- Don't know



If these responses were given in the order ITV1, BBC1, Channel 5, we would get the following result from using First():

The first channel selected was ITV1.



10.1.5.2. Nth

This function returns the nth category selected for a multi choice question with the capture order property, or the category ranked as the nth for a ranking question.

```
Nth(qid, position)
```

Nth returns the code or label, depending on the context, of the answer category in the position specified for the specified question ID. Label will be returned in text piping mode (within ^s), code elsewhere.

Nth("q1", 1) will return the same value as First("q1"). This function can only be used on ranking questions or multi's that have the capture order property enabled. It is not applicable to other multi's.

What TV channels are you presently receiving?

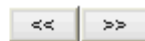
- BBC1
- BBC2
- ITV1
- Channel 4
- Channel 5
- Don't know



| | |
|--|----|
| Question ID | i3 |
| English | |
| Title | |
| TV Channels Today | |
| Text | |
| The first channel selected was ^Nth('channels',1)^. The second channel selected was ^Nth('channels',2)^. The third channel selected was ^Nth('channels',3)^. | |
| Instruction | |
| | |

If these responses were given in the order ITV1, BBC1, Channel 5, we would get the following result by using Nth():

The first channel selected was ITV1.
 The second channel selected was BBC1.
 The third channel selected was Channel 5.



10.1.5.3. AnswerOrder

This function is used to return an array of codes in the order selected for a multi choice question, or in the order ranked for a ranking question.

```
AnswerOrder(qid)
```

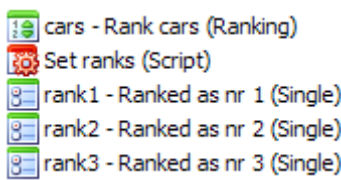
AnswerOrder returns the codes of the answers supplied in the order they were selected or ranked for the specified question ID. The primary purpose of this function is to make it easy for users to retrieve the selected answer codes without having to use the Nth() function and loop through the answer list multiple times, which would result in poor script and server performance in the event of a very long answer list.

This function can only be used on ranking questions or multi's that have the capture order property enabled, it is not applicable to other multis.

10.1.5.4. Setting Variables for Nth Mentioned / Ranked for Reporting Purposes

If you have a ranking question or a capture order multi, you will easily be able to report on which ranks/order of mention each answer got. However, if you want to report on answers per rank/order of mention, you will save some recoding work by creating a set of hidden single variables for each rank/order of mention, that have the same answer list as the multi.

In this example we have a question "cars", in which the respondents are asked to rank up to three of their favorite cars. The three hidden single questions rank1, rank2 and rank3, are set up with the same answer list as the multi, and will be used to store the car selected as number 1, 2 and 3.



The following script will set the single questions based on the responses to the ranking question:

```
var ordered = AnswerOrder("cars");
for(var i=0;i<ordered.length;i++)
{
  f("rank"+(i+1)).set(ordered[i]);
}
```

10.1.6. Table Lookup Specific Functions

10.1.6.1. GetDBCColumnValue

This is a survey engine scripting function used to retrieve data from an additional column or columns associated with a specific table inside of a table lookup list.

```
GetDBCColumnValue(schemaID, tableID, keyID, additionalColumnName,
[languageID])
```

where:

schemaID is the ID of the schema in database designer.

tableID is the ID of the table.

keyID (string) is the ID of the value being searched on (ID row from the contents of the table).

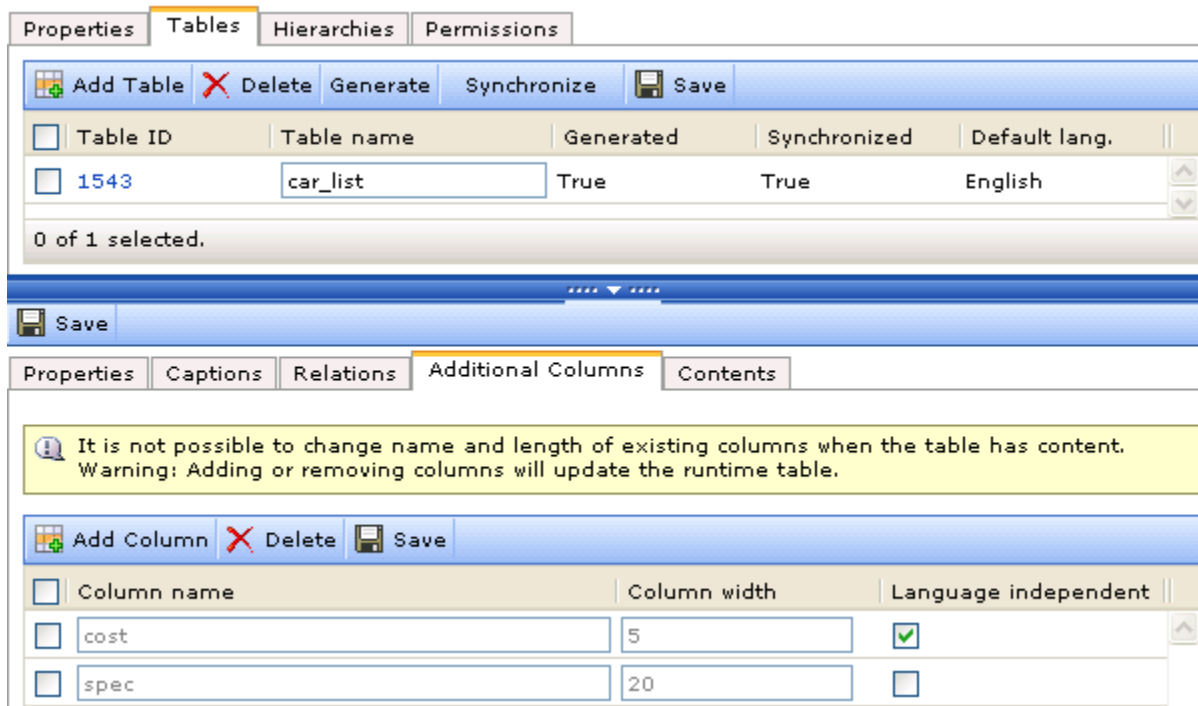
additionalColumnName is the name of the column that the data is to be pulled from.

[languageID] is the ID of the language to be retrieved from. This is optional; if not specified it uses the respondent's language for this survey.

Note: The schema and table IDs being referenced must be part of the survey, either as an answer list or loop list. If a table is referenced that is not used in the survey, the function will fail at run-time.

This function can be used to retrieve values from additional columns that are associated with answers for a table lookup list defined within database designer. For example a table lookup list may be defined in the following way:

The database schema "Basic_Cars" (schema ID 805) contains table "car_list" (table ID 1543) with a list of cars, each containing their own unique string key value. Additionally there are 2 columns "cost" and "spec" containing background information relating to the specific cars.



During the survey, the author would like to pipe in the answer to "cost" and store the value of "spec" in a hidden question. If table lookup question named car_owned is based on this table lookup as follows:

| Text | Answers | Validation | Masking | Preview | Results | L. |
|--------------------|------------|------------|---------|---------|---------|----|
| Schema name | Basic_Cars | | | | | |
| Table | car_list | | | | | |

Piping in the value of the cost of the selected car can be achieved using the following syntax:

```
^GetDBCColumnValue(805, 1543, f('car_owned').get(), 'cost')^
```

as shown here:

| | |
|-------------|--|
| Question ID | <input type="text" value="i2"/> |
| English | |
| Title | <input type="text"/> |
| Text | The cost of this car is: ^GetDBColumnValue(805, 1543, f('car_owned').get(), 'cost')^ |

Similarly, if the value for spec for the English language (language ID is 9) is to be stored in the hidden question c_spec, the following script syntax can be used:

```
f('c_spec').set(GetDBColumnValue(805, 1543, f('car_owned').get(), 'spec', 9))
```

If the keyID value is supplied explicitly, this must be contained within quotes as this is a string value. For example, to store the value of keyed 7, the following syntax can be used:

```
f('c_spec').set(GetDBColumnValue(805, 1543, '7', 'spec', 9))
```

Note: The GetDBColumnValue() function is not executed during a Random Data Generator run. In this case the value returned will be empty.

Note: The GetAdditionalColumnValue method is described here (see GetAdditionalColumnValue on page 46 for more information).

10.1.7. Offline Mobile App Specific Functions - CAPI and AskMe App

CAPI (Computer-Assisted Personal Interviewing) and AskMe App (Self-Completion) are Forsta add-ons.

CAPI App is designed for face-to-face interviewer led survey intercepts using Android, iOS or Windows devices.

AskMe App is designed for self-complete where the respondent completes the surveys on their own personal device. Supported platforms are Android and iOS.

For more information on specific platform support for CAPI and AskMe App, refer to the Forsta System Requirements document on Forsta.com

Note: The JavaScript Survey Engine must be enabled to use these functions. To enable this, check the "Use JavaScript scripting engine" survey setting.

10.1.7.1. CAPI and AskMe App Shared Functions

The functions described under this function apply to both CAPI and the AskMe App.

10.1.7.1.1. GetDeviceUniqueld

Return the unique ID for the device being used. Note that the identifier is retained/persisted even if the app is uninstalled.

```
GetDeviceUniqueId()
```

Alternatively, see GetOfflineInfo() for related information.

10.1.7.1.2. GetOfflineInfo

Use GetOfflineInfo() function, to access app and device information:

- **AppVersion** returns the application version in use.
- **BatteryLevel** returns the battery level in the device.
- **DeviceLanguage** returns the language code as exposed by the operating system (e.g. "fr").

- **DeviceLanguageId** returns the Forsta language code determined by the device locale (e.g. fr-be = 2060 French Belgium). Note that this is the derived Forsta language code and may not be the language set for a survey if the survey does not contain the same language. To determine if the survey contains the same language, you are recommended to use `CurrentLang()` to determine if the target device language is supported by the current survey.
- **DeviceLocale** returns the device country code exposed by the operating system (e.g. "be").
- **DeviceModel** - returns the model information exposed by the operating system.
- **DeviceOs** returns the operating system the device is using.
- **DeviceOsVersion** returns the operating system version.
- **DeviceUniqueId** returns the device's unique id code.
- **DeviceName** returns the name of the device (if exposed by the operating system).

Examples of use:

```
var lvl = GetOfflineInfo().AppVersion
var lvl = GetOfflineInfo().DeviceOs
var lvl = GetOfflineInfo().DeviceOsVersion
var lvl = GetOfflineInfo().BatteryLevel
var lvl = GetOfflineInfo().DeviceModel
var lvl = GetOfflineInfo().DeviceUniqueId
var lvl = GetOfflineInfo().DeviceName
```

10.1.7.1.3. GetSurveyDeviceVariable, SetSurveyDeviceVariable, GetUserDeviceVariable and SetUserDeviceVariable

AskMe and the CAPI app support the ability to write to and read from local storage on the device, either in the scope of the current survey, or the same user. These functions allow data to be stored within the app for future reference, which can be very useful for preventing re-asking questions or for building workflows between respondents/interviews or surveys. To access this information there are four scripting functions:

```
SetSurveyDeviceVariable()
GetSurveyDeviceVariable()
SetUserDeviceVariable()
GetUserDeviceVariable()
```

`SetUserDeviceVariable` is scoped to the same user but can share between surveys. This can be used for example, to store information relevant to the currently logged in CAPI interviewer.

`SetSurveyDeviceVariable` scope is local to the same survey only, shared between respondents. This can be used for example, to track a counter for every completed survey in AskMe.

To clear a device variable, set the value to null. Example:

```
SetSurveyDeviceVariable("diaryIteration", null);
```

`GetUserDeviceVariable` and `GetSurveyDeviceVariable` will return null if key is not found.

Example usage

Here we are setting/getting a counter for the survey local variable (just referencing the value of QID q1):

```
SetSurveyDeviceVariable("diaryIteration", f('q1'));
GetSurveyDeviceVariable('diaryIteration')
```

And here we are setting/getting the user's name from a user-level local variable (just referencing the value of QID fullname):

```
SetUserDeviceVariable("AskMeUsername", f('fullName'));
GetUserDeviceVariable('AskMeUsername')
```

10.1.7.1.4. Background Audio Capture

AskMe and CAPI provide the ability to record audio responses (see the separate Survey Designer User Guide for more information on adding these question types). However, there may be situations where you would like to record for longer durations, or record while the interview continues. For these situations a script method to trigger when to start and end an audio recording is available. A survey can contain more than one audio capture question, allowing audio recording throughout a survey, possibly covering multiple sections throughout an interview.

Note: You cannot set the value for an Audio Capture question.

startAudioCapture

Starts the audio recording.

```
f(qID).startAudioCapture()
```

Where qID is an audio capture question contained anywhere within the survey (it is recommend to set this as hidden).

Note: If this is the first time audio recordings have been initiated by the application on the device, the user may be prompted to allow access to the microphone. This could be confusing to the user as it may not be obvious why this is being requested. It may therefore be advantageous to include an Information node to explain what is happening and why.

stopAudioCapture

Stops the audio recording.

```
f(qID).stopAudioCapture()
```

The audio recording will be saved to the audio capture question referenced by qID.

Note that the following conditions will also cause the recording to be stopped:

- If the survey is closed (postponed, canceled, etc).
- If another audio recording is initiated either via startAudioCapture or a visible audio (or video) capture question.
- When the Max property set for the audio capture question (qID) has been reached.

Note: You cannot set the value for an Audio Capture question, and the Min property will be ignored.

10.1.7.1.5. openVideoInApp

Function to play a video using the device built-in video player triggered by a button or other event:

```
openVideoInApp()
```

Example question text HTML source:

```
<a onclick="openVideoInApp('/isa/BDJPDAVIOEQJR/p5165/demo.mp4');return false;">Play Video</a>
```

Alternatively, videos can be presented using the <video> HTML tag:

```
<video playsinline width="100%" controls preload="none">
  <source src="/isa/BDJPDAVIOEQJR/p5165/demo.mp4" type="video/mp4" />
</video>
```

Video files can be added to the File Library making them available for offline viewing.

Device specific behavior for playsinline option (e.g. within same survey view):

- iPhone: always plays fullscreen regardless (inline not supported)
- iPad: plays inline
- Android (phone or tablet): plays inline if playsinline property provided.

10.1.7.1.6. openAudioInApp

This function plays an audio file:

```
openAudioInApp(url, openExternalPlayer)
```

where:

- url is the file library path to the audio file.
- openExternalPlayer is a boolean value. Setting to true (default) plays the audio file using the default built-in audio player on the device. Setting to false will play the audio directly in the app without any controls. This can be helpful for playing short audio clips where controls are not needed.

Example question text HTML source:

```
<a onclick="openAudioInApp('/isa/BDJPDAVIOEQJR/p5165/demo.mp3');return false;">Play Audio</a>
```

Alternatively, audio can be presented using the <audio> HTML tag:

```
<audio playsinline width="100%" controls preload="none">
  <source src="/isa/BDJPDAVIOEQJR/p5165/demo.mp3" type="audio/mpeg />
</audio>
```

Audio files can be added to the File Library, making them available for offline playback.

10.1.7.2. CAPI App Specific Functions

The functions described under this section are specific the CAPI App.

10.1.7.2.1. PostponeInterview

```
PostponeInterview("description", removeOnSync)
```

This function can be used to postpone a survey automatically when an interviewer reaches a specific point in the survey path and the interview is to be considered as postponed. In CAPI App this function is equivalent to the interviewer going to the in-survey menu and selecting **Postpone Interview**.

The description parameter is optional; if it is not supplied, the following default text will be recorded – "Interview postponed via script".

The removeOnSync parameter is an optional boolean value (default false). If it is supplied, the description parameter is required. The removeOnSync parameter will result in the survey being removed on the next sync that is performed. This provides a way to allow respondents to be completed across many different CAPI devices or even web. For example, in the situation where a survey needs to be started on Device A, postponed, re-assigned to Device B, postponed, re-assigned back to Device A, the latest respondent will not be downloaded on Device A in normal situations as the respondent on Device A is retained after being uploaded. By setting removeOnSync to true, this will allow the respondent on Device A to be removed allowing a new/updated respondent to be downloaded at a later time.

10.1.7.2.2. GetCapiInterviewerName

```
GetCapiInterviewerName()
```

GetCapiInterviewerName returns the username of the currently logged on interviewer.

10.1.7.2.3. GetCapiDeviceOs

```
GetCapiDeviceOs()
```

GetCapiDeviceOs() returns the operating system used by the device. The returned string values can be:

Windows
Android
iOS

If the device is not set up for CAPI, then nothing is returned.

Alternatively, see GetOfflineInfo() for related information.

10.1.7.2.4. GetCapiBatteryLevel

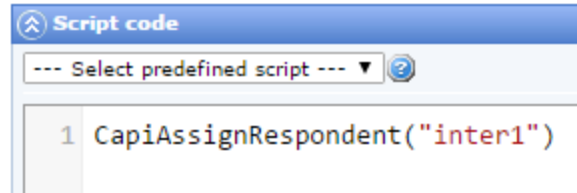
```
GetCapiBatteryLevel()
```

GetCapiBatteryLevel() returns the current percentage level for the CAPI device battery as a numeric value. This function only applies to Android and iOS CAPI apps; the Windows CAPI console, and any other modes such as a CATI or web survey, will always return a value of 100.

Alternatively, see GetOfflineInfo() for related information.

10.1.7.3. CapiAssignRespondent

```
CapiAssignRespondent("interviewername")
```



This function can be used to allow CAPI assignments to be added to the current respondent, meaning this interview will then be available for the CAPI interviewer to work on in the CAPI channel.

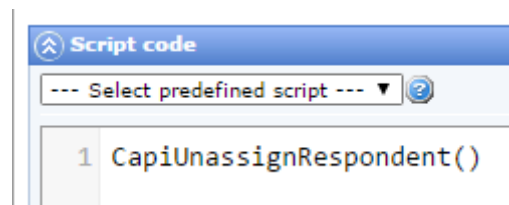
If the CAPI channel is not enabled for the survey, or if an invalid CAPI interviewer name is provided, the survey will continue and the survey author will receive an error email.

If the record is already assigned to another interviewer, calling this function will replace the existing assignment with the new assignment.

Note: This function is intended to be initiated while running in CAWI to facilitate transition of an online survey to an offline survey in CAPI.

10.1.7.4. CapiUnassignRespondent

```
CapiUnassignRespondent()
```



This function can be used to remove an interviewer assignment from this respondent.

If the CAPI channel is not enabled for the survey, the survey will continue and the survey author will receive an error email.

Note: This function is intended to be initiated while running in CAWI to facilitate transition of an online survey to an offline survey in CAPI.

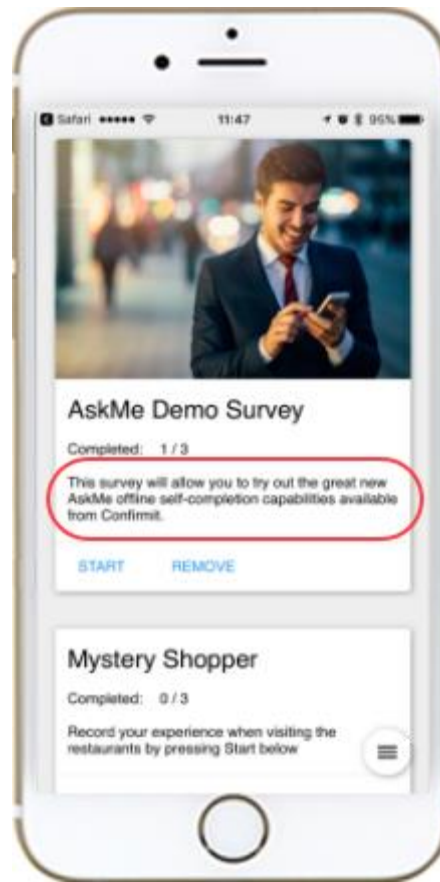
10.1.7.5. AskMe App Specific Functions

The functions described under this section are specific to the AskMe App. Refer to the separate Survey Designer user guide for further information on the AskMe app.

10.1.7.5.1. GetOfflineSurveyDescription and SetOfflineSurveyDescription

The AskMe app has the ability to control the description text that appears for surveys in survey tiles - see the figure below. You can also read from and write to that description using the functions:

```
GetOfflineSurveyDescription()  
SetOfflineSurveyDescription(description)
```



The rules for this text are:

- The text defaults to the survey description input in Survey Designer.
- HTML formatting is supported. However, hyperlinks are not supported.
- If a respondent data field called “SurveyDescription” exists, the text will take the value of this variable. This allows for respondent-level overrides of the initial value for the field.
- The function SetOfflineSurveyDescription() can be used to set the text while the survey is being completed.

Refer to the separate Survey Designer user guide for further information on the AskMe app.

10.1.7.5.2. Survey Reminders

Survey Reminders allow survey authors to script the display of one-time and recurring notifications that display in the device notification area to remind them to complete a survey. This is useful for diary studies, for example, where a survey author may want a reminder to be set for a time in the future when the app can remind the user to complete the next iteration of the survey. Depending on the type of study, the frequency of when to prompt the user can vary significantly. In some cases, it may require multiple surveys per day, and different times of the day for each respondent. In other cases it may be some time far into the future, for example a month or more.

This set of functions facilitates this alarm functionality.

Note that there are some limitations regarding the device OS:

- The number of iOS concurrent notifications is limited due to a limitation in the OS. It may be possible to schedule up to 64, but this number may be significantly lower depending on the surveys that are loaded in the app.
- Major device or OS upgrades may discard set alarms.

SetSurveyNotification

```
SetSurveyNotification(reminderName, displayLabel, notificationTimestamp)
```

- reminderName (String) - Unique identifier for this alarm
- displayLabel (String) - Text to display in notification. Plain text only. Recommended max length: 70
- notificationTimestamp (Date) - Date and time when to display notification. Max value < 60 days in future

This function sets a one-time reminder to display at a specific time in the future. This reminder will display regardless of whether the app is in use or not. Tapping on the reminder notification starts the app and enters the survey inside which the call was made.

Calling the function with the same reminderName overwrites previous settings.

Example: Remind user at the same time tomorrow

```
// Gets the current date and time
var date = new Date();
// Adds 24 hours to the date
date.setHours(date.getHours() + 24);
SetSurveyNotification("tomorrow", "Please record your diary input now.",
date);
```

Example: Remind on the 12, 14, 16th of the current month

```
// create 3 separate reminders
// Gets the current date and time
var reminder1 = new Date();
// Sets the date to the 12th of the month
reminder1.setDate(12);
// Gets the current date and time
var reminder2 = new Date();
// Sets the date to the 14th of the month
reminder2.setDate(14);

// Gets the current date and time
var reminder3 = new Date();
// Sets the date to the 16th of the month
reminder3.setDate(16);

SetSurveyNotification("MonReminder", "Please record your diary now.",
reminder1 );
SetSurveyNotification("WedReminder", "Please record your diary now.",
reminder2 );
SetSurveyNotification("FriReminder", "Please record your diary now.",
reminder3 );
```

SetAppNotification

```
SetAppNotification(reminderName, displayLabel, notificationTimestamp)
```

- reminderName (String) - Unique identifier for this alarm
- displayLabel (String) - Text to display in notification. Plain text only. Recommended max length: 70
- notificationTimestamp (Date) - Date and time when to display notification. Max value < 60 days in future

This function sets a single-shot reminder to display at a specific time in the future. This reminder will display regardless of whether the app is in the foreground or background. Tapping on the reminder notification starts the app.

In contrast to `SetSurveyNotifications`, this does not start a specific survey. This allows for situations where the user may need to continue where they left off providing an opportunity to resume.

Calling the function with the same `reminderName` overwrites previous settings.

SetRepeatingSurveyNotification

```
SetRepeatingSurveyNotification(reminderId, displayLabel, minuteOfHour,
hourOfDay, dayOfWeek)
```

- `reminderName` (String) - Unique identifier for this alarm
- `displayLabel` (String) - Text to display in notification. Plain text only. Recommended max length: 70
- `minuteOfHour` (Number) - The minute for the hour to trigger (0-59)
- `hourOfDay` (Number) - The hour of the day to trigger (0-23)
- `dayOfWeek` (String, optional) - Day of the week labels (mon, tue, wed, thu, fri, sat, sun)

This function sets a recurring reminder. This reminder will display regardless of whether the app is in the foreground or background. Tapping on the reminder notification starts the app and enters the survey inside which the call was made.

The firing of this notification is based on the `minuteOfHour`, `hourOfDay` and `dayOfWeek` settings. At every time where there is a match of these values with the current time, the notification will fire. For example, if we desire the notification to fire every Monday at 9am, we would set `minuteOfHour` to 0, `hourOfDay` to 9 and `dayOfWeek` to "mon".

The `dayOfWeek` parameter is optional. If not provided, the reminder will recur every day.

Calling the function with the same `reminderId` overwrites previous settings.

Example: Remind every day for next 3 days at 10am

```
SetRepeatingSurveyNotification("10amReminder", "Please record your daily
diary now.", 0, 10);
// NOTE: survey multiple complete set to Max 3 which will stop alarms
once 3 surveys are completed
```

Example: Remind every week on Saturday mornings

```
SetRepeatingSurveyNotification("SatReminder", "Please let us know your
weekly activities.", 0, 10, "sat");
```

CancelSurveyNotification

```
CancelSurveyNotification(reminderId)
```

- `reminderName` (String) - Unique identifier for this alarm

This function cancels the notification associated with `reminderId`.

CancelSurveyNotifications

```
CancelSurveyNotifications()
```

This function cancels all notifications set in this survey.

GetLastSurveyNotificationDate

```
GetLastSurveyNotificationDate()
```

This function returns the timestamp of the last time a notification was displayed to the user from this survey based on the set notifications.

It is important to understand that this returns the expected last notification timestamp, not the timestamp of the last actual display of a notification.

Example: Provide time window for when survey can be completed

```
// ensure the user started the survey within 15 minutes of receiving the
survey reminder
var d = new Date();
d.setMinutes(d.getMinutes() - 15);
if( GetLastSurveyNotificationDate() < d )
{
//show an informational question - "Sorry, you didn't start the survey in
time. You will get another chance tomorrow"
}
```

Example: Check if user has notifications enabled for app

```
if(!IsAppNotificationPermissionEnabled())
{
// Show informational node to ask user to enable notifications
```

IsAppNotificationEnabled

```
IsAppNotificationEnabled()
```

This function checks if the user has enabled notification permissions for the app.

ShowAppNotificationSettingsDialog

```
ShowAppNotificationSettingsDialog()
```

This function displays the notification permissions screen to allow the user to change the setting for the app.

10.1.7.5.3. GetAdvertisingInfo

Use `GetOfflineInfo().GetAdvertisingInfo()` function, to access device Advertising information:

- `.AdvertisingID` returns the device advertisingID where possible. This is a helper function without needing to perform platform specific checks.
- `.GAID` returns the Google Advertising ID (Android only, iOS returns null).
- `.IFV` returns the Apple Identifier for Vendors (iOS only, Android returns null).
- `.IFA` returns the Apple Identifier for Advertisers (iOS only, Android returns null).
- `.IsLimitAdTrackingEnabled` returns true if user has enabled option to limit ad tracking (Android only, iOS returns null).
- `.IsAdvertisingTrackingEnabled` returns true if user has enabled option to limit ad tracking (iOS only, Android returns null).

Examples of use:

```
var adId = GetOfflineInfo().GetAdvertisingInfo().AdvertisingID
var gaid = GetOfflineInfo().GetAdvertisingInfo().GAID
var ifv = GetOfflineInfo().GetAdvertisingInfo().IFV
var ifa = GetOfflineInfo().GetAdvertisingInfo().IFA
var isl = GetOfflineInfo().GetAdvertisingInfo().IsLimitAdTrackingEnabled
var isl =
GetOfflineInfo().GetAdvertisingInfo().IsAdvertisingTrackingEnabled
```

10.1.7.5.4. notifyNativeApp

This function is available for custom branded AskMe applications.

```
notifyNativeApp(provider, eventName, customData)
```

10.1.8. CATI Specific Functions

CATI (Computer-Assisted Telephone Interviewing) is a Forsta add-on.

10.1.8.1. Redo

Redo() forces a redo of a specific question:

```
Redo('qid')
```

where qid is the question ID of the question that is to be re-done.

Redo can be used together with SetErrorMessage to provide a redo-context sensitive error message (this can be defined per language). Example:

```
Redo('q1')
SetErrorMessage(LangIDs.en, 'Error Message')
```

Considerations regarding use of Redo:

- Redo can only be used for surveys that use the optimized database format.
- Redo can only be used in CATI, CAPI or AskMe survey channels. If, however, a survey is running in the CATI channel then Redo is available for CAWI interviewing also. No error will be reported at launch time if the survey contains an 'unsupported' Redo, instead the survey will produce an internal error at runtime.
- The question id has to be a question that the interviewer has seen before (i.e. a question that has already been processed).
- The question id can be a question inside a callblock. If the callblock has been called multiple times, the the most recent call the callblock will be chosen.
- The question id can be a question inside a loop. The first iteration of the loop is chosen.
- The function is supported by quick test.

Invoking the Redo() will cause the engine to return to the specified question ID. Having then answered this question the engine will fast forward back to the script that invoked the Redo. If during fast forward the interview cannot progress due to a change in the interview path or due to some validation the interview will continue from that point.

Important

When fast forwarding through the project, the Redo() WILL be re-executed. Therefore an example such as: q1 - Gender question

Script: Redo('q1')

will produce a loop, repeating q1 over and over again. This is intentional behavior. It is the survey author's responsibility to use the function in a way that takes this into account. The Redo is intended to be based on a particular condition that must be resolved to bypass the Redo, so it will typically be placed within a condition or similar.

10.1.8.2. GetTelephoneNumber and SetTelephoneNumber

Two functions exist for dealing with the telephone number of the respondent in CATI surveys. This can either be to access the value of the respondent's telephone number, or to explicitly set the value of the respondent's telephone number. The telephone number is a special field that is displayed in the survey's call list in CATI supervisor as well as on the manual selection screen for interviewers.

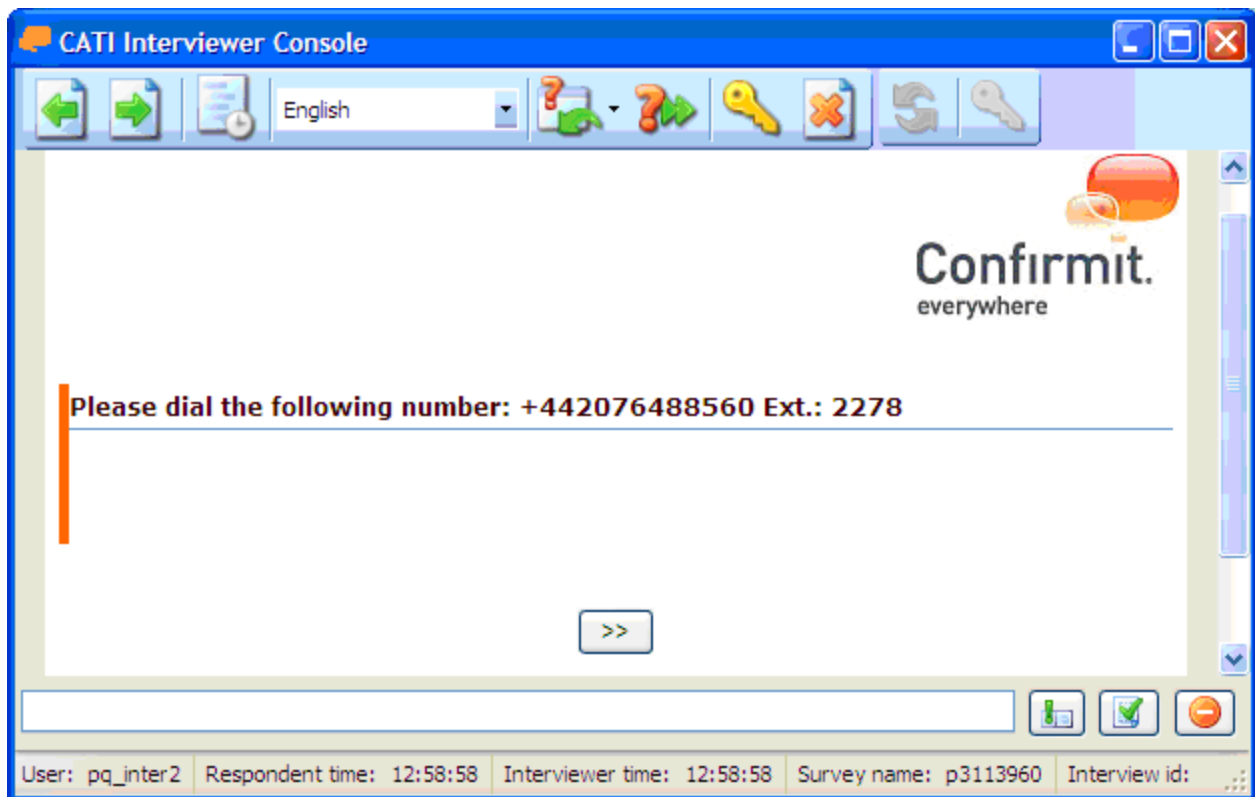
```
GetTelephoneNumber()
```

will return the value of the current respondent's telephone number (string).

An example of retrieving the value of the respondent's telephone number may be as part of an initial contact screen, such as the information node below:

The screenshot shows a configuration window for an 'Informational text' item. At the top, there are icons for help, edit, view, settings, copy, and delete. Below the item name, there are tabs for 'Edit', 'Translate', 'Display logic', and 'Script', with 'Edit' selected. A dropdown menu shows 'Edit in English'. The 'Text' field contains the script: `Please dial the following number: ^GetTelephoneNumber()^Ext.: ^GetExtensionNumber()^`. There are also fields for 'Title' and 'Instructions'.

This would be represented as follows in the CATI interviewing Console:



Similarly the telephone number can be set inside a script node in Survey Designer as follows:

```
SetTelephoneNumber (value)
```

Where value is the (string) value that is to be assigned as the respondent's telephone number.


10.1.8.3. *GetExtensionNumber* and *SetExtensionNumber*

Two functions exist for dealing with the telephone number extension of the respondent in CATI surveys. This can either be to access the value of the respondent's telephone number extension, or to explicitly set the value of the respondent's telephone number extension.

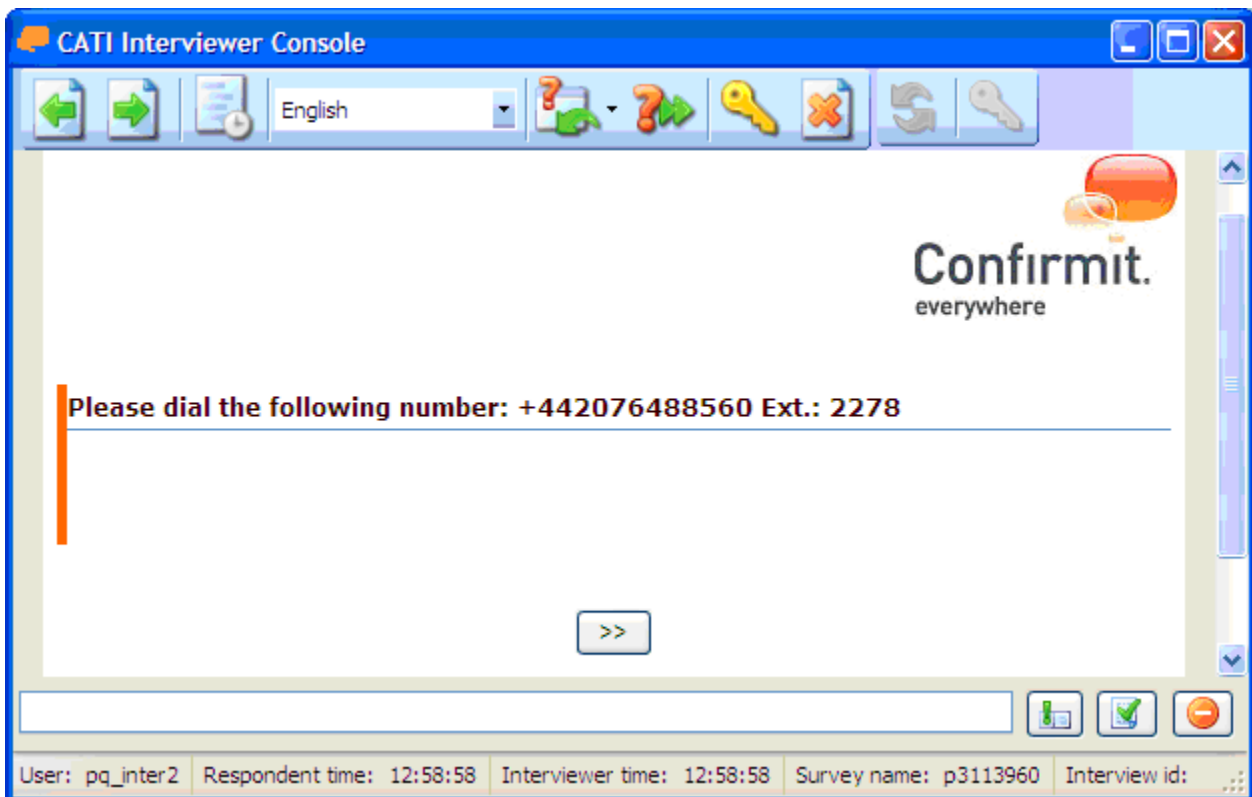
```
GetExtensionNumber ()
```

will return the value of the current respondent's telephone number (string).

An example of retrieving the value of the respondent's telephone number extension may be as part of an initial contact screen, such as the info node below:

| | |
|---|----|
| Question ID  | i2 |
| English | |
| Title | |
| Text | |
| Please dial the following number: ^GetTelephoneNumber()^ Ext.: ^GetExtensionNumber()^ | |
| Instruction | |

This would be represented as follows in the CATI interviewing Console:



Similarly the telephone number extension can be set inside a script node in Survey Designer as follows:

```
SetExtensionNumber (value)
```

Where value is the (string) value that is to be assigned as the respondent's telephone number extension.

Note: On a supporting dialer the system field for 'ExtensionNumber' will be sent to the dialer as a call property to specify the desired Caller ID (CLID). This means that individual CLIDs can be set by supplying the desired values in a sample file (using a column headed 'ExtensionNumber'). Contact support to check if your system supports this functionality.

10.1.8.4. GetTimeZoneId and SetTimeZoneId

Two functions exist for dealing with the time zone that the respondent resides in CATI surveys. It is possible to either retrieve or set a value for the respondent's time zone. The time zone associated with the respondent corresponds to the time zone list from the resources tab inside of the CATI supervisor. An example list is as follows:

| CATI Supervisor | | Timezones | |
|-----------------|---|-----------------|--|
| ID | Name | Bias (hh:mm:ss) | |
| 1 | (GMT) Greenwich Mean Time : Dublin, Edinburgh, Lisbon, London | 00:00:00 | |
| 3 | (GMT+01:00) Amsterdam, Berlin, Bern, Rome, Stockholm, Vienna | -01:00:00 | |
| 5 | (GMT+01:00) Brussels, Copenhagen, Madrid, Paris | -01:00:00 | |
| 6 | (GMT+01:00) Sarajevo, Skopje, Warsaw, Zagreb | -01:00:00 | |
| 16 | (GMT+03:00) Moscow, St. Petersburg, Volgograd | -03:00:00 | |
| 21 | (GMT+04:30) Kabul | -04:30:00 | |
| 30 | (GMT+07:00) Bangkok, Hanoi, Jakarta | -07:00:00 | |
| 62 | (GMT-05:00) Eastern Time (US & Canada) | 05:00:00 | |
| 63 | (GMT-05:00) Indiana (East) | 05:00:00 | |
| 65 | (GMT-06:00) Central Time (US & Canada) | 06:00:00 | |
| 68 | (GMT-07:00) Arizona | 07:00:00 | |
| 70 | (GMT-07:00) Mountain Time (US & Canada) | 07:00:00 | |
| 71 | (GMT-08:00) Pacific Time (US & Canada); Tijuana | 08:00:00 | |
| 74 | (GMT-11:00) Midway Island, Samoa | 11:00:00 | |

Total records : 14

The first 'ID' column corresponds to the respondent's time zone Id.

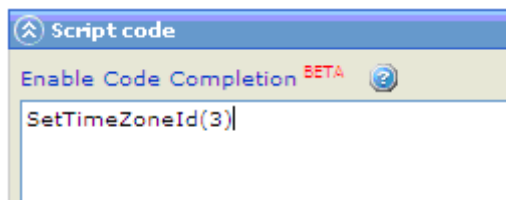
```
GetTimeZoneId()
```

will return the numeric Id stored for the current respondent.

It is also possible to define the time zone for the respondent; this can be achieved using a script node. Here

```
SetTimeZoneId(value)
```

can be used to set the value of the time zone, where value is a valid integer time zone Id value. In the following example the respondent's time zone is changed to time zone Id 3 (GMT+1).



10.1.8.5. *GetExtendedStatus and SetExtendedStatus*

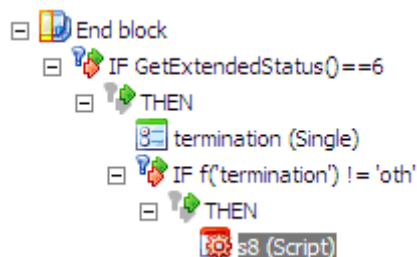
The Extended Status is the status primarily used for CATI interviewing that stores the call outcome of the interview record. The extended status is a numeric value corresponding to the extended status list within the CATI Supervisor. An example list is shown below:

| ID | |
|----|---------------|
| 1 | Appointment |
| 2 | Busy |
| 3 | No reply |
| 4 | Quota failure |
| 5 | Refusal |
| 6 | Terminated |
| 7 | Answer phone |
| 8 | Modem |
| 9 | Fax |
| 10 | Congestion |
| 11 | Unobtainable |

```
GetExtendedStatus()
```

will return the value of the current interview's extended status value (integer). If no value is set 0 will be returned.

A typical example of where this may be used is in the End block of a CATI interview. When an interviewer terminates the interview during an interview, the interview is immediately given a `GetExtendedStatus()` value of 6. The End block can then be used to react to this termination. In the example below, for interview terminations the type of termination is sub-classified by a termination question and then the interview is further dispositioned to a new extended status value depending on the termination type:

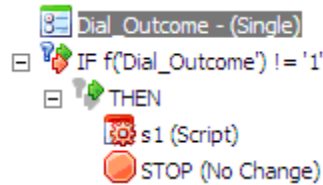


It is also possible to define the extended status value for an interview. This can be achieved using a script node. Here,

```
SetExtendedStatus (value)
```

can be used to set the value of the extended status, where 'value' is a valid integer extended status value; an integer between 1 and 120.

The initial contact screen that is used to record the call-outcome of the call demonstrates the use of this function. Here we can see the Dial_Outcome question where the call-outcome is recorded:



This contains the following answer list:

| Text | | Answers | Validation | Masking |
|-----------------------------|---------------------|---------|------------|---------|
| Add Add Predefined Add Loop | | | | |
| English | | Code | | |
| | Call answered | 1 | | |
| | Busy | 2 | | |
| | No repl | 3 | | |
| | Refusal | 5 | | |
| | Answer phone | 7 | | |
| | Modem | 8 | | |
| | Fax | 9 | | |
| | Unobtainable number | 11 | | |

The codes here correspond to the extended status code list within the CATI supervisor. Therefore the script node s1 is used to disposition the interview with a SetExtendedStatus() value corresponding to the code for the selected category in the Dial_Outcome question.

10.1.8.6. *GetLastInterviewStart*

```
GetLastInterviewStart()
```

GetLastInterviewStart returns the date/time of the previous call attempt made to this respondent.

10.1.8.7. *GetLastChannelId*

```
GetLastChannelId()
```

GetLastChannelId returns the ID (integer) corresponding to the channel used during the last interview attempt

| | |
|----|--------------------------|
| ID | Channel |
| 0 | None |
| 1 | Web |
| 2 | CAPI |
| 4 | Random Data Generator |
| 8 | CATI |

10.1.8.8. *GetCatiInterviewerId*

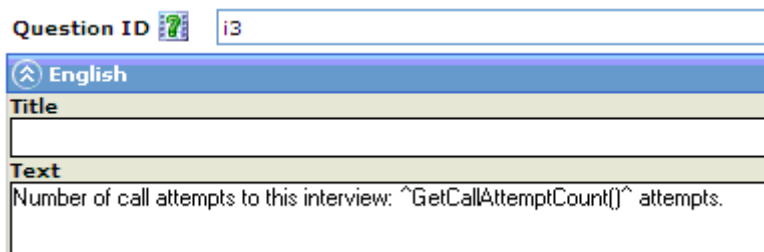
```
GetCatiInterviewerId()
```

GetCatiInterviewerId returns the ID corresponding to the CATI interviewer as defined by the ID column in the CATI interviewer list in the CATI supervisor.

10.1.8.9. *GetCallAttemptCount*

```
GetCallAttemptCount()
```

The GetCallAttemptCount function is used to return the number call attempts made to this respondent. For example the following info node would display the number of attempts made:



The screenshot shows a question editor interface. At the top, there is a 'Question ID' field with a question mark icon and the value 'i3'. Below this is a language selection dropdown set to 'English'. The 'Text' field contains the text: 'Number of call attempts to this interview: ^GetCallAttemptCount()^ attempts.'

This function is for CATI only, not CAPI.

10.1.8.10. *GetTotalAttempts*

```
GetTotalAttempts()
```

The GetTotalAttempts function is used to return the number of attempts made to this respondent in either CATI or Web interview modes. For example,

```
^GetTotalAttempts()^
```

used in an info node would display the total number of attempts made to this respondent in either CATI or Web interviewing.

Note: This function is not available for CAPI interviewing and is only available for surveys that have the CATI channel enabled.

10.1.8.11. *GetDialMode, SetDialMode and GetDialingMode*

Three functions exist for dealing with the dial mode in use when a company has the CATI Telephony add on enabled. GetDialMode checks the respondent data value, and SetDialMode explicitly sets the value of the dial mode. GetDialingMode gets the "live" in-progress dial mode assigned to this call in the dialer.

```
GetDialMode()
```

and

```
GetDialingMode()
```

will return a numeric value corresponding to the list below.

- 1 = Manual
- 2 = Preview
- 3 = Automatic
- 4 = Predictive (requires the additional predictive telephony add on)

The dial mode can be set inside a script node in Survey Designer as follows:

```
SetDialMode(value)
```

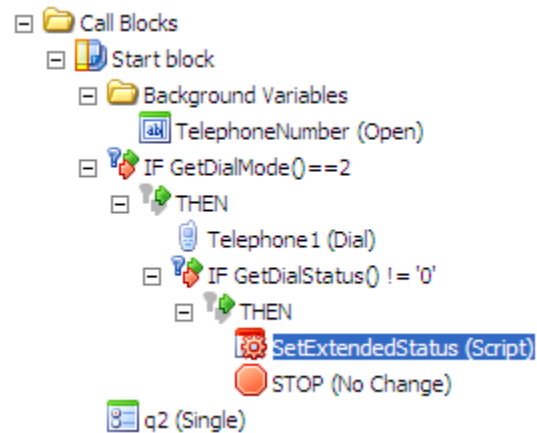
Where value is either 1, 2, 3 or 4 based on the list above.

10.1.8.12. *GetDialStatus*

A function exists that returns the outcome of a dial attempt made by the dialer (when a company has the CATI telephony add on enabled). The GetDialStatus() function call will return a numeric value corresponding to the outcome list below.

| Dial status value | Description |
|-------------------|-------------------------|
| 0 | Connected call |
| 2 | Busy |
| 3 | No reply |
| 7 | Answer phone |
| 8 | Modem |
| 9 | Fax |
| 10 | Congestion |
| 11 | Unobtainable |
| 12 | Nuisance |
| 15 | Returned not dialed |
| 25 | Returned dialer expired |
| 28 | Stopped |
| 29 | Telephony failure |
| 30 | Error |

Typically this would then be used to control either continuing the call or finishing the interview, as shown in the screens below:



With the script doing the following:

Name

Deleted

Script code

Enable Code Completion BETA

```
SetExtendedStatus(GetDialStatus());
```

Note: The `GetDialStatus()` function should not be called before the dial command has been issued for this interview. If it is, it will return the last `DialStatus` value from the previous call, or a “0” if it is the first call. For surveys using more than 1 dial mode (for example a predictively dialed survey that has preview in predictive calls), ensure that appropriate logic surrounds the function such that it is only retrieved once the dial command has been issued.

10.1.8.13. GetDialType

```
GetDialType()
```

`GetDialType()` can be used to obtain information about how the current phone interview was dialed, either manually (by hand) or automatically (using an autodialer).

10.1.8.14. GetTotalDuration

```
GetTotalDuration()
```

The `GetTotalDuration` function is used to return the number of seconds spent interviewing cumulatively across all interview attempts. For example the follow info node would display the amount of time spent on this interview across all interview attempts:

Question ID

English

Title

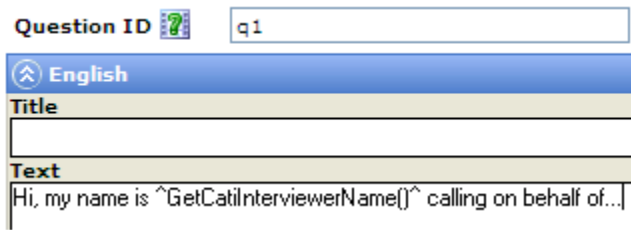
Text

Time spent interviewing on this survey: ^GetTotalDuration()^sec.

10.1.8.15. GetCatiInterviewerName

```
GetCatiInterviewerName()
```

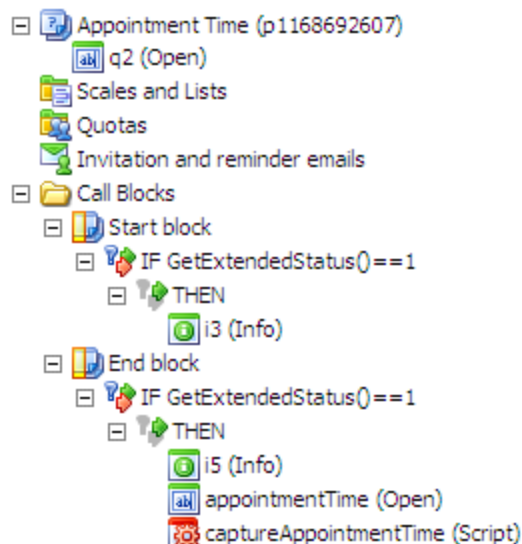
GetCatiInterviewerName returns the username of the currently logged on interviewer. This is the Login column in the CATI interviewer list in the CATI supervisor. This is typically used during the initial greeting with the respondent, for example as follows:



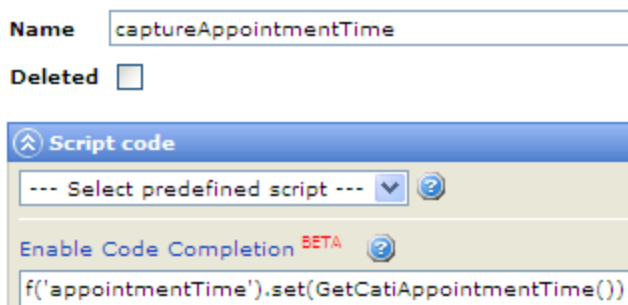
10.1.8.16. GetCatiAppointmentTime

```
GetCatiAppointmentTime()
```

GetCatiAppointmentTime returns the time (in local respondent time) for the CATI appointment that has just been made. This is designed to be used in the Exit block at the end of the current interview only. For example the following survey would display the time and also capture it to a hidden variable to be used at the start of a subsequent call. An example of such a survey is:



Where the captureAppointmentTime script contains the following:



This is then piped in during the Start block in the i3 info node.

10.1.8.17. *GetCatiRespondentUrl*

This is GetRespondentUrl for CATI.

Using a redirect inside a CATI survey that jumps to a specific question in the survey (for example *Redirect(GetRespondentUrl("q1"))*) results in the interview continuing in Web mode with a number of negative implications because GetRespondentUrl is not supported in CATI. The GetCatiRespondentUrl() function has the same signatures as GetRespondentUrl() and is intended for use in CATI interviewing to safely jump to a specific question.

The same rules apply as for GetRespondentUrl() (see GetRespondentUrl on page 82 for more information).

Note: The GetCatiRespondentUrl() function must ONLY be used in conjunction with redirects to questions inside of the same CATI survey. The GetCatiRespondentUrl() function only applies in the CATI interviewing mode. If it is used in other modes it behaves like GetRespondentUrl().

10.1.8.18. *GetCatiStationId*

```
GetCatiStationId()
```

GetCatiStationId() can be used to obtain the CATI interviewer station ID of the device being used to conduct the current interview. Each workstation in a CATI call center has its own workstation label (Station ID) – specified as a string when making a fresh console installation.

10.1.8.19. *StartVoiceRecording and StopVoiceRecording*

```
StartVoiceRecording('label')
```

StartVoiceRecording is only applicable when connected to a supported Forsta Local Dialer. When issued inside of a script node, sectional voice recording will begin. This will continue to run until a StopVoiceRecording() function call is made or the interview finishes. The user-supplied text label passed is incorporated into the filename of the .wav sound file created.

```
StopVoiceRecording(stopRecordingMode: String)
```

Where:

stopRecordingMode is an optional parameter that can either be "WholeInterview", "Sectional" or "Both".

StopVoiceRecording is only applicable when connected to a supported Forsta Local Dialer. When issued inside of a script node, if voice recording is enabled for this interview then the specified voice recording type will be stopped on the dialer. If no value is supplied, the default is "Both".

Depending on which dialer is being used, different recording methods are available:

1. TCI and ProTS: whole interview recording and sectional recording are available. However it is not possible to have concurrent whole interview recording and sectional recording; if whole interview recording is enabled when a StartVoiceRecording() function call is made the whole interview recording will be stopped
2. Open Dialler API diallers: whole interview recording and sectional recording are available, even concurrently.

Whole interview recording cannot be controlled with scripting functions – for example StopVoiceRecording("WholeInterview") or StopVoiceRecording("Both") - unless 'Enable whole interview audio recording' is checked in **Survey Designer > Survey Settings > CATI - Telephone**.

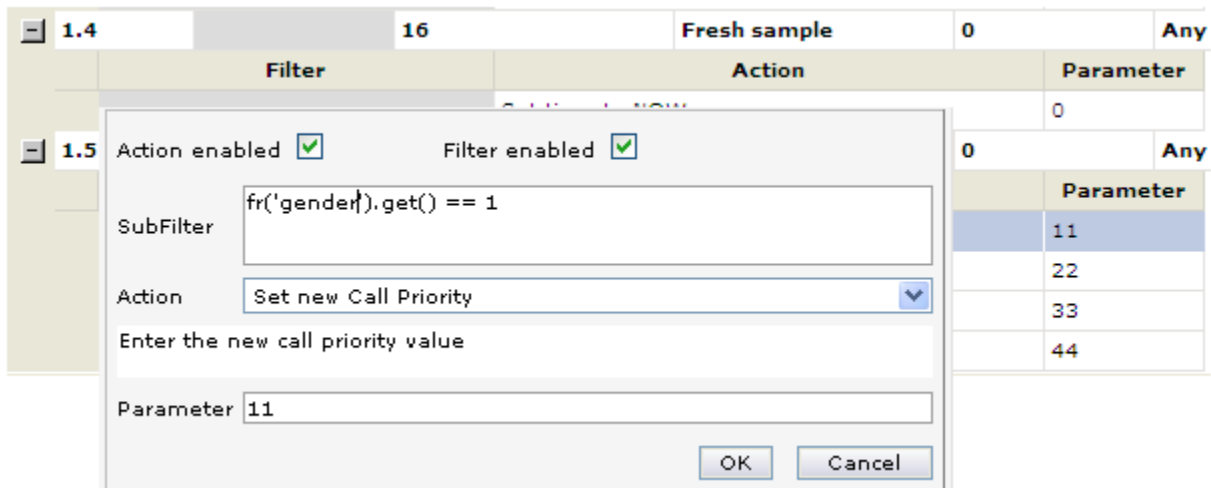
If only sectional recording is required, 'Enable whole interview audio recording' must be unchecked.

10.1.8.20. *fr*

```
fr()
```

Note: This function is obsolete; you should use GetRespondentValue() instead (see GetRespondentValue and SetRespondentValue on page 85 for more information).

This function is only available in survey scheduling within the CATI supervisor. The function can be used to reference the value of CATI replicated background variables in a scheduling script. Only variables with the "Available as CATI filter" question-level property can be referenced. The following demonstrates how a filter can be used when referring to the value of the CATI replicated variable named gender:



10.1.8.21. IsCallExpired

```
IsCallExpired()
```

This function is only available inside of survey scheduling inside of the CATI supervisor. CATI scheduling is invoked when a call expired event occurs. Typically, this would be due to an appointment expiry timeout being reached. During scheduling execution the IsCallExpired function returns true if scheduling has been invoked due to a call expiry event. This allows a new call to be scheduled in this scenario, here the actions are to remove assignment locking, set the call priority to be 2000 and set the time to call to be now.

| SubRules | Filter | Extended Status Code | Extended Status Name |
|----------|----------------------|-----------------------|----------------------|
| 1.1 | IsCallExpired() == 1 | 0 | Any |
| | Filter | Action | Parameter |
| | | Assign user/group | -3 |
| | | Set new Call Priority | 2000 |
| | | Set time to NOW | 0 |

10.1.8.22. AddToCatiBlacklist

```
AddToCatiBlacklist()
```

This function is available in Survey Designer for CATI-enabled projects. When this function is called, the current respondent's telephone number (contained within the respondent data variable named TelephoneNumber) will be added to the company's telephone blacklist. The telephone blacklist can be managed from the CATI Supervisor, from the **Resources tab > Telephone Blacklist** item. When telephone blacklist support is enabled at the survey level in Survey Designer, any attempt to call one of the blacklisted numbers will not be processed and the respondent extended status will automatically be changed to 'Blacklist'. Duplicate numbers or numbers containing spaces or special characters such as () + # - will not be added to the list. Refer to the separate CATI Supervisor User Guide for further information on creating and maintaining a telephone blacklist.

10.1.8.23. GetParamValue

```
GetParamValue (value)
```

This function is only available in survey scheduling in the CATI supervisor. If the scheduling script contains some defined parameters then these parameters can be referenced in filters in scheduling. In this example a scheduling parameter named TimeFrame exists, where ID is 1.

| ID | Name | Type | Default Value | Description |
|----|-----------|---------|---------------|--------------------------------|
| 1 | TimeFrame | Numeric | 5 | Period of time to recall after |

To refer to these parameters, use the `GetParamValue(value)` function where you can either pass the `GetParamValue("ParameterName")` or `GetParamValue(ParameterId)` to reference by name or ID. For example, `GetParamValue("TimeFrame")` or `GetParamValue(1)`. The example below shows this being used in the filter for the Busy call outcomes.

| 1.4 | GetParamValue(1) == 5 | 2 | Busy | 0 | Any |
|--------|--------------------------------|-----------|------|---|-----|
| Filter | Action | Parameter | | | |
| | Recall after number of minutes | 5 | | | |

10.1.8.24. StartCATIAudioPlayback

```
StartCatiAudioPlayback ("filename", [auto_start])
```

This function is only applicable for CATI-enabled projects, in the CATI channel and when working with a supported Dialer. When this function is called a command is sent to the dialer to play the specified sound file. The function can be used in any interactive text that will be displayed to the CATI interviewer; typically this would be a question relating to the sound file being played. This function should not be used inside of non-interactive nodes such as script nodes or hidden questions as this will result in nothing being played to the CATI interviewer.

The parameters are the filename (excluding path) of the .WAV file to be played and optionally a Boolean for automatically starting the sound file playback when the function is invoked. The `auto_start` parameter determines whether the sound file should immediately start playing when the function is invoked, if this is not specified the default value is false (or 0) meaning the file will not start playing immediately. Example of usage is as follows:

Text-Mode **Wysiwyg**

Question ID

English

Title
Radio Ad 1

Text
What are your views on this radio add clip?

^StartCatiAudioPlayback("radio1.wav")^

In this example, the CATI interviewer console will activate the sound playback buttons on this page allowing the CATI interviewer to play, pause or stop the sound clip, "radio1.wav", it will not start automatically. Using this syntax: `^StartCatiAudioPlayback("radio1.wav", 1)^` upon displaying this page the sound file would immediately be played.

A CATI interviewer can use the play, pause and stop toolbar buttons to control the playback of the audio file and whenever the audio file is playing both the interviewer and the respondent will hear it. These buttons are only active for questions that make use of the sound playback capabilities. Sound file playback will automatically be stopped if the CATI interviewer submits the current page.

Note: It is the responsibility of the survey author or the person who manages the local dialer to ensure that the sound file has been placed in the appropriate directory on the dialer(s). This task is not automated in any way by the Forsta system. If the file cannot be located and played by the dialer the interview will continue as if there was no request to play a sound file.

10.1.8.25. IsInOpenendReviewMode

```
IsInOpenendReviewMode ()
```

This function is only applicable for CATI-enabled projects, being interviewed in the CATI channel. `IsInOpenendReviewMode` returns true if the function is executed during CATI openend reviewing, false otherwise. You may use this function to prevent questions from appearing during openend reviewing either as part of a question mask or from condition logic. This would typically be used for open text questions that do not require review at the end of the CATI interview.

Note: If you use this masking, remember to check the "No cleaning on question masking" property (refer to the separate Survey Designer user guide for more information). If this property is not checked, then the data will be cleared if the page is empty.

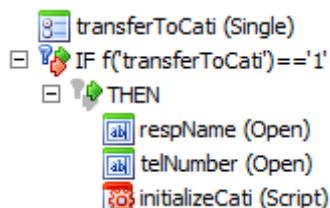
10.1.8.26. AddRespondentToCati

```
AddRespondentToCati(extendedStatus)
```

This function is only applicable for CATI-enabled projects, and applies to interviews being conducted in the Web interviewing mode. It is designed for open surveys where respondent data has not been loaded into the system and the Web respondent needs to continue the survey in the CATI interviewing channel. When this function is called the current respondent will be initialized in the CATI system and be available to be interviewed on in the CATI interviewing channel. If a record already exists for that respondent ID in the CATI interviewing channel the existing respondent will be updated and have the specified extended status value allocated to it.

The `extendedStatus` parameter that is supplied is the numeric value of the extended status (between 1 and 120) that will be assigned to the respondent in the CATI system; call scheduling will be executed on this call using this extended status value.

The following example demonstrates how this could be used in an open Web survey:



If the answer to the question in “transferToCati” is “Yes” (code 1) then the respondent name and telephone number is collected and initialized via the script node “initializeCati”. The call is then initialized in the CATI interviewing channel with an extended status value of 21 (“Transfer to CATI”). The script contains the following code:

```
SetRespondentValue("respondentname", f("respName"));
SetTelephoneNumber(f("telNumber"));
AddRespondentToCati(21);
```

Note: You must ensure that a scheduling rule is defined to handle calls with the specified extended status to ensure that an appropriate CATI call is created.

10.1.8.27. CreateCatiAppointment

```
CreateCatiAppointment()
```

This function is available for CATI-enabled projects in Survey Designer. When this function is called, the appointment dialog will appear on the CATI interviewing console. The interviewer will be able to make an appointment and on clicking **OK** the survey will finish with an appointment status. If the interviewer clicks **Cancel**, they will be allowed to continue the interview without making an appointment.

Note: This function is only effective if there is an interactive question located after it in the survey. If there are no interactive questions in the survey after this function is called then the function will be ignored, the appointment dialog will not appear and the interview will merely continue until it is finished.

10.1.8.28. CreateCustomAppointment

This function can be used when CAWI respondents would like to set up an appointment to be called back via CATI. The CreateCustomAppointment function can be used in a CATI schedule custom script to create an appointment for CATI using date and time information captured from survey variables.

The function 'CreateCustomAppointment' will accept parameters for date/time in the respondents time zone.

Example:


```
function CreateAppointment()
{ var time: DateTime = DateTime.Parse('2021-01-25 13:00');
  CreateCustomAppointment(time); }
```

Refer to the CATI Admin manual for a worked example


10.1.8.29. EnableLiveMonitoring and StartScreenRecording

Legislation in some countries prohibits live monitoring of respondent's answers until they provide their explicit consent for such live monitoring. To comply with these rules the Forsta software provides means of disabling and enabling the interview live monitoring and video recording functions. Two controls which make it possible to only enable live call monitoring and/or video recording of the interviewers screen if the respondent has given explicit consent are activated by settings in the survey's **Survey Settings > CATI Options** tab (refer to the separate Survey Designer user guide for further details).

Monitoring and recording options

Enable live call monitoring 

- allow monitoring from the beginning of the interview
- only allow after execution of enable function

Enable interview screen recording 

- automatically start at beginning of interview
- only start after execution of enable function

Figure 2 The Monitoring and recording options in the CATI Options tab

When the second option for either of these settings is selected, the call monitoring and/or video recording features will only be permitted after explicit consent has been obtained in the survey. This requires that the survey includes the corresponding script functions:

```
EnableLiveMonitoring()
StartScreenRecording()
```

A simple method of achieving this is to add the functions to a script node inside a condition that is activated by a "Yes/No" consent question. No parameters are required for the functions.

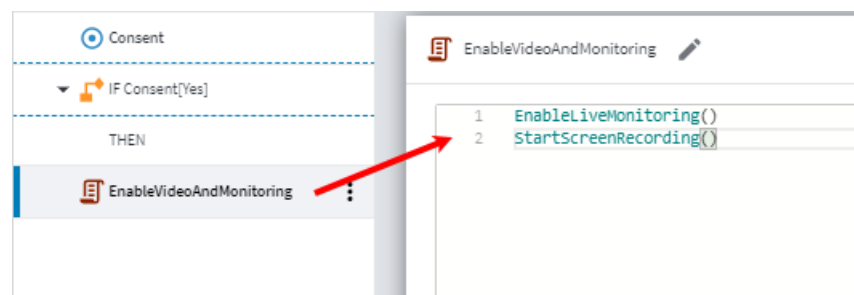


Figure 3 The functions in a script node in the survey

10.1.8.30. *IsCatiGroupMember*

```
IsCatiGroupMember()
```

The IsCatiGroupMember function can be used to check if the interviewing agent conducting the current interview belongs to a given group (as specified by the function by referring to it with its applicable group name). The function returns FALSE if the interviewer is not a member of the specified group.



Figure 4 Example of usage

10.1.8.31. *IsCatiIvr*

```
IsCatiIvr()
```

Use the IsCatiIvr function to determine if the current interview is operating in IVR mode. If this is the case then the function will return true.

10.1.8.32. *IsCatiInbound*

```
IsCatiInbound()
```

Use the IsCatiInbound function to determine if the current interview was initialized via an inbound call to the call center. If this is the case then the function will return true.

10.1.8.33. *Linked Surveys / Interviews*

The following set of functions can be used to facilitate linkages across different surveys and interview records. A common use case is when handling inbound calls and where there is a need to locate an applicable survey and interview record for the respondent. Initially the interviewer is put into a locating survey where they obtain relevant locating details from the respondent before being able to transfer to the appropriate survey/interview from a resulting lookup table.

10.1.8.33.1. *GetCatiInterviews*

GetCatiInterviews can be used to find other interview records, for example it can be used in an inbound call scenario to locate a pre-existing interview record when CLI matching is not possible and so a new temporary interview has been created.

```
GetCatiInterviews(string[] surveyList, string telephoneNumber, string
respondentName, string filter)
```

Both **telephoneNumber** and **respondentName** parameters work as a “starts with” filter. So if “1234” is specified as a telephoneNumber, it will search for all numbers starting with “1234”.

These parameters also support wildcards:

- % - Any string of zero or more characters.
- _ (underscore) - Any single character.

So if “%1234” is specified as a telephoneNumber, the system will search for all numbers containing “1234”. The filter parameter makes it possible to search interviews by survey questions (only those that have the “Available as CATI filter” option enabled). Its format is:

```
“q2=2 AND q3=1”
```

It does not support wildcards and must always be an exact match.

In the typical Inbound interview locating scenario, the function returns an array of objects which should be placed into an open text list variable. Then in turn a single type variable is used to show the results contained in the open text list so that the user is able to select a specific record. After the interviewer selects an applicable single response answer, it is necessary to parse the open text list item string to get the project id and resp id.

10.1.8.33.2. SetNextCatiInterview / SetNextCatiInterviewToPrevious

```
SetNextCatiInterview()
SetNextCatiInterviewToPrevious()
```

These functions do not immediately switch interview, but just set the next interview to start after finishing the current interview. SetNextCatiInterview determines which survey and interview record to start.

SetNextCatiInterviewToPrevious returns interviewing activity back to the previous survey record.

10.1.8.33.3. GetCatiLinkedInterviews

```
GetCatiLinkedInterviews()
```

This returns a list of "parent" interview records. This is a list of previously started interviews in the current linked interviews chain (where the SetNextCatiInterview function has been used).

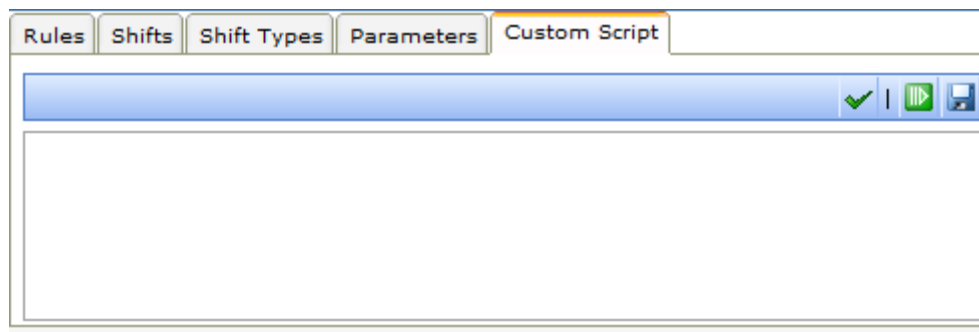
10.1.8.34. Writing Custom CATI Script Code

In the event you wish the scheduling script to perform operations which cannot be configured using the regular CATI Supervisor functions available through the user interface, you can write the script code manually. This requires a thorough knowledge of the JavaScript.NET language.

The script code you enter using this tab is executed only when the "Run specified script" action is enabled.

To create a custom scheduling script manually:

1. With the scheduling script opened in the View mode, go to the Custom Script tab in the lower-right frame.



This tab contains a single text field, which you use to enter your script code.

2. Enter the script code (JavaScript.NET language is used) in the text field. You can also paste the clipboard contents into this field. Click the **Parse** button in the lower-right frame's toolbar to check the code is correct.

(see Accessing the Call Object in Custom Scripting on page 125 for more information).

10.1.8.34.1. Accessing the Call Object in Custom Scripting

This topic describes how the call object can be accessed in custom scripting, inside of CATI scheduling. This functionality is available through the "Scheduling" object which is available in custom scripts. The "Scheduling" object has the following properties:

| Type | Name | Description |
|------|------|-------------|
|------|------|-------------|

| | | |
|-------------------|-----------|---|
| BvSurveyEntity | Survey | This object provides data for the survey which contains the current interview. ReadOnly. |
| BvInterviewEntity | Interview | This object provides data for interview which is scheduled. Read/Write. |
| BvCallEntity | LastCall | If the scheduling script is run for interview which previously had a call, then this object contains info about the call, otherwise null. ReadOnly. |
| BvCallEntity | NewCall | If the scheduling script creates a call, this object provides info about the new call. If the object is null, call will not be created upon scheduling completion. Read/Write. |
| DateTime | Time | Scheduling time. |
| ShiftService | Shifts | This object provides for shift functionality. |

A function exists to initialize a new call inside of the scheduling object when used via a custom scheduling script:
`CallShouldBeCreated()`

Once initialized `Scheduling.NewCall` will be initialized and available.

To cancel the creation of the new call, set `Scheduling.NewCall` to Null.

Object breakdown

BvSurveyEntity object provides access to survey data as follows:

| Type | Name | Description |
|--------|-------------|----------------------|
| Int | SID | Internal object ID |
| String | Name | Project ID |
| String | Description | Project name |
| Int | ScheduleID | Scheduling script ID |

BvInterviewEntity object provides access to interview data as follows:

| Type | Name | Description |
|--------|-----------------|-----------------------------|
| Int | ID | ID of interview |
| String | TelephoneNumber | Respondent telephone number |
| String | RespondentName | Respondent name |

| | | |
|----------|-------------------|---------------------------|
| Int | TimezoneID | ID of respondent timezone |
| Int | TransientState | Extendend status |
| DateTime | LastCallTime | Last call time |
| Int | LastCallPersonSID | User ID of last interview |
| byte | DialingMode | Dialing mode |

BvCallEntity object provides access to call data as follows:

| Type | Name |
|----------|--------------|
| int | CallID |
| int | SurveySID |
| int | InterviewID |
| int | Phase |
| int | RoleID |
| int | ShiftID |
| DateTime | TimeInShift |
| DateTime | TimeToExpire |
| int | Priority |
| int | Resource |
| int | ApptID |
| int | ResourceType |
| Guid | RuleNumber |

Shift functionality is available through the ShiftService object supporting methods when working with shifts:

- MatchingShift GetExactShift(DateTime utcNowTime, int tzID)
- MatchingShift GetMatchingShift(DateTime utcTime, int tzID)
- DateTime GetMatchingTime(DateTime utcNowTime, int tzID)
- MatchingShift GetNextShift(MatchingShift currentShift, int tzID)
- MatchingShift GetNextShift(MatchingShift currentShift, int tzID, out int countSkipShifts)
- MatchingShift GetNextShiftByID(DateTime utcTime, int tzID, int scriptShiftID)
- MatchingShift GetNextShiftOfSpecifiedType(DateTime utcTime, int tzID, int scriptShiftTypeID)
- MatchingShift GetShiftAfterNumberOfMinutes(DateTime utcNowTime, int tzID, int countMinutes)
- MatchingShift GetShiftAfterNumberOfShifts(DateTime utcNowTime, int tzID, int numberOfShifts)
- MatchingShift GetShiftAfterNumberOfShifts(MatchingShift curentShift, int tzID, int numberOfShifts, bool isTakingExclusionIntoAccount)

Custom code examples

1. Custom script creates new call with priority 10

```
function ScriptFunction()
{
    CallShouldBeCreated();
    Scheduling.NewCall.Priority = 10;
}
```

2. Custom script creates new call with priority which is taken from number variable with 'num_prior' name

```
function ScriptFunction()
{
    CallShouldBeCreated();
    Scheduling.NewCall.Priority = f("num_prior").get();
}
```

3. Custom script creates new call with time to call on next shift

```
function ScriptFunction()
{
    CallShouldBeCreated();
    var shift = Scheduling.Shifts.GetMatchingShift( Scheduling.Time,
1/*Timezone*/ );
    shift = Scheduling.Shifts.GetNextShift( shift, 1/*Timezone*/ );
    Scheduling.NewCall.ShiftID = shift.ShiftTypeID;
    Scheduling.NewCall.TimeInShift = shift.StartDate;
}
```

4. Custom script creates new call and assigns the interviewer with the ID from variable 'inter'

```
function ScriptFunction()
{
    CallShouldBeCreated();
    var name = f("inter").get();
    Scheduling.NewCall.Resource = PersonRepository.GetByName( name ).SID;
}
```

5. Custom script writes the interviewer's SID to variable 'history' (for all interviewers who have conducted an interview)

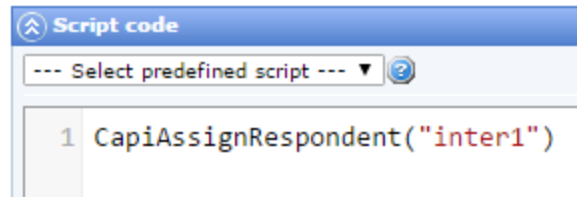
```
function ScriptFunction()
{
    var history= f("history").get();
    var name : String = "";
    if( Scheduling.Interview.LastCallPersonSID != 0 )
    {
        var person =
PersonRepository.GetByID(Scheduling.Interview.LastCallPersonSID);
        if( person != null )
        {
            if( String.IsNullOrEmpty(history))
            history = person.name;
            else if( !String.Split( history, ',' ).Any( x => x == person.name ) )
            history = history + "," + person.name;
            else
            return;
            f("history").setValue(history);
        }
    }
}
```

10.1.9. Multimode Functions - CAWI to CAPI

The functions listed under this section are intended to be initiated while running in CAWI to facilitate transition of an online survey to an offline survey in CAPI.

10.1.9.1. CapiAssignRespondent

```
CapiAssignRespondent("interviewername")
```



This function can be used to allow CAPI assignments to be added to the current respondent, meaning this interview will then be available for the CAPI interviewer to work on in the CAPI channel.

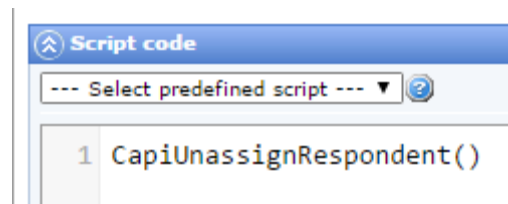
If the CAPI channel is not enabled for the survey, or if an invalid CAPI interviewer name is provided, the survey will continue and the survey author will receive an error email.

If the record is already assigned to another interviewer, calling this function will replace the existing assignment with the new assignment.

Note: This function is intended to be initiated while running in CAWI to facilitate transition of an online survey to an offline survey in CAPI.

10.1.9.2. CapiUnassignRespondent

```
CapiUnassignRespondent ()
```



This function can be used to remove an interviewer assignment from this respondent.

If the CAPI channel is not enabled for the survey, the survey will continue and the survey author will receive an error email.

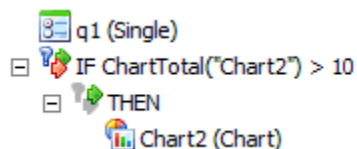
Note: This function is intended to be initiated while running in CAWI to facilitate transition of an online survey to an offline survey in CAPI.

10.1.10. Chart

10.1.10.1. ChartTotal

```
ChartTotal (chartID)
```

ChartTotal returns the current total number of responses in the question the chart with the id chartID is based on. The function is typically used in conditions to prevent showing the chart until a minimum number of responses is reached.



10.1.11. Quota

Note: The functions described in this section are not supported by CAPI.

10.1.11.1. *qf*

The function `qf` is used to check if a quota is full.

```
qf(quotaName)
```

`qf` will check if the quota `quotaName` is full with the current respondent's answers on the questions the quota is based on, and will return `true` if it is full and `false` if it is not.

If the respondent qualifies for several quotas within `quotaName`, `qf` returns `true` if one of these is full, and `false` if none of them are full. If Optimistic Quota is enabled on `quotaName` then the In Progress counts are considered by the `qf()` function.

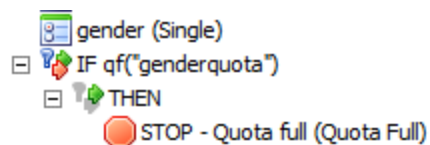
Note: The use of redirects, quotas, status-screened or other solutions with the principle purpose of avoiding the survey "complete" status being reached by a respondent having offered a reasonable amount of responses, is prohibited and will be regarded as an attempt to avoid transaction fee obligations to Forsta.

Quota Check

If a quota `genderQuota` is based on a question `gender`, and the quota is full for males and not full for females,

```
qf("genderQuota")
```

will return `true` if the respondent has answered "Male" on the `gender` question, and `false` if the respondent has answered "Female" on the `gender` question.



Presetting a Quota Question to Check Several Quotas

Note: This example has been superseded by the `GetLeastFilledQuotaCodes()` function (see `GetLeastFilledQuotaCodes` on page 131 for more information). You should consider using this function instead of the example given here as it is more efficient.

Sometimes you have quotas based on a brand list, where the respondent may qualify for several of the quotas, but you want to pick only one of the brands the respondent has chosen and ask a set of questions for that brand only. Out of the brands the respondent has chosen, there should be picked a brand where the quota is not full yet. To check this, we have to try to set the quota question and use `qf` to check the quota until we find a brand where the quota is not full.

Let us say there is a multi question `brands`, and from this question one of the brands answered should be picked, if the quota is not full for that brand. We set up a hidden single question `chosen_brand` that should hold this brand. The quotas will be set up based on this question in the quota `brandsquota`.

The script will try to set `chosen_brand` to a brand chosen in `brands`, check the quota and continue to next brand if the quota is full. If the quota is not full, the current brand will be used.

```
var answers = f("brands").categories(); //codes of all brands selected
for(var i : int = 0;i<answers.length;i++) //iterate through the codes
{
  var code = answers[i]; //current code
  f("chosen_brand").set(code); //try to preset this code
  if(!qf("brandsquota")) //check if quota is not full for this code
  {
    break; //if quota is not full, keep this brand
  }
}
```

After this script *chosen_brand* will either be set to a brand where the quota is not full, or if the quota is full for all the brands *chosen_brand* will be set to the last one. Typically the interview should terminate if the quotas are full for all the brands answered, so after the script there should be a normal quota check in a condition, and then an info and a stop node with *quotafull* status in the then-branch. The expression in the condition should be like this:

```
qf("brandsquota")
```

10.1.11.2. qc and qt

The function *qt* is used to retrieve the target set for a particular quota, and *qc* is used to retrieve the current count.

```
qt(quotaName)
qc(quotaName)
```

qt and *qc* both return an integer. They will return target and count for the quota cell in the quota *quotaName* corresponding with the current respondent's answers on the questions the quota is based on.

If the respondent qualifies for several quotas within *quotaName*, *qt* and *qc* will return -1.

Note: Quota functions require a database, so will not work in Quick Test / External Quick Test.

Allocate a Respondent to the Lowest Current Quota Cell

Assume for example that you are performing a survey to evaluate respondents' feelings about five different web page layouts, but you want each respondent to only evaluate one of the layouts. You also want the respondents to be evenly distributed across the five layouts. You could use the following script to select which layout a respondent is shown:

```
var form = f('q1')
var codes = form.domainValues();
var count = 2000; //a value higher than your highest quota target

var code;
var lowestCode;

/*Loops through all the alternatives in q1 and checks whether the quota
count is lowest with that answer*/

for(var i: int=0; i<codes.length; i++) {
  var code = codes[i];
  form.set(code);
  if( qc("quota1") < count ) {
    count = qc("quota1");
    lowestCode = code;
  }
}

form.set(lowestCode);
```

Here "q1" is the question id for the question with an answer per web page layout tested (should normally be a hidden question). "quota1" is the quota id for the quota used in the survey. Now you can create skip logic in the survey based on q1.

Note: It is important that the quota 'quota1' does not have any quota cells set to 'Any' for this example. If that is the case then the respondent will qualify for several quota cells, and the qc() function will then return -1 which will stop the script working as required. If the Total rows or columns of the quota have been changed manually in quota Grid View, then an 'Any' row may be added to the table automatically. The respondent will then always qualify for both one of the answer choices AND the Any cell, hence resulting in -1 being returned by these functions.

10.1.11.3. GetLeastFilledQuotaCodes

The function *GetLeastFilledQuotaCodes* is used to retrieve an ordered array of codes for the least filled quota cells for a specific quota.

```
GetLeastFilledQuotaCodes(quotaName, N, [code mask])
```

where

quotaName is the name of the quota to be evaluated.

N is the number of quota cell codes to be returned if available.

[code mask] is an optional array that can be applied as a mask when considering the quota cells.

The array returned is the codes of the quota cells ordered by least filled first, in percentage terms. If the percentage filled values are equal, then the equal cells are ordered randomly. The function can be used with a quota which is based on one question only, the question can be either a single or multi choice question, but there cannot be more than one question used in the quota. If the quota is based on more than 1 question an empty array is returned.

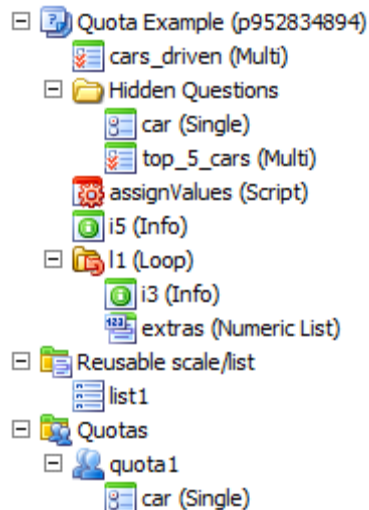
Note: In quick test mode, external test mode and through RDG, this function returns an empty array. See below.

For testing purposes you can create your script so that the GetLeastFilledQuotaCodes() function is only called when in production mode, and script another way to select quota cells for any of the test modes. For example:

```
if(IsInProductionMode())
{
  f("top_5_cars").set(new Array(GetLeastFilledQuotaCodes('quota1',
5,f("cars_driven").categories())));
}
else
{
  SetRandomCategories(5,"top_5_cars"); //test mode so select 5 random
quota cells
}
```

For a quota based on multi choice question, answers code(s) without the prefix questionName_ are returned. Quota cells that are already full or that have a target value of 0 are not returned. For a quota based on a single choice question, [Any] cells are not considered and are not returned by the function. For a quota based on a multi choice question all answers should be [Any] except one which should be [Chosen]; only cells with this structure are considered by the function.

In this example:



There is an interactive multi choice question “cars_driven”, a hidden single choice question “car” and a hidden multi choice question “top_5_cars” has the same answer list. Of the cars selected in “cars_driven” the quota cell that is least filled is assigned to the question “car”, and the top five least filled quota cells are assigned to the question “top_5_cars”. This is achieved using the “assignValues” script node, the contents of this is:

```
//Find the least filled quota cell and assign it
```

```
f("car").set(GetLeastFilledQuotaCodes('quota1',
1,f("cars_driven").categories()).toString());

//Find the top 5 least filled quota cells and assign them

f("top_5_cars").set(new Array(GetLeastFilledQuotaCodes('quota1', 5,
f("cars_driven").categories())));
```

The loop "1" is then masked based on the value assigned to the question "car", meaning that only the chosen car (least filled quota) will have the loops questions asked.

Note that the ...(new Array()... is required because Forsta returns a standard .NET array type but "Array" in JScript.NET is different; this then eliminates any possible incompatibility.

Other examples of using this function include:

1. Display the least filled code:

```
^GetLeastFilledQuotaCodes('quota1', 1).toString()^
```

2. Display the length of the array:

```
^GetLeastFilledQuotaCodes('quota1', 6).Length^
```

3. Display the top 3 filtered by a hard-coded array:

```
^GetLeastFilledQuotaCodes('quota1', 3, ['1', '2', '3', '4', '5',
'6']).toString()^
```

Note: The GetLeastFilledQuotaCodes() function is calculated every time the function is called, therefore if it is executed several times in the same interview, the values returned could be different due to either the state of the quotas changing or due to the random selection of cells that are equally full in percentage terms.

Note: This function does not take into account the Optimistic Quota setting. I.e. in an Optimistic Quota the returned array is ordered based on the percentage of Counter/Target and does not include the In Progress or Optimistic Total Limit.

If Optimistic Quota is enabled on a quota that is used with GetLeastFilledQuotaCodes(), then potentially the function could return quota cell codes where interviews are In Progress and therefore quota cells could overachieve their targets if the In Progress interviews complete. By using qf() and GetLeastFilledQuotaCodes() it is possible to check if the least filled cells are already optimistically full. Below is an example script:

```
var qtaId = "aQuotaId"; //a quota that has Optimistic Quota enabled
//there is no additional advantage in using this script unless Optimistic
//Quota is enabled
var qid = "qtaQuestion"; //the question on which the quota is based
var n = 99; //this should be the number of cells defined in
//the quota
var openCells = GetLeastFilledQuotaCodes(qtaId,n);
var leastFilled;
var stop = false;
if(openCells.length>0)
{
    var leastFilled = openCells[0];
    for(var i=0; !stop && i<openCells.length; i++)
    {
        var currCell = openCells[i];
        f(qid).set(currCell);
        if(qf(qtaId))
        {
            //optimistically, In Progress interviews might fill this cell soon,
            //discount it
            f(qid).set(null);
        }
        else
        {
            //this cell is included in Least Fill and also isn't optimistically full,
            //let's use it and stop the for() loop:

```

```

        stop = true;
    }
}
if(!f(qid).toBoolean())
{
//all quota cells are OPTIMISTICALLY full, maybe redirect the interview
to some quota full handling call block?
}
}
else
{
//all quota cells have achieved targets, redirect the interview to some
quota full handling call block
}
}

```

10.1.12. Credits in Panels

This section describes the functions that can be used to give points (credits) to panelists. Some functions can be used only in Standard Panels and Professional Panels, and some can also be used in Basic Panels. Basic Panels and Standard Panels and Professional Panels are Forsta add-ons. If you do not have access to this functionality, please contact your Forsta account manager for more information.

10.1.12.1. *SetPanelistCredit*

SetPanelistCredit is used for giving panelists points for registering in the panel and responding to surveys. *SetPanelistCredit* can be used in Basic Panels, Standard Panels and Professional Panels.

```

SetPanelistCredit(credit, comment)
SetPanelistCredit(credit, comment, sectionId)
SetPanelistCredit(credit, comment, panelistId)
SetPanelistCredit(credit, comment, panelistId, sectionId)

```

All of these update a global credit counter in the panel called *CreditBalance* which can be found inside the *PanelistParticipation* folder. The instance of the function that is being used, depends on the number of parameters and their type.

credit is an integer that represents the number of points that is to be added to the balance. *comment* is a String that can be used to include some information about why the points were added. The limit for *comment* is 256 characters.

If you include just *credit* and *comment* as parameters, you set *credit* points to be added to the credit balance from the survey the panelist is responding to. These points will be added as soon as interview status is set to "complete", "screened" or "incomplete" for the respondent. A repeated call to the function in the same survey will overwrite the previous credit assigned for the survey.

If you would like to assign different sets of points for different parts of a survey, you can also include *sectionId*. *sectionId* is a String with maximum 40 characters that can identify different parts of the survey. You can call the sections whatever you like as long as you are within the 40 character limit and do not use Unicode characters. The credits (points) will be active as soon as the respondent's interview status is set. If the panelist does not have any status (=incomplete), a pending flag will be set and the points will not become active until the status changes to for example "complete", "screened" or "quotafull".

If you need to update points for a different panelist, you can do this by including the *panelistId* (integer) of that panelist. This can for example be done to credit panelist's that refer friends to the panel. You may send the *panelistid* (resp id in panelist survey) of the panelist that referred into the survey in the URL and retrieve it with *Request* (see *QueryString* on page 228 for more information), and then use *SetPanelistCredit* to credit his/her points balance.

Note: Panelistid must be a valid number/integer. If panelistid is a String, then the current panelist will be used irrespective of the panelistid value.

SetPanelistCredit() can over-write an existing row depending on how the function is called. The full function call, including all arguments is:

```

SetPanelistCredit(credit, comment, panelistId, sectionId)

```

Credit and comment are required arguments. If you wish to make more than one set from a “single survey record”, you will also need to include the sectionId.

Example: Assuming a starting credit value of 5000, run the following script for a specific record in the survey:

```
SetPanelistCredit(-1000, 'redemption')
```

At this point you will have a balance of 4000. If you change the script to the following and re-launch and re-enter:

```
SetPanelistCredit(-2000, 'redemption')
```

on viewing the balance you will see 3000, not the expected 2000. If you wish to have each expression counted “separately”, you must add a sectionId. This will cause separate rows to be written for each. For example:

```
SetPanelistCredit(-1000, 'redemption', 'R-20130827170301')
```

In the example, a sectionID of "R-" is specified and then YYYYMMDDHHMMSS is appended. This is pulled from a new Date() object. You can alter your code to send in a sectionID that will be different each time a panelist runs over the script. This ensures that a new row will be written.

Note: If you just want something unique per row, use .getTime() from a new Date() object.

Note: comment is limited to 256 characters and sectionId is limited to 40 characters.

Also note that rows are marked 'pending' until a status (complete, screened, etc) is set for the record.

10.1.12.2. Using Custom Variables with SetPanelistCredit

Custom Variables variables are supported in Standard and Professional Panels.

```
SetPanelistCreditWithCustomVariables(credit, comment, fieldNames,
fieldValues)
SetPanelistCreditWithCustomVariables(credit, comment, sectionId,
fieldNames, fieldValues)
SetPanelistCreditWithCustomVariables(credit, comment, panelistId,
fieldNames, fieldValues)
```

fieldNames (array of Strings) are the names of the custom fields in the credit transaction loop in the database to be updated, and fieldValues are the corresponding values to set in these fields.

10.1.12.3. GetPanelistCreditBalance

GetPanelistCreditBalance() can be used to retrieve the credit balance for a panelist as an integer. You can get either the total balance or the balance within a specific period. GetPanelistCreditBalance is supported in Basic Panels, Standard Panels and Professional Panels.

```
GetPanelistCreditBalance()
```

returns the current total for a panelist as an integer.

With the Date Time parameters fromDate and toDate you can get the balance for a panelist within a specific period as an integer (the sum of all the transactions within that period), e.g:

```
GetPanelistCreditBalance(fromDate, toDate);
```

Displaying Current Credit Balance in a Survey

If you want to show the panelist their current credit balance in a survey, you can include the following in the text of an info node or question:

```
^GetPanelistCreditBalance()^
```

Calculating Credit Balance for the Last 30 Days

The following function can be used to calculate the credit balance, looking at the last 30 days ("adding" -30 days).

```
function last30()
{
var toDate : DateTime = DateTime.Now;
var fromDate : DateTime = toDate.AddDays(-30);

return GetPanelistCreditBalance(fromDate,toDate);
}
```

10.1.12.4. GetPanelistCredits

The `GetPanelistCredits` function can be used to retrieve a subset of a panelist's transactions, as an array of `PanelistCredits` objects. `GetPanelistCredits` is supported in Basic Panels, Standard Panels and Professional Panels.

```
GetPanelistCredits(topN);
GetPanelistCredits(fromDate,toDate);
GetPanelistCredits(topN, fromDate, toDate, startPosition,
orderAscending);
```

`GetPanelistCredits(topN)` will return an array of `PanelistCredits` objects (see below), representing the last `topN` transactions. `topN` is an integer.

`GetPanelistCredits(fromDate,toDate)` will return an array of `PanelistCredits` objects (see below), representing transactions performed between `fromDate` and `toDate`. `fromDate` and `toDate` are both of type `DateTime`.

`GetPanelistCredits(topN, fromDate, toDate, startPosition, orderAscending)` will return an array of `PanelistCredits` objects (see below), representing the first `topN` transactions performed between `fromDate` and `toDate`, if ordered ascending (true for `orderAscending`) or descending (false for `orderAscending`). `topN` is an integer, `fromDate` and `toDate` are both of type `DateTime` and `orderAscending` is Boolean.

The `PanelistCredits` objects in the array returned have the following properties:

```
pCredit.CreditId
```

`CreditID` (integer) is the unique identifier for a transaction.

```
pCredit.PanelistId
```

`PanelistID` (integer) is the responseid of the panelist the credits are assigned to.

```
pCredit.SecondaryPanelistId
```

`SecondaryPanelistId` (integer) is the responseid of another panelist. This field holds a different panelistid if points have been set from a different panelist's survey (for example for referrals).

```
pCredit.PanelistTransactionId
```

`PanelistTransactionId` (integer) is the id of the transaction, unique to this panelist.

```
pCredit.SectionId
```

`SectionId` (String) is an identifier a survey designer may assign to the credits, for example if assigning credits to panelist at various points in the survey.

```
pCredit.SurveyId
```

`SurveyID` (String) is the project number (pXXXXXX) of the project the credits were assigned from.

```
pCredit.Credit
```

`Credit` (integer) is the number of credits (points) assigned to the panelist in this transaction. A negative number would represent points withdrawn.

```
pCredit.Comment
```

`Comment` (String) is a text assigned to the transaction, for example explaining what the transaction represents.

```
pCredit.Created
```

`Created` (DateTime) is the time the transaction was made (added).

```
pCredit.Pending
```

Pending (Boolean) represents whether the transaction is pending (not active) or not. If the transaction is pending, the flag is set to true, if not, it is set to false.

Retrieving and Listing the last 10 Panelist Credits Transactions inside a Survey

The following functions will list out the date, project number and credits (points) of the last 10 credits transactions assigned to the current panelist in an HTML table:

```
function ShowCredits()
{
  var pCredits = GetPanelistCredits(10);
  var txt = "<table>\n"
  txt += "<tr><td>Date</td><td>Project</td><td>Points</td></tr>\n";
  for(var i : int = 0;i<pCredits.length;i++)
  {
    txt+="<tr><td>" +pCredits[i].Created+"</td>";
    txt+="<td>" +pCredits[i].SurveyId+"</td>";
    txt+="<td>" +pCredits[i].Credit+"</td></tr>\n";
  }
  txt += "</table>\n";
  return txt;
}
```

10.1.12.5. Using Custom Variables when Getting Panelist Credits

Custom variables are supported in Standard and Professional Panels.

```
GetPanelistCreditsWithCustomVariables(topN, fieldNames);
GetPanelistCreditsWithCustomVariables(fromDate, toDate, fieldNames);
```

will retrieve panelist credit transactions with the default properties (see GetPanelistCredits on page 136 for more information) and in addition any custom variables listed in fieldNames (array of Strings), either the topN first records or the records between fromDate and toDate.

Retrieving and Listing the last 10 Panelist Credits Transactions inside a Survey, including custom variables

The following functions will list out the date, project number, credits (points) and the two custom variables listed in the array fieldNames, of the last 10 credit transactions assigned to the current panelist in an HTML table:

```
function ShowCreditsWithCustomVariables()
{
  var fieldNames = ['customVariable1', 'customVariable2'];
  var pCredits = GetPanelistCreditsWithCustomVariables(10, fieldNames);

  var txt = "<table>\n"
  txt += "<tr><td>Date</td><td>Project</td><td>Points</td><td>Custom  
Variable 1</td><td>Custom Variable 2</td></tr>\n";
  for(var i : int = 0;i<pCredits.length;i++)
  {
    txt+="<tr><td>" +pCredits[i].Created+"</td>";
    txt+="<td>" +pCredits[i].SurveyId+"</td>";
    txt+="<td>" +pCredits[i].Credit+"</td>";
    txt+="<td>" +pCredits[i].CustomFieldValues[0] +"</td>";
    txt+="<td>" +pCredits[i].CustomFieldValues[1] +"</td></tr>\n";
  }
  txt += "</table>\n";
  return txt;
}
```

10.1.13. Standard and Professional Panels

This section describes functions that can be used in registration and profile update surveys linked to a Standard or Professional Panel to add and update panelists.

Standard Panels and Professional Panels are Forsta add-ons. If you do not have access to this functionality, contact your Forsta account manager for more information.

Registration and profile update surveys are set up as regular Forsta surveys, and are linked to the panel database through a setting on the **Project Management > Overview** page General tab:

Panel Allow current survey to access [Go to panel](#)

This setting will allow scripts in the survey to add new panelists to the panel database and retrieve and update data from the panel database for the current panelist. Very often the registration and profile update surveys will be linked from the Panel Portal.

10.1.13.1. CreatePanelist

In a registration survey linked to a Panel as described below, the person registering to participate in the panel can be asked for email (which will be used as the login name and unique identifier), password and other information. The panelist can be added to the panel database with the `CreatePanelist` function:

```
CreatePanelist(fieldNames, fieldValues)
```

`CreatePanelist` will return the panelist id (positive integer) if the insert succeed, or a negative integer if the insert of a new panelist fails, for example because a panelist is already registered with the provided email address (see below).

The parameters are both arrays of Strings: `fieldNames` are names of the fields in the panel database to insert data into, and `fieldValues` are the corresponding values to insert into these fields. `fieldNames` needs at least to include "email", but if the panel database has other user provided unique fields, these fields need to be included as well.

The codes returned from the insert of a new panelist are listed below. A negative code (less than zero) represents an error and means that the panelist creation did not succeed.

| Code | Description |
|------|---|
| >0 | The panelist was created successfully. A new panelist record is added to the database and the panelist id is returned. |
| -1 | Error on the survey end, for example not being able to connect to the panel database etc. |
| -2 | The unique constraint is violated, i.e. a panelist already exists with the provided values in the unique fields (email + any user provided unique fields) |
| -3 | Other database errors when inserting the new panelist. |
| -5 | The password failed on one or more of the password complexity rules, according to the Panel settings for password complexity. |

Inserting a new Panelist in a Panel

In a registration survey that is linked to a Panel as described above, there is an open text question with question id "email". In the validation code of this open text question the following script can be included to insert the new panelist in the Panel database, and provide an error message if the insert fails:

```
var fieldNames : String[] = ["email"];
var fieldValues : String[] = [f('Email')];
var result = CreatePanelist(fieldNames, fieldValues);
if(result<0 && result!= -2 && result!= -5)
{
```

RaiseError();

SetErrorMessage(LangIDs.en,"Unknown error: Couldn't register with this email address. Error code:" + result);

```
}
else if(result == -2)
{
```

RaiseError();

SetErrorMessage(LangIDs.en,"Can't register with this email address. It is already in use.");

```
}
else if (result == -5)
{
```

RaiseError();

SetErrorMessage(LangIDs.en,"Password does not comply with password complexity rules. Please choose a different password.");

```
}
```

10.1.13.2. UpdatePanelVariables

If a survey is linked to a Panel as described above, and the panelists are identified either through panelistid being included in respondent table (a survey you have sampled to), because the survey is opened within a protected page (requires login) in the panel portal (profile update), or because you have just inserted this panelist with the CreatePanelist function (registration survey), you may use the UpdatePanelVariables function to update variables in the panel database.

```
UpdatePanelVariables(fieldNames, fieldValues)
```

The parameters of the UpdatePanelVariables function are both arrays of Strings: fieldNames are names of the fields in the panel database to update, and fieldValues are the corresponding values to set in these fields.

UpdatePanelVariables will return a negative integer if the update fails:

| Code | Description |
|------|--|
| 0 | Update successful. |
| -1 | Error on the survey end, for example not being able to connect to the panel database etc. |
| -2 | The unique constraint is violated, i.e. another panelist already exists with the provided value(s) you are trying to set for (one of) the unique field(s) (email + any user provided unique fields). |
| -3 | Other database errors when updating the panelist. |
| -4 | The panelist does not exist. |
| -5 | The password failed on one or more of the password complexity rules, according to the Panel settings for password complexity. |

Update Panel Variables in a Panel

Here is an example from a survey linked to a Panel as described above, where the questions gender, dateofbirth, USstate, householdsizе, carowner, empstatus, marstatus and email are asked. A hidden open text question status_desc is used to store the status returned from the update call. The following script can be placed in a script node to update these variables in the panel database for the current panelist:

```
var fieldNames : String[] =
["gender", "dateofbirth", "USstate", "householdsizе", "carowner", "empstatus",
"marstatus", "email"];
var fieldValues : String[] =
[f('Gender'), f('dateofbirth'), f('USstate'), f('householdsizе'), f('carowner'),
f('empstatus'), f('marstatus'), f('email')];
var result = UpdatePanelVariables(fieldNames, fieldValues);

if(result <0 && result!= -2 && result!= -4 && result!= -5)
{
f('status_desc').set("Unknown error. Error code:" + result);
}
else if(result == -2 )
{
f('status_desc').set("Update of email address failed. It is already in
use for another panelist.");
}
else if(result == -4 )
{
f('status_desc').set("Panelist does not exist in the panelist
database.");
}
else if(result == -5 )
{
f('status_desc').set("Password does not comply with password complexity
rules.");
}
else
{
f('status_desc').set("Succesfully updated.");
}
```

10.1.13.3. GetPanelVariables

If a survey is linked to a Panel as described above, and the panelists are identified either through panelistid being included in respondent table (a survey you have sampled to) or because the survey is opened within a protected page (requires login) in the panel portal (profile update), you may use the GetPanelVariables function to update variables in the panel database.

```
GetPanelVariables(fieldNames)
```

Note: If this function is used in a survey, then the survey must be launched as a Limited survey. Failure to do this will result in an error message being generated for each respondent who attempts but fails to enter the survey either because they are not uploaded or because they do not enter via a portal.

GetPanelVariables will retrieve values from the fields provided in fieldNames (array of Strings) and return these values. The data types will be according to the question types (for example date, numeric, open text etc.).

Retrieving Data for a Panelist in a Panel

The following script can be placed in a script node in the beginning of a profile update survey linked to a panel as described above to retrieve the fields gender, dateofbrith, USstate, carowner, empstatus, marstatus and email and set these values in the corresponding questions in the survey. The script will skip empty values (empty string "" or null), and also shows how true and false for the carowner variable, which is a Boolean in the Panel, are converted to codes 1 and 0.

```

var fieldNames : String[] =
["gender", "dateofbirth", "USstate", "householdsize", "carowner", "empstatus",
"marstatus", "email"];
var variables = GetPanelVariables(fieldNames);
for(var i=0;i<fieldNames.length;i++)
{
  if(fieldNames[i]=="carowner")
  {
    if(variables[i])
      f(fieldNames[i]).set("1")
    else
      f(fieldNames[i]).set("0")
  }
  else if(variables[i]!=" " && variables[i]!=null)
    f(fieldNames[i]).set(variables[i]);
}

```

10.1.13.4. UpdateSurveyHistoryPanelVariables

The function UpdateSurveyHistoryPanelVariables replaces UpdateSurveyHistoryVariables, and is used for updating the survey history of a panelist directly from a script in the panel survey. It requires that the survey from which it is called is linked to the panel as described previously.

```
UpdateSurveyHistoryPanelVariables(fieldNames, fieldValues)
```

fieldNames and fieldValues are both arrays. fieldNames holds the variable names of the survey history variables you want to update, and fieldValues the corresponding values to assign to them.

Update Survey History Variables in a Panel

This is an example from a survey linked to a Panel as described, where sample has been uploaded from a sample job. The response to a question "surveyrating", asked at the end of the survey, is to be set in the panel's survey history.

```

var fieldNames : String[] = ["surveyrating"];
var fieldValues : String[] = [f('surveyrating')];
UpdateSurveyHistoryPanelVariables(fieldNames, fieldValues);

```

10.1.13.5. UpdateSurveyHistoryVariables (obsolete)

The function UpdateSurveyHistoryVariables is used for updating the survey history of a panelist directly from a script in the panel survey, in a similar way to UpdateSurveyHistoryPanelVariables, but requires providing the panelistID and jobNumber in addition to the variables to update and their values. It requires that the survey from which it is called is linked to the panel as described previously.

```
UpdateSurveyHistoryVariables(panelistIDString, jobNumber, fieldNames,
fieldValues)
```

panelistIDString (string) is the panelistid (the responseid in the panel database). jobNumber (string) is the sample job number. fieldNames and fieldValues are both arrays. fieldNames holds the variable names of the survey history variables you want to update, and fieldValues the corresponding values to assign to them.

It is recommended that you use UpdateSurveyHistoryPanelVariables instead, as that is simpler. However UpdateSurveyHistoryVariables is still supported.

10.1.13.6. IsFromCommunityPortal and GetCommunityPortalReturnUrl

When the registration and/or profile update survey is opened from the Panel Portal, it will be opened within a frame in the Panel Portal. The functions IsFromCommunityPortal and GetCommunityPortalReturnUrl are provided to seamlessly handle redirecting back to the Panel Portal for panelists that have opened the survey from within the Panel Portal.

```
IsFromCommunityPortal()
```

`IsFromCommunityPortal()` returns `true` if the survey is opened from the Panel Portal and `false` if not. The function can be used to determine when to redirect to the Panel Portal Url provided by the `GetCommunityPortalReturnUrl` function.

```
GetCommunityPortalReturnUrl()
```

`GetCommunityPortalUrl()` returns a URL that can be used to redirect back to the Panel Portal, with authentication (so that the panelist does not need to log on again if he/she was already logged in).

Redirect back to Panel Portal

The following script can be placed in a script node at the end of a survey to redirect back to the Panel Portal for panelists that open the survey from the Panel Portal:

```
if(IsFromCommunityPortal())
{
  Redirect(GetCommunityPortalReturnUrl());
}
else
{
  Redirect("http://www.confirmit.com");
}
```

10.1.13.7. *IsFieldValueTaken*

In Professional and Standard Panels it is possible to set panel variables to be unique. That means that each panelist must have a unique value in this field. The `isFieldValueTaken` function can be used in panelist recruitment surveys to check if any previous respondents have selected the same value in a given field.

```
isFieldValueTaken(fieldName, value)
```

`isFieldValueTaken` returns `true` if there is already a panelist in the sample with the provided value (string) in the question with question id `fieldname` (string), `false` otherwise.

It can be used in the validation code of the question defined in "uniqueid" in a panel survey:

```
if(isFieldValueTaken("uniqueid", f("uniqueid").get()))
{
  SetQuestionErrorMessage(LangIDs.en,"The value in uniqueid is already
taken. Please input a different value.");
  f("uniqueid").set("");
  RaiseError();
}
```

The function can also be used in the same way in ordinary projects to check that the value entered in a question with a given question id is unique. If the function is used in ordinary projects, performance will be improved if the Indexed property is set on the question being checked. If the function is used to check variables in a panel, again performance will be improved if the Indexed property is set on the variable being checked.

Note: This function is not supported in RDG, quick-test and external test mode.

When connected to a panel (Professional, Standard or Basic), this function will look in the panel database to see if the value is taken. When used in a normal survey not connected to a panel, the function will look in the survey database.

Note that if the `qid` referenced in `isFieldValueTaken(qid,value)` does not exist in the panel database the function will always return `true`.

10.1.13.8. *isEmailTaken*

The `isEmailTaken` function is used in panelist recruitment surveys in the same way as `isUsernameTaken`; to check if any previous respondents have registered with the same email address.

```
isEmailTaken(email)
```

`isEmailTaken` returns `true` if there already is a panelist in the sample with the provided `email` (string), `false` otherwise.

The function can also be used in the same way in ordinary projects, to check that the value entered in a question with question id *email* is unique. If the function is used in ordinary projects, the *indexed* property should be set on the *email* question to improve performance.

Note: This function is not supported in RDG, quick-test and external test mode.

Note: If you call the function from a survey that is connected to a panel (for example a registration/update profile survey), then the string argument is compared with the email column in the panel, while if the function is called from a survey that is not connected to any panel, then the argument is compared to the email column in the response database of the actual survey.

10.1.13.9. DeleteCurrentResponse

Since the data of registration and profile update surveys are usually posted back to the panel database before the end of these surveys, it is usually not necessary to keep the data in the survey itself. Therefore a function is provided to enable deletion of the entire response at the end of the survey after all update scripts have been run:

```
DeleteCurrentResponse()
```

DeleteCurrentResponse will remove the entire record with all responses from the survey database.

When DeleteCurrentResponse is used at the end of the survey in a script node, it should be followed immediately by a redirect script. This is because any attempt to open a survey page (including the end page) after the record has been deleted will give an error, as the respondent no longer exists (see IsFromCommunityPortal and GetCommunityPortalReturnUrl on page 141 for more information).


10.1.13.10. Functions for Sample Only

RedirectToExternalSurvey and GetExternalSurveyState

Note: "Sample Only" is a Panel add-on to be used by access panel providers who, as a part of their business, sell sample to other companies, on projects where they do not perform the data collection themselves. Any other usage of this functionality is prohibited. Contact your Forsta account manager for more information.

With the "Sample Only" add-on enabled, you can upload a repository of external survey links to the sample job. To upload the links:

Create a text file (.txt) with 'Link' as the only column header and the external survey links listed, one link per row. On "Job Information", the interface shown below is available to upload external survey links to the job:

External Survey Links 500 links are available out of 1500 links total Upload links 
Delete available Delete all

These survey links will then be included in the sample file(s). These can then be uploaded to a Forsta survey, which must be linked to a Panel on Project Overview:

Panel Allow current survey to access p733098433 Find Panel... Clear Go to panel

This project is used for:

- Emailing survey invitations and reminders to panelists
- Redirecting panelists to the external survey links
- Update status, panelist credits etc. if panelists are redirected back to the survey when finished in the external survey link with status.

You can also add questions to this survey; you could for example ask panelists to rate the survey experience etc. when they are finished with the external survey, or you may need an initial screener before respondents are redirected. Note however that you are NOT allowed to use this redirect survey for general data collection.

The following function can be used in this survey to handle redirects and statusing:

```
RedirectToExternalSurvey(queryString)
```

`RedirectToExternalSurvey` will redirect the panelist to the url uploaded to the background variable "ExternalSurveyLink", with `queryString` (optional, String) added to the link. `queryString` can be used if you need to send in some values with the link. This can be useful if the system running the survey is capable of fetching these values sent in with the link.

For example, if you have a background variable **gender** in the sample file, you could send in that value with the external survey link by using:

```
RedirectToExternalSurvey("?gender="+f("gender").get())
```

If you send in several parameters like this, then you must separate them with the ampersand (&) character.

The `RedirectToExternalSurvey` function will also set a session cookie that will be used when panelists are redirected back to the survey after finishing the external survey, to identify the panelist and set the correct status on the panelist for this job.

At the end of the external survey, there should be a redirect back to the survey with the correct status in the survey link. This status will then be set both on the redirect survey, and back to the panel (in survey history). The statusing URL is one of the following:

```
http://<server>/wix/<pid>.aspx?status=complete
```

```
http://<server>/wix/<pid>.aspx?status=screened
```

```
http://<server>/wix/<pid>.aspx?status=quotafull
```

```
http://<server>/wix/<pid>.aspx?status=incomplete
```

```
http://<server>/wix/<pid>.aspx (this will default to complete)
```

`<server>` is to be replaced with either `survey.confirmit.com` or `survey.euro.confirmit.com` if you are a SaaS user, or your system's survey domain if you are an On-Premise user. `<pid>` is to be replaced with the project id of the survey that is used for the redirect.

When panelists are redirected back, the system will retrieve the necessary information from the cookie to identify the panelist so that the right status is set, and open the survey after the redirect. The survey will be opened on the node following the script node with the Redirect script (for example a question, a script node or a stop node). Additional questions or scripts, for example to set Panelist Credits (points), can be placed after the Redirect script to be executed when the panelist is redirected back to the redirect survey. The redirect survey will be opened automatically at the point where the redirect was done when the panelists return from the external survey, due to the details stored in the cookie.

The cookie is a "session cookie", so is removed when the panelist closes his/her browser.

The function `GetExternalSurveyState` can be used to keep track of what state the panelist is in, i.e. whether status has been set or not.

```
GetExternalSurveyState()
```

`GetExternalSurveyState` will return one of the following state codes:

```
ExternalSurveyState.NONE
```

```
ExternalSurveyState.NOT_STARTED
```

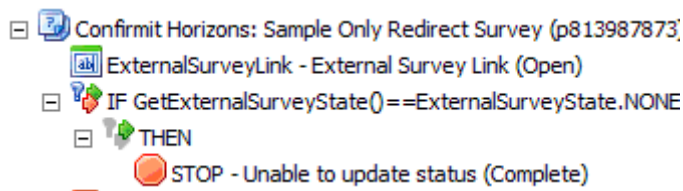
```
ExternalSurveyState.IN_PROGRESS
```

```
ExternalSurveyState.STATUS_SET
```

The `GetExternalSurveyState` function is useful if a panelist has disabled cookies in his/her browser. If the session cookie cannot be found, you will be unable to automatically update the panelist status. To treat this special case, you can include a condition with the expression

```
GetExternalSurveyState() == ExternalSurveyState.NONE
```

followed by a stop node so that these panelists don't cause any errors in scripts you have for example to update panel variables or points. The text on this stop node could for example notify the panelist that their points status was not updated automatically and that they will have to wait some days for this to be done, depending on the procedures for this. It is probably a good idea to flag these incidents by setting a hidden variable as well so that you keep track on how often it happens.



Note: The statusing survey must have "Encrypt system request parameters" (default) enabled in Survey Settings/Web for statusing to work.

If you follow the procedure described above, "Interview complete - Sample Only" units will be logged for completes instead of regular "Interview complete - CAWI ". These units are solely intended to be used by access panel providers who, as a part of their business, sell sample to other companies, on projects where they do not perform the data collection themselves. Any other usage of this functionality is prohibited. The following must be in place for the "Interview complete - Sample only" units to be logged:

1. The project must be linked to a Standard or Professional Panel.
2. The respondent must have a value in the panelistid column in the respondent table.
3. The respondent must have a value in the External Survey Link column in the respondent table.

All of this happens automatically when uploading sample from the sample job if you follow the procedure described above.

10.1.13.11. AddPanelSurveyHistory

This function is used to create a survey history entry for the current panelist, it is used in scenarios where the panelist is participating in a survey linked to the panel that they are a member of, but have not been directly sampled to.

```
AddPanelSurveyHistory( panelistId, jobNumber)
```

The input parameters are strings: panelistId is the panelist's ID from the linked panel and jobNumber is the job number in the panel that the survey history entry will be associated with.

The following syntax can be used to update the current panelist in job number 10 in the linked panel. An error will be reported if the insert fails:

```
AddPanelSurveyHistory(GetRespondentValue('PanelistId'), "10");
```

The following criteria must be met for the panelist's survey history to be updated successfully:

1. The survey must be linked with a Standard or Professional Panel.
2. The specified panelist ID must exist in the panel.
3. The survey needs the panel fields in the Respondent table: panelistid, jobnumber and runnumber

On successful execution of the function, the survey panel history for the specified panelist will be updated in the panel for this survey. If the job number does not exist, a new job will be created with this job number.

Note: This function is required when a Survey Router is used to route panelists from one survey to another where the routed-to survey is one that the panelist was not sampled to.

10.1.14. Basic Panels

This section describes two functions available for Basic Panels but which also may be used in ordinary projects.

Note: Basic Panels is a Forsta add-on. If you do not have access to this functionality, contact your Forsta account manager for more information.

10.1.14.1. *isUsernameTaken*

In Basic Panels, the unique identifier for a panelist is the panelist's username. The `isUsernameTaken` function is used in panelist recruitment surveys to check if any previous respondents have selected the same username.

```
isUsernameTaken( userName )
```

`isUsernameTaken` returns `true` if there is already a panelist in the sample with the provided `userName` (string) in the question with question id "username", `false` otherwise. Note that the question id must be "username".

It is used in the validation code of the `username` question (mandatory) in a panel survey:

```
if(isUsernameTaken(f("username").get())){ SetQuestionErrorMessage(LangIDs.en,"User name taken. Please choose another user name."); f("username").set(""); RaiseError();}
```

The function can also be used in the same way in ordinary projects, to check that the value entered in a question with question id "username" is unique (note that the question must have the question id "username"). If the function is used in ordinary projects, the `indexed` property should be set on the `username` question to improve performance.

Note: If you call the function from a survey that is connected to a panel (for example a registration/update profile survey), then the string argument is compared with the username column in the panel, while if the function is called from a survey that is not connected to any panel, then the argument is compared to the username column in the response database of the actual survey.

10.1.15. Classification Functions

Use these functions to check that the data input by the respondents, for example date and age information, is of the correct format.

10.1.15.1. *IsNumeric and IsInteger*

```
IsNumeric( argument )
```

`IsNumeric` returns `true` if the argument (string) is numeric.

```
IsInteger( argument )
```

`IsInteger` returns `true` if the argument (string) is an integer.

Checking that a Response in an Open Text List Question is an Integer

If you have an Open Text List question `details`, you can have text boxes for "name", "title", "address", "age" etc. If we want integers only to be allowed for "age", you have to provide validation code for that specific row in the open text list question. So, if "age" has code 4 in the open text list question `details`, we can use this validation code:

```
if(!IsInteger(f("details")["4"])) //Age not integer
{ RaiseError(); SetQuestionErrorMessage(LangIDs.en,"Please use integers only for \"age\"."); }
```

You could use `InRange` as well if you want to check that the value answered is in a reasonable range for age (see [Range](#) on page 77 for more information).

10.1.15.2. *IsDateFmt and IsDate*

```
IsDateFmt( argument, format )
```

determines whether the provided `argument` (string) is a valid date according to `format` (string).

Within a date format, the following character sequences have special significance:

| | |
|---|--------------------|
| Y | Year, four digits. |
|---|--------------------|

| | |
|------|-----------------------------------|
| YY | Year, two digits. |
| YYYY | Year, four digits. |
| M | Month number, one or two digits. |
| MM | Month number, exactly two digits. |
| D | Day number, one or two digits. |
| DD | Day number, exactly two digits. |

All other characters are treated as separators.

All parts are optional. If omitted, then the system date is used to determine month and year and the number 1 is used for the day.

```
IsDate( day, month, year )
```

`IsDate` determines whether the provided `year`, `month` and `day` combination (all strings) constitutes a valid Gregorian date.

The `month` and `year` arguments are optional. If they are not provided then the current month and/or year is used.

For both `IsDateFmt` and `IsDate` century interpolation for 2-digit years is handled with a break-point value of 10: values between 0-10 are interpreted as the years 2000-2010, while 11-99 is treated as 1911-1999.

`IsDateFmt` and `IsDate` return an object with the properties `day`, `month` and `year` if the date is valid and in the correct format, `null` otherwise. A general description of objects follows (see Objects on page 164 for more information), and examples where the object returned from `IsDateFmt` and `IsDate` and the properties `day`, `month` and `year` are used are given.

Both `IsDateFmt` and `IsDate` can be used in conditions to check for valid dates. If the date is valid and in the correct format, an object is returned. Used in a condition this will be interpreted as `true`. If the date is invalid or in wrong format, `null` will be returned. Used in a condition this will be interpreted as `false`.

Note: The Date question type gives a date input box and calendar popup, and has built-in validation so that you do not need to use `IsDate` or `IsDateFmt` to validate the date.

Validating Date Format of Open Text Date Question

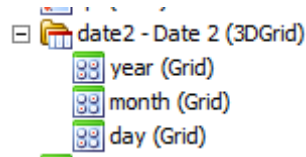
If you have an open text question `date1` and want the respondent to answer in a particular format, you can use `IsDateFmt`. `IsDateFmt` will both check that the format is correct, and that the date is a valid date.

Here is a script you can use in the validation code of such a question:

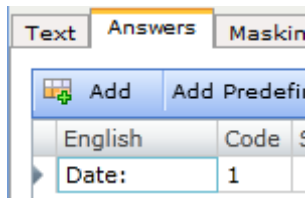
```
if(!IsDateFmt(f("date1").get(), "YYYY-MM-DD"))
{ RaiseError(); SetQuestionErrorMessage(LangIDs.en, "Invalid date. Please correct. Use the format YYYY-MM-DD"); }
```

Validating Date with Drop-downs for the Date Parts

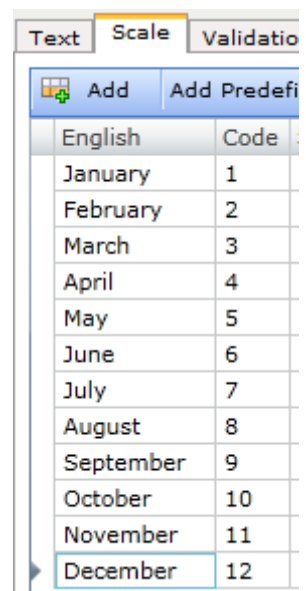
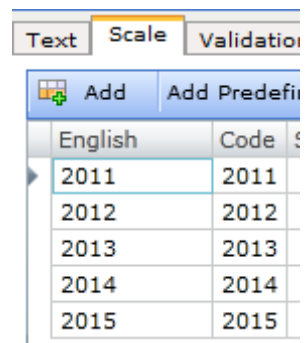
You can also set up date in three questions with drop-downs: One for year, one for month and one for day. To get these on the same line, you can place three grid questions in a 3D grid question as here:



The 3D grid's answer list will just have one item:



The grid's answer list will be years, months and dates. It is important that you define codes that are equal to the number of the years, months (1-12) and dates (1-31):



| English | Code |
|---------|------|
| 1 | 1 |
| 2 | 2 |
| 3 | 3 |
| 4 | 4 |
| 5 | 5 |
| 6 | 6 |
| 7 | 7 |
| 8 | 8 |
| 9 | 9 |
| 10 | 10 |
| 11 | 11 |
| 12 | 12 |
| 13 | 13 |
| 14 | 14 |

The question will then look like this:

Here is a script you can use in the validation code of such a question, using the `IsDate` function with the different date parts (the grid questions) as arguments:

```
if (!IsDate(f("day") ["1"].get(), f("month") ["1"].get(), f("year") ["1"].get()))
{
  RaiseError();
  SetQuestionErrorMessage(LangIDs.en, "Invalid date. Please correct.");
}
```

10.1.15.3. IsEmail

```
IsEmail( argument )
```

`IsEmail` checks whether the argument has the format of a valid email address. It returns true if it has, false otherwise.

Note: the function does not attempt any name look-ups or address verification, it just checks that the format is valid (i.e. includes an @ character etc.).

Validation of Email Address Format

An open text question *email* is used to collect the respondent's email address. To check that the answer is a valid email address, use the following code in the validation code field:

```
if(!IsEmail(f(CurrentForm())))
{
  RaiseError();
  SetQuestionErrorMessage(LangIDs.en,"Please provide a valid email
address.");
}
```

Note: In Survey Designer, users can enable the 'Email' property on a Text question. This removes the need for validation script to check that the answer adheres to email format.

10.1.15.4. IsNet

```
IsNet(quadIP, quadNet, quadMask)
```

Determines whether an IP address belongs to an Internet network.

| Argument | Description |
|----------|---|
| quadIP | The IP address, in quad form (X.X.X.X.). |
| quadNet | The network number, in quad form. |
| quadMask | An optional mask, in quad form, if sub netting is used. |

If no mask is provided then the number of bits that constitute the network part of the address is determined from the address class type. In this case the function returns true if the IP address' network number is identical to the supplied network number and it has a non-zero local address. Otherwise it returns false.

If a mask is provided then the function returns `true` if the IP address' network and subnet parts are identical to the one supplied and the host number part is non-zero. Otherwise it returns `false`.

You can use the `RequestIP` function to get the respondent's IP address (see `RequestIP` on page 95 for more information).

Excluding Respondents from Specific Networks

Assume you wish to exclude respondents with the network number "192.168.18.0", subnet mask "255.255.255.0" from taking a specific survey (for example because they work for the company that is running the survey).

Then you may place a condition in the beginning of the questionnaire with the following expression to screen those respondents:

```
IsNet(RequestIP(), "192.168.18.0", "255.255.255.0")
```

10.1.16. General Utilities

Use these functions to send emails etc.

10.1.16.1. SendMail

```
SendMail(from, to, subject, body, cc, bcc, mailformat, bodyformat, codepage)
```

SendMail can be used to send an email from inside a survey. For information on sending of multipart emails (see SendMailMultipart on page 153 for more information).

Arguments:

| Argument | Description |
|--------------------|--|
| <i>From</i> | Message sender (string) |
| <i>to</i> | Recipient's address (string) |
| <i>subject</i> | Message subject line (string) |
| <i>Body</i> | Message body (string) |
| <i>cc*</i> | Carbon Copy (string) |
| <i>bcc*</i> | Blind Carbon Copy (string) |
| <i>mailformat*</i> | (int) (obsolete) |
| <i>bodyformat*</i> | (int) 0 – HTML, 1 – Plain text |
| <i>codepage*</i> | (int) The codepage the mail is to be sent with. 1252 is Western European, 65001 is Unicode (UTF-8). |

*) optional

The last 5 arguments are optional, but if you include any of them, you have to include all arguments that precede them. For example, if you do not want a carbon copy (*cc*), just use an empty string ("") for that argument (see APPENDIX D: Codepage on page 283 for more information).

Send Confirmation Email at the End of a Survey

Here is an example of a script placed at the end of a pop-up survey to thank the respondent for participating in the survey. The respondent has provided her or his email address in an open text question called email:

```
//build body of email:
var body : String = "You have just completed a survey powered by
Confirmit.\r\n\r\n";
body += "We would like to thank you very much for your
contribution.\r\n\r\n";
body += "Best Regards\r\n\r\n";
body += "Confirmit\r\n";

//send mail:
SendMail("me@example.com",f("email"),"Thank
you!",body,"","bcc@example.com");
```

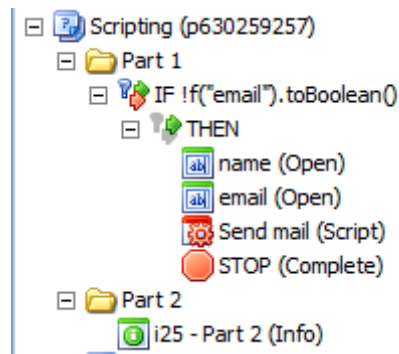
The email will be sent to the respondent, with a blind copy sent to "bcc@example.com". The respondent will not know that this copy has been sent as the address is in the bcc field. You must include an empty string ("") for the cc argument if you do not want to cc anybody but do want to bcc as in this example. If you need more than one email address in either to, cc or bcc, separate the addresses with semi colons (;) inside the string, e.g. "support@confirmit.com;consulting@confirmit.com".

Invitation Email to a Different Part of the Same Survey

We want a survey to start as a pop-up survey where the respondent registers email (with validation of the email address) and name. Based on that, an email is to be sent to the email address with the url to the rest of the survey, and the pop-up survey is to terminate.

When the respondent opens the url in the mail, he or she should get a page with a text that includes his or her name.

Build a questionnaire like this:



The first condition checks if there is an answer to the *email* question. The *email* question is required, so if it has no answer the respondent should get the first part of the survey.

Then *name* and *email* questions follow. In the *email* question, use the following validation code:

```

if(!IsEmail(f(CurrentForm()))))
{
  RaiseError();
  SetQuestionErrorMessage(LangIDs.en,"Please provide a valid email
address.");
}
  
```

After the email question there is a script node, which does the emailing (change "survey.confirmit.com" if you are not using Confirmit's ASP):

```

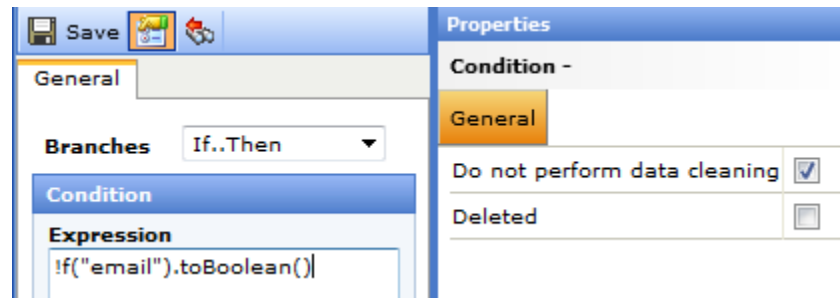
var body : String = "Thank you for registering.\r\n\r\n";
body += "Here is the url to your follow up survey:\r\n";
body += GetRespondentUrl()+"\n";

SendMail("interviewer@confirmit.com",f("email"),"Follow up",body);
  
```

Then there is a stop node to end the first part of the interview. When the respondent re-opens the interview with the url, he/she is brought into the same interview with the data from the first part. So since there now is an answer to the email question, the first part will be skipped and the respondent will be brought to the info node (i4).

However, by default, when a condition in Forsta evaluates to *false*, the interview engine removes all answers to questions in the THEN-branch. This ensures that you get consistent data in your surveys and do not have to do data cleaning. But here, this would mean that the answers to *name* and *email* would be deleted, and that is not what we want – we are going to use *name* in part 2 of the interview.

Fortunately there is a property on conditions that can be used in situations like these: "Do not perform delete". When this property is checked, the interview engine will never remove answers in any of the branches (THEN/ELSE).



To pipe in the name in the first info node (*i4*), use the code below:

```
^f("name") ^
```

10.1.16.2. SendMailMultipart

```
SendMailMultipart (from, to, subject, bodyText, bodyHtml, cc, bcc, codepage)
```

`SendMailMultipart` can be used to send a multipart email from inside a survey. A multipart email is an email where the body text can be defined both as plain text and as HTML. The recipient's mail client will determine which version is to be displayed to the recipient.

Arguments:

| Argument | Description |
|-----------|---|
| From | Message sender (string) |
| to | Recipient's address (string) |
| Subject | Message subject line (string) |
| BodyText | Message body, plain text (string) |
| BodyHtml | Message body, HTML (string) |
| cc* | Carbon Copy (string) |
| bcc* | Blind Carbon Copy (string) |
| Codepage* | (int) The codepage the mail is to be sent with. 1252 is Western European, 65001 is Unicode (UTF-8) (default value). |

*) optional

The last 3 arguments are optional, but if you include any of them, you have to include all arguments that precede them. For example, if you do not want a carbon copy (*cc*), just use an empty string ("") for that argument (see APPENDIX D: Codepage on page 283 for more information).

10.1.16.3. SendPdfMail

The `SendPdfMail` function allows the generation and emailing of a PDF file from a survey with for example a summary of the respondent's answers. Typically the file is sent to the respondent, but it could also be sent to someone who is to review the respondent's answers. Note that you can also send PDF mail with copies (see `SendPdfMailWithCopy` on page 155 for more information).

Note: PDFs are only sent when the device is synched with the server.

The syntax of the function is:

```
SendPdfMail(html, emailSender, emailReceiver, emailBody, emailSubject, outputFile  
fileName, pdfPageSize, pdfOrientation)
```

Arguments (all strings):

| Argument | Description |
|-----------------|--|
| html | A string with the html that the PDF file should be created from. |
| emailSender | The sender of the message. |
| emailReceiver | The recipient's address. |
| emailBody | The message body text (optional). |
| emailSubject | The message subject (optional). |
| outputFileName | The filename of the pdf file (optional). Note that the filename can only contain alphanumeric characters. Do not specify the extension of the file. |
| pdfPageSize | The paper size for which the PDF is formatted (optional). Valid options are A3, A4, A5, B4, B5, Legal, Letter and Tabloid. |
| pdfOrientation | The orientation of the page (optional). Valid options are Landscape or Portrait. |
| companyId | The company id (required if pdfPageSize and/or pdfOrientation are included in the function). Each company has one id. Note that normal users do not have access to this information; you must contact Forsta support to retrieve it. |
| useNewPdfEngine | (Required if PaperSize and/or Orientation are included in the function) This is a Boolean value which can be either true or false. |

```
SendPdfMail(html: String, emailSender: String, emailReceiver: String, emailBody: String)
SendPdfMail(html: String, emailSender: String, emailReceiver: String, emailBody: String, emailSubject: String, outputFile  
fileName: String)
SendPdfMail(html: String, emailSender: String, emailReceiver: String, emailBody: String, emailSubject: String, outputFile  
fileName: String, companyId: Int32)
SendPdfMail(html: String, emailSender: String, emailReceiver: String, emailBody: String, emailSubject: String, outputFile  
fileName: String, companyId: Int32, useNewPdfEngine: Boolean)
SendPdfMail(html: String, emailSender: String, emailReceiver: String, emailBody: String, emailSubject: String, outputFile  
fileName: String, pdfPageSize: String, pdfOrientation: String, companyId: Int32, useNewPdfEngine: Boolean)
```

Figure 5 Examples of functions

As the content of the PDF file is a string containing HTML, there is considerable flexibility concerning the layout and content of such a respondent-specific report.

If no subject is provided, the subject of the email will be "Respondent Report". If no filename is provided, the name of the pdf file will be "respondentreport".

The call to the function initiates a task that runs on the batch servers to generate and send a zipped PDF file. This means that, depending on the queue of tasks on the batch server, there may be a delay in producing and sending the file. If the PDF report is to be sent to the respondent, it is recommended that the respondent is informed of this possible delay. The function will not run in RDG mode.

For SaaS customers there is a charge for each of these reports, just as for PDF exports from Reportal.

The PDF-software does not parse anchor tags; it only adds the link text. So to have clickable links in the PDF file that is generated with SendPdfMail, you must include the URL itself.

```
http://www.confirmit.com
```

NOT:

```
<a href=" HYPERLINK "http://www.confirmit.com/"%3eLink" http://www.confirmit.com/">Link text</a>
```

If you want blue text and underline, you can define this in a tag:

```
<span style="text-decoration: underline; color: blue">HYPERLINK "http://www.confirmit.com%3c/span"
http://www.confirmit.com</span>
```

Sending a PDF to the respondent with answers from the survey

Here is a short example where the respondent answers questions on *name*, *email*, *age* and *gender*. Following these questions is a script that generates and sends a PDF file with the answers the respondent has given:

```
var html ="<html><body>\n";
html += "<h1>Answers for "+f("name").get()+"</h1>\n";
html += "<table><tr><th>Question</th><th>Answer</th></tr>\n";
html +=
"<tr><td>"+f("email").label()+"</td><td>"+f("email").get()+"</td></tr>\n"
;
html +=
"<tr><td>"+f("age").label()+"</td><td>"+f("age").get()+"</td></tr>\n";
html +=
"<tr><td>"+f("gender").label()+"</td><td>"+f("gender").valueLabel()+"</td
></tr>\n" ;
html += "</table>\n";
html += "</body></html>\n";

SendPdfMail(html,"noreply@us.confirmit.com",f("email").get(),"Here are
your responses to the survey.", "Your responses", "responses");
```

Note: Non-ASCII characters are not accepted by the PDF creator. If non-ASCII characters must be used, write valid HTML for the required character and include a metatag such as the following: <meta http-equiv="content-type" content="text/html; charset=utf-8" />

10.1.16.4. SendPdfMailWithCopy

The SendPdfMailWithCopy function is an extension of the SendPdfMail function, giving you the possibility to copy the mail to others. The function allows the generation and emailing of a PDF file from a survey with for example a summary of the respondent's answers.

Note: PDFs are only sent when the device is synched with the server.

The syntax of the function is:

```
SendPdfMailWithCopy(html, emailSender, emailReceiver, cc, bcc, emailBody, email
Subject, outputFile, pdfPageSize, pdfOrientation)
```

Arguments (all strings):

| Argument | Description |
|----------|--|
| html | A string with the html that the PDF file should be created from. |

| | |
|-----------------|--|
| emailSender | Message sender. |
| emailReceiver | Recipient's address. |
| cc | The email will be copied to these addresses. Separate multiple addresses with comma. The addresses will be visible to other recipients. |
| bcc | The email will be copied to these addresses. Separate multiple addresses with comma. The addresses will not be visible to other recipients. |
| emailBody | The message body text (optional). |
| emailSubject | Message subject (optional). |
| outputFileName | The filename of the pdf file (optional). Note that the filename must only contain alphanumeric characters. Do not specify the extension of the file. |
| pdfPageSize | The paper size for which the PDF is formatted (optional). Valid options are A3, A4, A5, B4, B5, Legal, Letter and Tabloid. |
| pdfOrientation | The orientation of the page (optional). Valid options are Landscape or Portrait. |
| companyId | The company id (required if pdfPageSize and/or pdfOrientation are included in the function). Each company has one id. Note that normal users do not have access to this information; you must contact Forsta support to retrieve it. |
| useNewPdfEngine | (Required if PaperSize and/or Orientation are included in the function) This is a Boolean value which can be either true or false. |

Note that if this function is used, both `cc` and `bcc` must be used.

For further details, see `SendPdfMail` (see `SendPdfMail` on page 154 for more information).

10.1.16.5. Redirect

```
Redirect(url, {noexit})
```

`Redirect` can be used to redirect the respondents to a different site (`url`).

Important

If a redirect is included at the end of the survey, it is important that the interview status is also set using the `SetStatus` function (see `GetStatus` and `SetStatus` on page 87 for more information).

Note: The use of redirects, quotas, status-screened or other solutions with the principle purpose of avoiding the survey "complete" status being reached by a respondent having offered a reasonable amount of responses, is prohibited and will be regarded as an attempt to avoid transaction fee obligations to Forsta.

`noexit` is a Boolean. It is optional, and is used when you want the respondents to be able to reenter the survey, for example if you redirect out of the survey to another `url`, and then at some point the respondents are redirected back to the survey again (with `r` (`respid`) and `s` (`sid`)). This is especially important if the survey is set up without "Allow user to modify answers after the interview is complete". With `noexit` as `true`, the respondent will be allowed to reenter the survey. With `noexit` as `false` (default), the respondent will not be allowed reentry to the survey.

Redirect to Another Site Before the End Page

If you want to send the respondent to another site (here: Google) before he or she reaches the default end-of-survey page in Forsta, you can use a script as below:

```
SetStatus("complete");
SetInterviewEnd();
Redirect("http://www.google.com", false);
```

`Redirect` is used in combination with `SetStatus` and `SetInterviewEnd` so that the respondent is given the correct status and end time stamp before being redirected out of the survey.

Note: The use of scripted Redirect() to jump into or out of questions that are in Call Blocks will cause problems and should not be attempted. A key attribute of Call Blocks is that they can be entered from multiple points in a survey, so the survey engine will not have a specific “entry-point” that has been used to enter that call block. Therefore when the Call Block finishes it does not know where in the main body of the survey to return to, and the survey will simply error. Refer to the separate Survey Designer user guide for further details on Blocks.

10.1.16.5.1. Opening a Specific Survey Page or Call Block

If you would like to open a specific survey page with an internal redirect, then you can either use RedirectToRespondentUrl() (see RedirectToRespondentUrl on page 84 for more information), or Redirect together with GetRespondentUrl() (see GetRespondentUrl on page 82 for more information).

Example:

```
Redirect (GetRespondentUrl("q9"), true);
```

Or:

```
RedirectToRespondentUrl("q9");
```

Both of these lines will redirect respondents to question q9 and allow the respondent to re-enter the survey again (noexit = true). The difference between these two functions is that Redirect(GetRespondentUrl(),{noexit}) will display the respondent unique link in the URL field, while RedirectToRespondentUrl will redirect without updating the URL visible to the respondent.

Redirect between surveys, or between the survey and an external application with encrypted links:

You can use Redirect if you need to send the respondent to a different survey or another application. If you need to send the respondent back into the survey again, then you can add the respondents sid value as a parameter to the link, and use this to send the respondent back into its unique survey link.

Example:

In this example we will send the respondent from survey A into survey B, then when they complete survey B they are sent back into survey A directly to question q4.

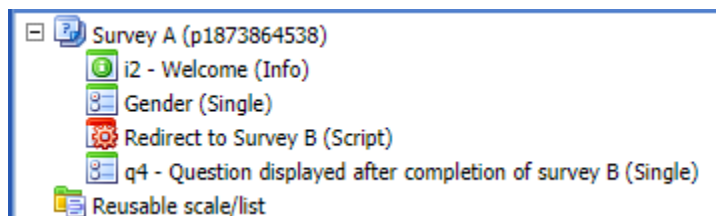


Figure 6 Redirecting from survey A to survey B

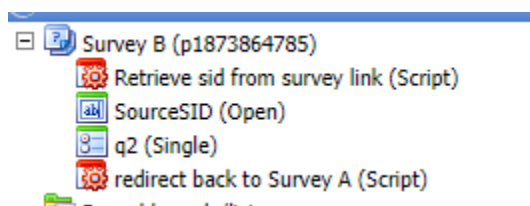


Figure 7 Redirecting from survey B back to survey A

Survey A includes the script “Redirect to survey B”. This will retrieve sid from the respondent link, and add this as a parameter to the target link:

```
//Get the respondent unique survey link for question q4:  
var UniqueLink = GetRespondentUrl("q4");
```

```
//split the survey link to retrieve sid:
var sid = UniqueLink.split("__sid=");
//link to the target survey/application
var
RedirectToLink="https://survey.euro.confirmit.com/wix/p1873864785.aspx";
//send the respondent to the link added in RedirectToLink and add
parameter SourceSID to the link
Redirect(RedirectToLink + "?SourceSID=" + sid[1], true);
```

This will send the respondent into survey B (p1873864785 in this example). In the beginning of survey B we will have a script to retrieve the "SourceSID" value from the link and add this into variable "SourceSID".

Script "Retrieve sid from Survey link":

```
var linkBackToSurveyA = Request("SourceSID");
f("SourceSID").set(linkBackToSurveyA);
```

At the end of survey B there is a script to redirect the respondent back to survey A and into question q4:

Script "Redirect back to survey A":

```
Redirect("https://survey.euro.confirmit.com/wix/p1873864538.aspx?__sid__="
+ f("SourceSID").get(), true);
```

Redirect to specific question with unencrypted links:

If you for example use Redirect to redirect the respondent to another application, but want to send the respondent back to the Forsta survey on a particular page, you can include a parameter in the survey link to specify which page is to open. This parameter is __qid (two underscores + qid). Valid values are the question ids of any question on the root level of the survey (outside loops). When opening a survey url with this parameter, the survey will open on the page that contains the question indicated in __qid.

Example:

```
http://survey.confirmit.com/wix/pXXXXXXXXX.aspx?__sid__=ww-
redcOmXd5s2yCeqAQYTjtCOc0bqXHg9QNh281-FFg7WyktC2GBFh8qJPBNGtY0&__qid=q4
```

This will just open that particular page (here: the page with question q4). No attempt is made to transfer background variables, set interview start, or save any data.

Similarly, if you use __gotoCallBlock=CallBlockID (two underscores + gotoCallBlock), you can direct respondents directly to a specific call block. When the call block is finished, the interview will finish.

Note: To use parameter __qid and the __gotoCallBlock option, the "Disable unencrypted QID request parameter" must be unselected in the Overview page > More Survey Settings > Options section (Survey settings > General Options tab in Professional Authoring).

10.1.17. Survey Router Functions

This section describes functions that can be used in surveys linked to a Survey Router.

Survey Router is a Forsta add-on. If you do not have access to this functionality, contact your Forsta account manager for more information.

Survey Router surveys are set up as regular Forsta surveys, and are linked to the Survey Router via the Survey Router menu. A survey can be registered in one Survey router and this is shown on the **Project Management > Overview** page General tab:

Survey Router Registered in [My example router](#)

This setting will allow scripts in the survey to find project IDs to route the respondent/panelist to or perform the routing itself.

10.1.17.1. GetAvailableSurvey

GetAvailableSurvey is used to get a Project ID that the respondent/panelist could be routed to based upon supplied selection criteria.

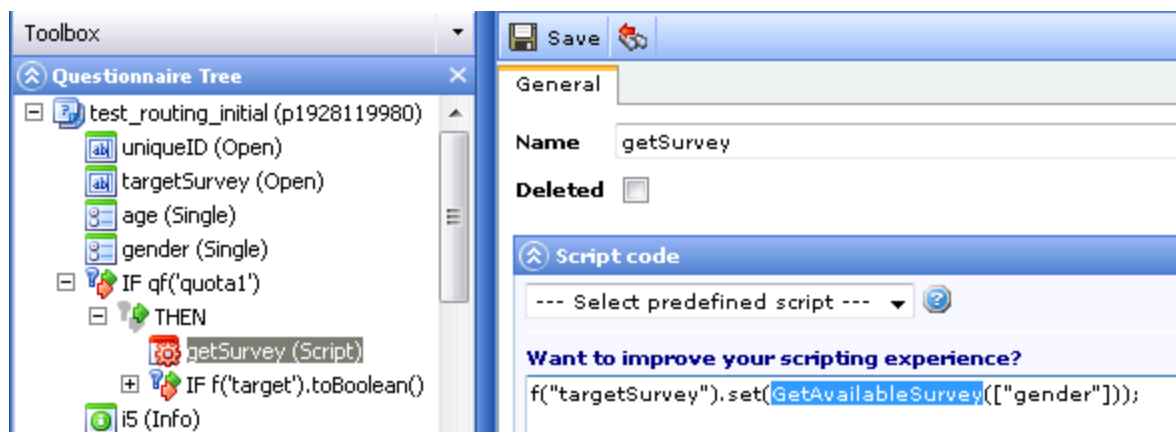
```
GetAvailableSurvey(fieldnames{, projectList, mode})
```

The list of question IDs supplied in fieldNames (array of Strings). Up to 5 questions IDs can be supplied (this value is configurable for On-Premise license holders) that you want to be checked by the Survey Router selection algorithm. The list of optional project ID to be included/excluded from the selection criteria supplied in projectList (array of Strings). Mode (Boolean) optional unless a projectList is supplied, determines whether the projectList is an inclusion or an exclusion list, where true demotes an inclusion list and false denotes an exclusion list.

In the following example both "gender" and "age" questions are considered in the survey selection but both project IDs "p1234567" and "p7654321" will be excluded from the selectable surveys.

```
var fieldNames : String[] = ["gender", "age"]
var projectList : String[] = ["p1234567", "p7654321"]
f("targetSurvey").set(GetAvailableSurvey(fieldNames, projectList, 0));
```

In this example the "gender" question is to be checked. If for example the respondent has answered the "gender" question in the original survey by stating he is "male", then the survey routing algorithm will check the remaining surveys in the group and ignore any surveys where the quota for males is already full. As in this case "gender" is the only selection criteria required, the routing algorithm would now select the survey with the highest priority and open that survey for the respondent.



Availability of the respondent's quota profile does not consider Optimistically populated (currently active) respondents; only those that have completed the survey and have caused the quota cell to be incremented.

In the event several projects satisfy the selection criteria and they all have the same priority, a project will be selected from the group at random.

In the event that no projects satisfy the selection criteria, no project IDs will be returned. When a potential project is found, the system will verify that the respondent has not already participated in that specific survey (username in the respondent table is used as the key); if they have then the survey will not be considered as available for selection and the system will attempt to find another survey. After attempting to find another survey three times (this value is configurable for On-Premise license holders) due to the fact that the respondent has already participated, the system will stop trying to find a survey and will return nothing (as if no surveys are available for selection).

An exact match is required for all the criteria listed in the array. So in this case if a survey in the group does not have a "gender" question, then that survey will not be considered for selection by the algorithm.

10.1.17.2. RedirectToRouterSurvey

RedirectToRouterSurvey is used to seamlessly route the respondent from one survey to another inside of the Survey Router they are registered with.

```
RedirectToRouterSurvey(projectId, username, language{, fieldnames})
```

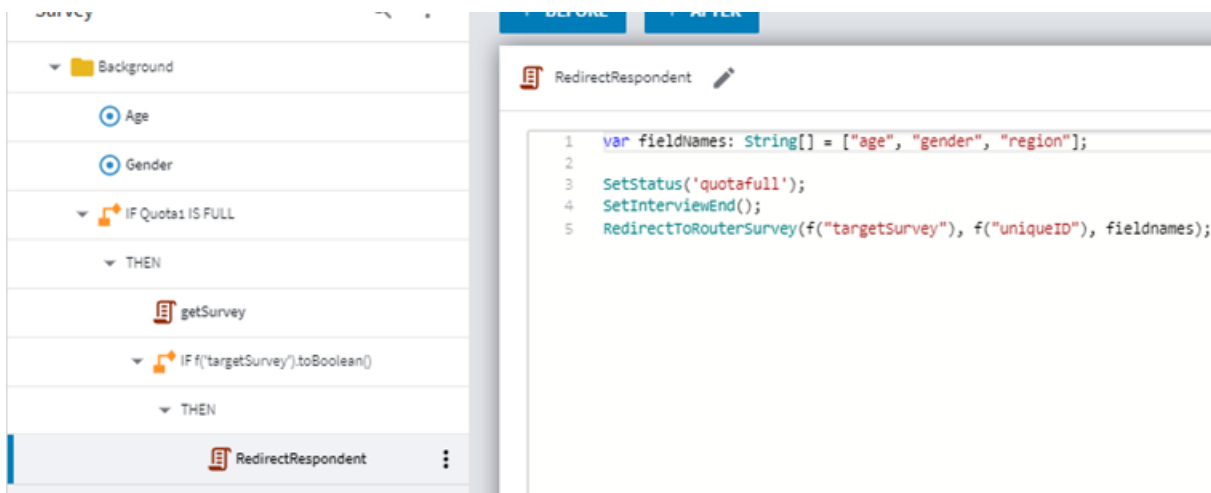
The survey ID that the respondent is to be routed to is supplied in the projectId (string), the unique identifier for the respondent is supplied in the username (string), and the optional list of question IDs that are to be passed to the routed-to survey is supplied in fieldNames (array of Strings). You can explicitly specify the language that the routed-to survey is to use by supplying the optional language value. This is the numeric identifier for the "l" value. If no language value is supplied, the survey default language will be used.

In the following example the respondent will be routed to the project ID stored in the question "targetSurvey" using the unique identifier supplied in the question "uniqueID" and passing the values to questions "age", "gender" and "region".

```
var fieldNames : String[] = ["age", "gender", "region"]
RedirectToRouterSurvey(f("targetSurvey"), f("uniqueID"), fieldNames);
```

Open text, single choice and numeric questions can be passed to the target survey, other question types are not supported. The questions that are passed can be normal, background or hidden, but no validation is performed on the data until the question is executed in the target survey. If the question passed does not exist in the target survey no error will be reported.

In this example, if the quota of the current project is filled then the respondent will automatically be routed to a new project within their Survey Router group. Both age and gender questions will be passed to the target survey.



Note: Survey router redirection will only occur if the Survey Setting > Web Options > Survey type is set to "Limited survey with external respondent creation" in the target survey.

Typically, you will not want to ask the same questions in the target survey as you have already asked in the initial survey. To prevent this, a question mask can be applied to the questions that are passed to the target survey. In this case you may check if the question has already been answered, and if so, do not display the question again:

```
Question mask
1 !(f("age").toBoolean());
```

Note: If you use this masking, remember to check the "No cleaning on question masking" property (refer to the separate Survey Designer user guide for more information). If this property is not checked, then the data will be cleared if the page is empty.

10.1.17.3. GetRouterName

```
GetRouterName ()
```

The GetRouterName() function can be used to return the name of the router that the survey is assigned to. If the survey is not assigned to a router, this function will return an empty string.

10.1.18. 3rd Party Integrations

Forsta incorporates a number of 3rd Party Software Components. Some of these components may allow or require scripting to extract the full benefits of usage; these follow.

10.1.18.1. *CintFulfillmentRespondentsTransition*

The **CintFulfillmentRespondentsTransition** scripting function has the following signature:

```
CintFulfillmentRespondentsTransition(respondentId: String, status: String)
```

Below are examples of how you might use the function to pass one of the three transition status values. Note that all three are displayed together here; you would only ever use one at a time.

Note: This function requires that an administrator with the Company admin permission adds the Cint API key to the Company Details page > Security tab. See the Forsta Administrator Manual for further details.

Code examples:

```
//Complete
setStatus('complete')
setInterviewEnd()
CintFulfillmentRespondentsTransition('04fe9a97-a579-43c5-bb1a-58ed29bf0a6a', 'Complete')

//Screened
setStatus('screened')
setInterviewEnd()
CintFulfillmentRespondentsTransition('04fe9a97-a579-43c5-bb1a-58ed29bf0a6a', 'Screenout')

//QuotaFull
setStatus('quotafull')
setInterviewEnd()
CintFulfillmentRespondentsTransition('04fe9a97-a579-43c5-bb1a-58ed29bf0a6a', 'QuotaFull')

//QualityTerminate
setStatus('screened')
setInterviewEnd()
CintFulfillmentRespondentsTransition('04fe9a97-a579-43c5-bb1a-58ed29bf0a6a', 'QualityTerminate')
```

The interview would be completed with the specified status and the respondent with the specified respondent GUID will have the specified status passed over to Cint. Note that in these examples a GUID is hard-coded, however it could reference a variable within the survey.

10.2. Creating Your Own Functions

You can create your own functions and use them where needed. It is recommended to use functions:

- Whenever there are pieces of code that it is likely that you will reuse several times in the questionnaire.
- When you need to refer to values (often computed expressions) that are not stored in survey variables.
- To group statements that perform a well-defined task, to make the code easier to read, and to make your code more modularized.

Functions can be called from anywhere within the questionnaire.

Type annotation in a function specifies a required type for function arguments, a required type for returned data, or a required type for both. If you do not type annotate the parameters of a function, the parameters will be of type Object. Likewise, if the return type for a function is not specified, the compiler will infer the appropriate return type.

Using type annotation for function parameters helps ensure that a function will only accept data that it can process. Declaring a return type explicitly for a function improves code readability since the type of data that the function will return is immediately clear.

10.2.1. Defining functions

Before you can use a function, you must define it. In Forsta, functions are usually defined in script nodes. The syntax of a function definition is as follows:

```
function FunctionName(p1 { : type}, p2 { : type}, ..., pn { : type}) : type
{
  <statements>
}
```

The function name is used to refer to the function in function calls. The same naming rules apply to function names as to variable names. The convention for function names is to start them with a capital letter, to distinguish them from variable names. The arguments (*p*₁, *p*₂, . . .) are the names of the variables that receive the values passed to the function. You may define functions without any arguments at all, and functions with a variable number of arguments.

Type annotation on parameters and the function itself (for the return type) is not required.

10.2.2. Function Call

As we have seen in numerous examples, to call a function simply use the function name followed by parentheses containing the arguments, if any:

```
FunctionName (p1, p2, . . ., pn)
```

A function defined in a survey's script node may be called in all script contexts; from other script nodes, conditions, response piping (within ^s) and in code masks and column masks in the same survey.

The function `RequiredMulti` defined previously (see Defining functions on page 162 for more information) can be called from the validation code of a multi question using:

```
RequiredMulti();
```

Note: When calling a function, ensure that you always include the parentheses and any required arguments. Calling a function without parentheses causes the text of the function to be returned instead of the results of the function.

10.2.3. Functions with a Fixed Number of Arguments

When you define a function with arguments, you define variables with the argument names as variable names. The arguments will hold the values that are passed into the function, and may be used as normal JScript .NET variables inside the function.

10.2.4. Functions with a Variable Number of Arguments

Previously in JScript you could define functions that took a variable number of arguments, using the `arguments` array. In JScript .NET fast mode this is not available. If you need a function to take an arbitrary number of arguments, you can use a *parameter array*. This is done by including, as the last element in the argument list, an array that is defined with three periods (...), then the name of the array and then a typed array annotation:

```
function FunctionName(... parArray : type[]) { <statements> }
```

`parArray` can then be used like any other array inside the function.

```
parArray.length
```

returns the number of arguments in this array.

To refer to each argument in this array, use indexing as in all other arrays: 0 for the first argument, 1 for the second, and so on:

```
parArray[index]
```

This makes it possible to write extremely flexible functions, as we have seen examples of in the built-in arithmetic functions in Forsta; Sum, Count, Average, Max and Min (see Arithmetic Functions on page 72 for more information).

Code Masking Based on a Variable Number of Conditional Expressions

The following function can be used to create a code mask where the items to be included in the mask is determined by the results from a number of conditional expressions that are sent in as parameters. It does require some caution when used: It requires all answers to have numeric codes, and the position of the expression represents each code (1,2,3,...).

```
function Pattern(... parArray : Object [])
{
  var codes = parArray.length;
  var s = new Set();
  for(var i: int = 0; i<codes; i++)
  {
    var code = i+1;
    var result = parArray[i];
    if(result==true)
    {
      s.add(code);
    }
  }
  return s;
}
```

Here is an example of calling this function from a code mask:

```
Pattern(f("q1").toBoolean(), f("q2")==="2", f("q3").any("1", "3", "4"), true)
```

If q1 is answered, the answer with code 1 would be included. If the answer to q2 is "2", the answer with code 2 would be included. If q3 (a multi) has answer(s) 1, 3 or 4, code 3 is included, and code 4 is always included.

Note: The script node defining this function must be placed before the question in which it is called in the questionnaire tree.

10.2.5. The return Statement

Often you want a function to return a value, either a result from a calculation that has been done in the function, or just a Boolean to indicate whether the function did what it was supposed to. To return a value to the statement that invoked the function, use the return statement:

```
return expression
```

The return statement will terminate a possible loop and send the value to the statement that invoked the function.

Returning a Calculated Value from a Function

The following function will return what percentage the number n is out of the base b:

```
function Percentage(n : int,b : int) : float
{ return (n/b)*100; }
```

11. Objects

JScript .NET is an **object-oriented language**. We will not elaborate on the object-oriented features in this manual. We will just describe the JScript and Forsta objects that are relevant for survey programmers, and advise the reader to consult a JScript .NET reference for more in-depth knowledge.

All script code in Forsta is wrapped as functions inside a class. This means that you can not define your own classes in Forsta scripts.

JScript objects are collections of **properties** and **methods**. A method is a function that is a member of an object. A property is a value or set of values that is a member of an object.

11.1. Properties

Properties are used to access the data values contained in an object.

An object's properties are accessed by combining the object's name and its property name:

```
objectName.propertyName
```

We have already seen an example of a property on the `Array` object, a property called `length` for the size of the array (for example, the `weekday` array from previous examples):

```
weekday.length
```

11.2. Methods

Methods are functions that are used to perform operations on an object.

You access a method of an object by combining the object's name and the name of a method:

```
objectName.methodName(arguments)
```

Just like in functions, arguments in method calls are optional.

We have already used the basic variable objects of Forsta returned from the `f` function. We have seen some methods that can be applied on these objects to retrieve information about the questions in a Forsta survey. For example will

```
f(qID).label()
```

return the title of the question with ID `qID`, and

```
f(qID).get()
```

the code or answer stored in the database for that question.

We have also seen a method that can be used to set the answer of a question:

```
f(qID).set(code)
```

11.3. Constructors: Creating Instances of Objects

Instances of objects of a particular object type are created using an operator called `new`, which you already have seen used when creating an array, for example:

```
var a = new Array();
```

An array is a special object type. The general syntax for creating an instance of an object is like this:

```
variableName = new objectType(arguments);
```

`objectType(arguments)` is called the **constructor** of the object. Some object types have more than one constructor. Constructors differ in the number of arguments they allow.

12. The f Function

The `f` function is probably the most important function available in Forsta. It is used to access survey variables/questions, and we have already seen numerous examples of how to use it (see Methods of the Form Objects on page 42 for more information).

12.1. Calling the f Function

```
f(qID, {loopiter1, loopiter2, ..., loopitern})
```

returns a form object of some kind. A **form** is a question or loop node in a survey, and the argument `qID` is the question ID as defined in the properties of the question.

The rest of the argument(s) (`loopiter1, loopiter2, ..., loopitern`) are only used for questions inside loops. These arguments are codes of specific loop iterations, starting with the innermost loop if there are nested loops (loops within loops). The curly brackets `{}` are used here to indicate that the loop iterations are optional.

Let us say you have a question `q1` in a nested loop structure with two loops. The outer loop has iterations with codes "1" and "2", and the inner loop has iterations with codes "a" and "b". Then the question `q1` is asked four times, and these four instances of `q1` can be referenced like this (in the order they were asked) from outside the loop:

```
f("q1", "a", "1")
f("q1", "b", "1")
f("q1", "a", "2")
f("q1", "b", "2")
```

12.2. Storing the Form Object in a Variable

The form objects can be large data structures with long answer lists and texts. Every call of the `f` function will result in a new instance being retrieved. If the question has a code or scale mask, this mask will be evaluated for every call on the `f` function for this question. It is recommended to try to reduce the number of calls on the `f` function, for example by not always applying methods and properties directly on the function as we have been doing in all our examples so far. If you will be calling the `f` function on the same question ID several times in a script (especially if you call the `f` function inside a `for` or `while` loop), the best approach is to call it once and store the object instance in a variable instead:

```
variableName = f(qID, {loopiter1, loopiter2, ..., loopitern});
```

Usually the difference is not significant, but it is recommended because it will reduce the execution time of your scripts. The interview pages will then load faster reducing the risk of irritating respondents and reducing server performance.

12.3. Compounds

The `f` function returns in fact different objects for different question types. These objects have some properties and methods in common, but some are specific to questions of a specific type.

Grid, multi, open text list, numeric list and ranking questions are questions with one or more variables that are defined in the same form. They are called **compounds**. They can be accessed using the `f` function in the normal manner, but the object returned is more complex than objects returned from other question types. You can refer directly to each of their elements using syntax that is similar to that of an array:

```
x[code]
```

`x` represents a variable holding an instance of an object returned from calling the `f` function on a compound. `code` is a string representing the code from the answer list of the compound. An example is referring to the element with code "1" in a multi question with question ID `q2`:

```
f("q2") ["1"]
```

Using a Variable instead of Repeated Calls on the f Function

Once more, back to the example with hours and weekdays where we validate the number of hours per day.

Please make sure that the total number of hours for each day equals 24. Currently the sum for Wednesday is 25.

Time spent

Please specify approximately how many hours you spent working, sleeping and on leisure last week:

| | Sleep | Work | Leisure |
|-----------|---------------------------------|---------------------------------|---------------------------------|
| Monday | <input type="text" value="7"/> | <input type="text" value="8"/> | <input type="text" value="9"/> |
| Tuesday | <input type="text" value="7"/> | <input type="text" value="11"/> | <input type="text" value="6"/> |
| Wednesday | <input type="text" value="8"/> | <input type="text" value="9"/> | <input type="text" value="8"/> |
| Thursday | <input type="text" value="5"/> | <input type="text" value="12"/> | <input type="text" value="7"/> |
| Friday | <input type="text" value="7"/> | <input type="text" value="7"/> | <input type="text" value="10"/> |
| Saturday | <input type="text" value="12"/> | <input type="text" value="2"/> | <input type="text" value="10"/> |
| Sunday | <input type="text" value="10"/> | <input type="text" value="0"/> | <input type="text" value="14"/> |

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>>

In our previous solution for validation of this question (see The while Statement on page 62 for more information) we looped through the weekdays. For each day, we called the f function for three questions q2, q3 and q4:

```
sum = Sum(f("q2")[code], f("q3")[code], f("q4")[code]);
```

Now, instead we can define three variables sleep, work and leisure to hold the form objects:

```
var sleep = f("q2");
var work = f("q3");
var leisure = f("q4");
var codes = sleep.domainValues(); // array with all codes
var i : int = 0;
var correctSum : Boolean = true;
while(i < codes.length && correctSum) //iterate through codes (rows)
{
    var code = codes[i]; //current code
    //calculate sum:
    var sum : int = Sum(sleep[code], work[code], leisure[code]);
    if(sum != 24)
    {
        correctSum = false;
    }
    i++;
}
if(!correctSum)
{
    RaiseError();
    SetQuestionErrorMessage(LangIDs.en, "Please make sure that the total
number of hours for each day equals 24. Currently the sum for
"+sleep[code].label()+" is "+sum+".");
}
```

The way the script was initially set up you could have as much as 21 calls ($3*7=21$) on the f function inside the loop. We have now reduced this to 3 function calls.

12.4. Properties

The form objects can have the following properties, depending on the type of the question (x represents a form object returned from the f function):

```
x.CODED
```

CODED is true if the question referenced is a **coded variable**. If not, CODED is undefined. Coded variables are single questions and loops, and answer list items of a grid or a multi question.

```
x.OPEN
```

OPEN is true if the question referenced is an **open variable**. If not, OPEN is undefined. Open variables are open text questions, other-specify elements of answer lists and answer list elements of an open text list, numeric list or ranking question.

```
x.DICHOTOMY
```

DICHOTOMY is true if the question referenced is a **dichotomy**. If not, DICHOTOMY is undefined. The elements of a multi question (referenced with `f(qID)[code]`) are dichotomies.

```
x.COMPOUND
```

COMPOUND is true if the question referenced is a **compound**. If not, COMPOUND is undefined. Multi, open text list, numeric list, ranking and grid questions are compounds.

```
x.NUMERIC
```

NUMERIC is true if the question referenced is numeric. If not, NUMERIC is undefined.

```
x.EXTERNAL
```

EXTERNAL is true if the question referenced gets its answerlist from Database Designer (either as a lookup table or a hierarchy).

```
x.DATE
```

DATE is true if the question referenced is a date question. If not, DATE is undefined.

```
x.BOOL
```

BOOL is true if the question referenced is Boolean (has the Boolean property set). If not, BOOL is undefined.

```
x.GEO
```

GEO is true if the question referenced is a Geolocation question. If not, GEO is undefined.

Note: The Boolean property and Date question type are only available when using the Optimized database format.

These properties are extremely powerful, because by using them it is possible to write generic scripts that will work no matter what the question type is.

Using a combination of COMPOUND with DICHOTOMY and OPEN enables the user to differentiate between a grid and a multi and a numeric list, open text list or ranking question since the elements of a multi are a DICHOTOMY, but DICHOTOMY would be undefined for a grid, numeric list, open text list or ranking, and elements of numeric list, open text list or ranking are OPEN, but OPEN is undefined for grid and multi.

```

var form = f("q1");
if(form.COMPOUND)
{
  var cats = form.domainValues();
  var code = cats[0];
  if(form[code].DICHOTOMY)
  {
    //form is a multi
  }
  else if(form[code].OPEN)
  {
    //form is a numeric list, open text list or ranking question
  }
  else
  {
    //form is a grid
  }
}

```

Deleting the Content of any Question

This function will remove the answers on any question, no matter what kind of question it is. This could for example be used to automatically remove respondent information at the end of the survey if you ask the respondents if they want to be anonymous or not. An answer is removed by overwriting the current value with null. It will work on open text, single, date, numeric, multi, open text list, numeric list, ranking and grid questions, and you use it like this:

```
ClearForm(f("q1"));
```

for a question with question ID q1.

If the question is a compound, the function will remove answers in all variables in the compound. (It will however not automatically remove a value in an "Other, specify" field on a question. To remove the answer on "Other, specify" you have to call the function referring to the "Other, specify" field, e.g. like this:

```
ClearForm(f("q1_98_other"));
```

if the "Other " property is set on the item in the answer list with code "98".)

Here is the definition of the function:

```

function ClearForm(form)
{
  if(form.COMPOUND) //form with multiple items
  {
    var fcodes = form.domainValues(); //all codes in form
    for(var i : int = 0;i<fcodes.length;i++) //iterate through code
    {
      form[fcodes[i]].set(null); //clear item
    }
  }
  else //form with one item
  {
    form.set(null);
  }
}

```

Copying the Contents of any Form into Another

Here is a function that will copy any type of question. It will return true if the copying succeeds, and false without copying anything if it does not. (If the from and to questions were not the same type of questions).

```

function CopyForm(from,to) : Boolean
{
  if((from.CODED && to.CODED) || (from.OPEN && to.OPEN) ||
(from.DICHOTOMY && to.DICHOTOMY) || (from.DATE && to.DATE) ||
(from.EXTERNAL && to.EXTERNAL))
  {
    to.set(from.get());
    return true;
  }
  else if(from.COMPOUND && to.COMPOUND)
  {
    var fcodes = from.domainValues();
    var tcodes = to.domainValues();
    if(fcodes.length == tcodes.length)
    {
      for(var i : int = 0;i<fcodes.length;i++)
      {
        if(fcodes[i].toString()==tcodes[i].toString())
        {
          to[fcodes[i]].set(from[fcodes[i]].get());
        }
        else
        {
          return false;
        }
      }
      return true;
    }
  }
  return false;
}

```

12.5. The f Function Methods

The methods of the form objects are listed below. The methods are described in detail in sections Conversion Methods in Forsta, Methods of the Form Objects, and Methods of the Set Object.

| Methods | CODED | OPEN | BOOL | DATE | NUMERIC | DICHOTOMY | COMPOUND | GEO |
|-------------|-------|------|------|------|---------|-----------|----------|-----|
| toBoolean | X | X | X | X | X | X | X | X |
| toNumeric | X | X | | | X | X | | |
| toInt | X | X | X | | X | X | | |
| toDecimal | X | X | | | X | | | |
| toDate | | | | X | | | | |
| day | | | | X | | | | |
| month | | | | X | | | | |
| year | | | | X | | | | |
| datestring | | | | X | | | | |
| get | X | X | X | X | X | X | | X |
| set | X | X | X | X | X | X | X | X |
| label | X | X | X | X | X | X | X | X |
| text | X | X | X | X | X | X | X | X |
| instruction | X | X | X | X | X | X | X | |

| | | | | | | | | |
|----------------|---|---|---|---|---|---|---|---|
| value | X | | X | X | | | | X |
| valueLabel | X | | X | | | | | |
| domainValues | X | | X | | | | X | |
| domainLabels | X | | X | | | | X | |
| categories | | | | | | | X | |
| categoryLabels | | | | | | | X | |
| values | | | | | | | X | |
| getType | X | X | X | X | X | X | X | X |
| any | X | | | | | | X | |
| all | | | | | | | X | |
| none | X | | | | | | X | |
| between | | | | | X | | | |
| inc | X | | | | | | X | |
| size | X | | | | | | X | |
| union | X | | | | | | X | |
| isect | X | | | | | | X | |
| diff | X | | | | | | X | |
| members | X | | | | | | X | |
| isNearBy | | | | | | | | X |
| latitude | | | | | | | | X |
| longitude | | | | | | | | X |

13. Working with Sets

Sets are typically used in code masks of single, multi, open text list, numeric list, ranking and grid questions, in loops, and in scale masks of grids. A set consists of a collection of strings that represent codes. When used in code and scale masks, the codes contained in the set are used to determine which answer alternatives are to be displayed to the respondent. Only answers corresponding to codes from the set returned from the expression in the code or scale mask will be shown.

13.1. Constructor

An instance of the Set object can be created like this:

```
s = new Set();
```

You will also get instances of the Set object returned from the functions `a`, `set`, `nset`, `nnset`, and `Filter`.

13.2. Functions Returning Sets

A number of functions return sets. These are described in the following sections.

13.2.1. The `a` Function

The function `a` returns a set consisting of all possible codes on a question (i.e. the codes of all items in the answer list).

```
a(qID)
```

Note: There is a limitation with this function when `qid` uses a table lookup for its answerlist. In this case, it should not be called from the code mask of `qid`. The workaround is to add an additional hidden single question which points to the same table lookup, and use that with the `a()` call instead. So if `qid1` uses table lookup answerlist and needs to call `a(qid1)` in its code mask, instead it should use `a(qid2)` where `qid2` is a hidden single question that uses the same table lookup answerlist.

13.2.2. `set`, `nset` and `nnset`

There are three functions you can use to define sets with specific codes – `set`, `nset` and `nnset`.

```
set (code1, code2, . . . , coden)
```

will return a set consisting of the codes listed within the parenthesis. For example

```
set ("1", "3", "4")
```

returns a set consisting of the codes "1", "3" and "4".

```
nset (n)
```

will return a set with codes "1", "2", ..., `n`. `n` must be an integer greater than 0. For example

```
nset (5)
```

returns a set consisting of the codes "1", "2", "3", "4" and "5".

```
nnset (m, n)
```

will return a set consisting of codes from `m` to `n` inclusive, i.e. `m`, `m+1`, . . . , `n-1`, `n`. For example

```
nnset (6, 10)
```

returns a set consisting of the codes "6", "7", "8", "9" and "10".

13.2.3. `lset`

```
lset (params)
```

`lset` can be used to construct a set. The input to the function can either be an object such as an Array, or a list of parameters from which the function will create a set.

```
lset(new Array(1,2,8))
```

returns a set consisting of the codes 1, 2 and 8.

13.2.4. The Filter Function

The function `Filter` is used to filter a list based on the matches a prefix has in the answer list.

```
Filter(qID, prefix)
```

It returns a set with the codes of items in the answer list of question `qID` that starts with the string prefix, regardless of case. If prefix is "c", Filter will return the codes of the answers "Cadillac", "Chevrolet" and "Chrysler" if they are in the answer list of `qID`.

Filtering an Answer List by the First Characters in the Answer

There may be situations where you have a single question with a long answer list, which you want to filter based on text input by the respondents. In this case you can present an open text question to the respondents asking them to provide the first one or two letters in their answer, and then filter the answer list based on that answer.

For example, imagine you have a single question `carmake` where the respondent is to be asked to select a car make from a list. There are a lot of different car makes, so the selection list will be long. Here you can place an open text question `prefix` in front of the car question. In the prefix question the respondent is asked to type in the first letter in the name of the car, and this will filter the answer list such that only those car makes starting with the input letter will be presented. The code mask of the car question can have this code mask:

```
Filter("carmake", f("prefix").get())
```

13.2.5. The f Function

The `f` function can also be used in set context (code and scale masks). The `f` function does not return a `Set` object, but a form object. However, since it can be used in set context (in code and scale masks) and has most of the methods of the `Set` object, we choose to discuss it together with the `Set` object. The two set methods not supported by the form object, as indicated in the next section, are `add` and `remove`.

```
f(qID {, loopiter1, loopiter2, ..., loopitern})
```

The curly brackets `{}` are used here to indicate that the loop iterations are optional arguments (see The `f` Function on page 165 for more information).

13.3. Methods of the Set Object

In the syntax below, `s1` and `s2` represents instances of set objects or form objects (returned from the `f` function). For `add` and `remove` `s1` represents only an instance of the set object, because these methods are not defined for form objects.

13.3.1. inc

```
s1.inc(code)
```

`inc` returns `true` if the `code` is contained in the set `s1`.

For example, for a multi question `q1`, the expression

```
f("q1").inc("1")
```

is `true` if the answer with code "1" has been selected on `q1`.

If you need an expression that is `true` if the answer with code "1" **or** the answer with code "2" has been selected, you can use this code:

```
f("q1").inc("1") || f("q1").inc("2")
```

If you need an expression that is `true` if the answer with code "1" **and** the answer with code "2" has been selected, you can use this code:

```
f("q1").inc("1") && f("q1").inc("2")
```

13.3.2. size

```
s1.size()
```

`size` returns the number of elements in the set s_1 .

Asking for Favorite Only when More than 1 Item is Chosen

If you have a multi question `cars` asking for cars the respondent would like to drive, followed by a single question `cars_favorite` asking for the favorite among those selected in `cars`, the single question is only needed when more than 1 element is chosen on the multi. This can be achieved with the following expression in a condition:

```
f("cars").size()>1
```

The `cars_favorite` question will then have the following code mask so that it only shows answers from the `cars` question::

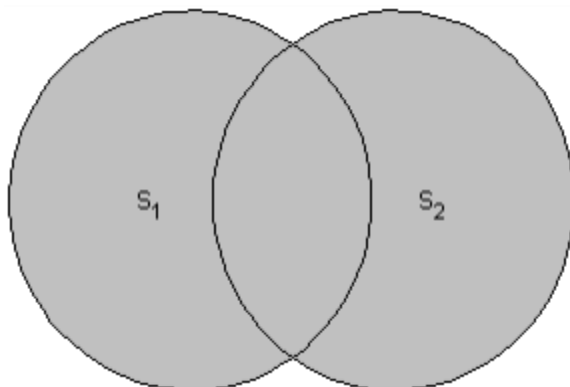
```
f("cars")
```

13.3.3. union, isect and diff

There are three methods available to use for set operations: `union`, `isect` and `diff`. These methods are useful when you need complex code masks, for example when you want to filter the answer list based on answers to two previous questions. Examples of this are: Showing the items answered on both questions, on any of the questions, on one but not the other etc.

```
s1.union(s2)
```

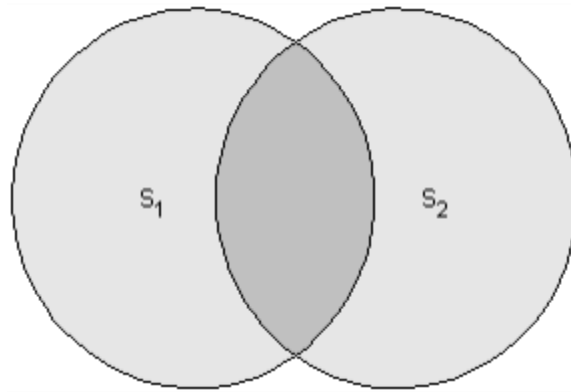
The **union** of two sets s_1 and s_2 is the set obtained by combining the members of both sets. So `union` will return a set consisting of all elements in s_1 **or** s_2 .



`s1.union(s2)`

```
s1.isect(s2)
```

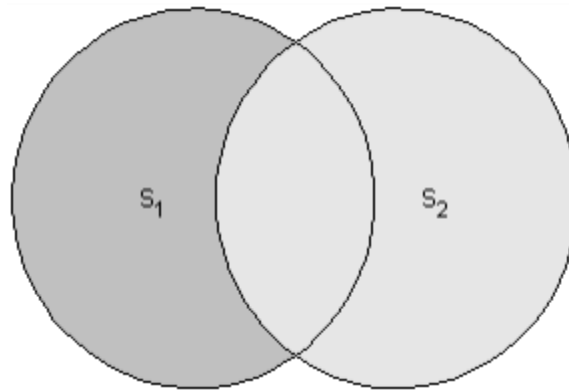
The **intersection** of two sets s_1 and s_2 is the set of elements common to s_1 and s_2 . So `isect` will return a set consisting of the elements that are both in s_1 **and** s_2 .



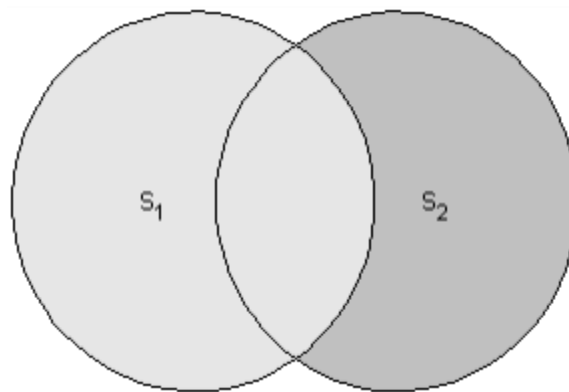
$s_1.\text{isect}(s_2)$

```
s1.diff(s2)
```

The **difference** between two sets s_1 and s_2 will yield a set consisting of the elements that are in the first set, but not in the other. For difference the order of the sets in the expression is significant. $s_1.\text{diff}(s_2)$ will return a set consisting of the elements in s_1 that are not in s_2 , but $s_2.\text{diff}(s_1)$ will return a set consisting of the elements in s_2 that are not in s_1 . As the illustrations show, these are two completely different sets.



`s1.diff(s2)`



`s2.diff(s1)`

Filtering an Answer List on Items Selected in Two Previous Questions

You have two multi questions *q1* and *q2*, and then a loop where you loop through the same answer list that is used in *q1* and *q2*.

If you want the loop to be filtered so that only the items the respondent answered in both *q1* and *q2*, you can use a code mask like this on the loop:

```
f("q1").isect(f("q2"))
```

If you want the loop to be filtered so that all the items the respondent answered in either of *q1* or *q2*, you can use a code mask like this on the loop:

```
f("q1").union(f("q2"))
```

If you want the loop to be filtered so that only items answered in *q1*, but not in *q2*, you can use a code mask like this:

```
f("q1").diff(f("q2"))
```

Similar, for items answered in *q2* but not in *q1*:

```
f("q2").diff(f("q1"))
```

Filtering Answers Not Selected in a Previous Question

If you have a multi question *q1* followed by a grid *q2* where you only want the answers not selected in *q1* to be displayed, you can use the `a` function to get a set with all the codes in the answer list, and use the `diff` method to remove the codes of the answers selected on *q1*. The code for such a code mask will be like this:

```
a("q2").diff(f("q1"))
```

You have to use the same codes for corresponding items in the answer lists of the two questions. This can easily be achieved for example by using a predefined list.

Always Including a "Don't know" Answer Alternative

Often you want to filter the answer list, but you want a "Don't know" alternative always to be included at the bottom of the answer list. Say for example a multi $q1$ is followed by a single question $q3$ where the answers given to $q1$ and "Don't know" should be displayed. It is a good idea to assign a code to "Don't know" that is different from the other codes, for example by using a large number like "99" or letters like "DK". We will use "DK" in this example. In the code mask of $q3$ we can use this code:

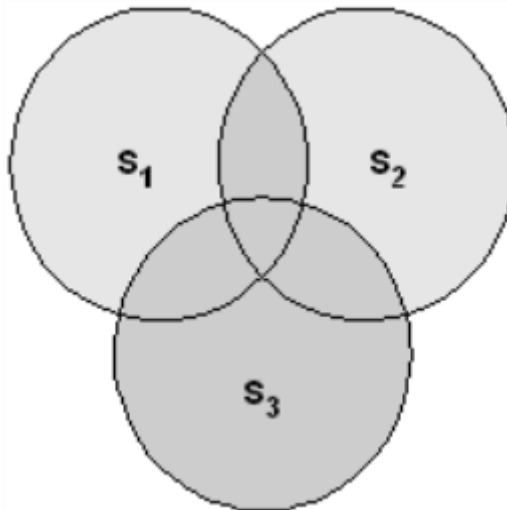
```
f("q1").union(set("DK"))
```

13.3.4. Combining Set Operators

You may build expressions where several set operators are combined. When several set operators are included in the same expression, the expression is evaluated from left to right. So if you for example have three sets s_1 , s_2 and s_3 , the expression

```
s1.isect(s2).union(s3)
```

will give a set consisting of all codes either in the sets s_1 and s_2 , or in set s_3 :

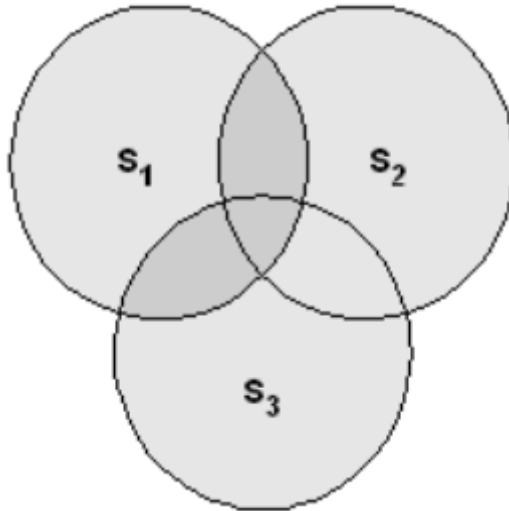


$s_1.isect(s_2).union(s_3)$

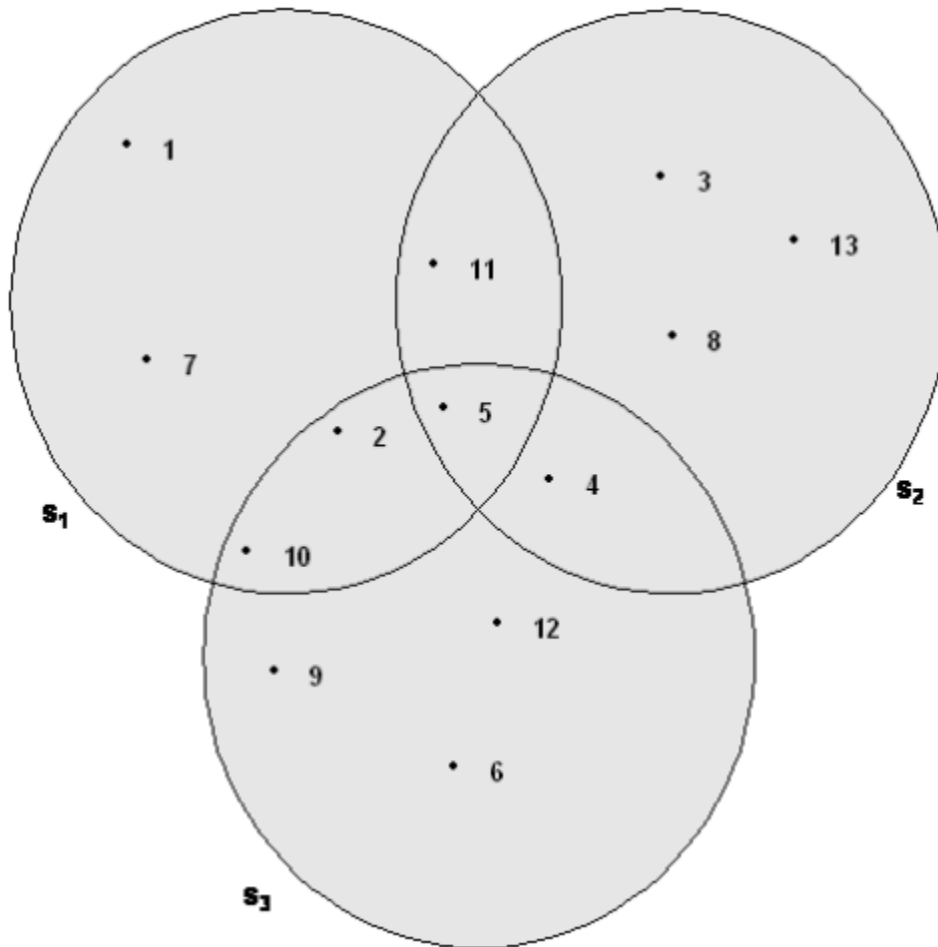
To force a sub-expression to be evaluated before other expressions, you can insert entire expressions inside the parentheses of the set methods. In the expression

```
s1.isect(s2.union(s3))
```

the sub-expression $s_2.union(s_3)$ will be evaluated first, and then the intersection between the result of this sub-expression and the set s_1 is computed. The result is a set consisting of all codes both in s_1 and in either of s_2 or s_3 :



`s1.isect(s2.union(s3))`



Exercise 6:

You have three sets: s_1 , s_2 and s_3 . s_1 consists of the codes 1, 2, 5, 7, 10, 11, s_2 consists of the codes 3, 4, 5, 8, 11, 13 and s_3 consists of the codes 2, 4, 5, 6, 9, 10, 12, as indicated in the illustration above.

What elements will the sets returned from the following expressions contain?

1. `s1.union(s3.diff(s2))`
2. `s1.union(s3).diff(s2)`
3. `s1.isect(s2.diff(s3))`
4. `s1.isect(s2).union(s2.isect(s3)).union(s3.isect(s1))`

The answers are given in APPENDIX A Answers to Exercises.

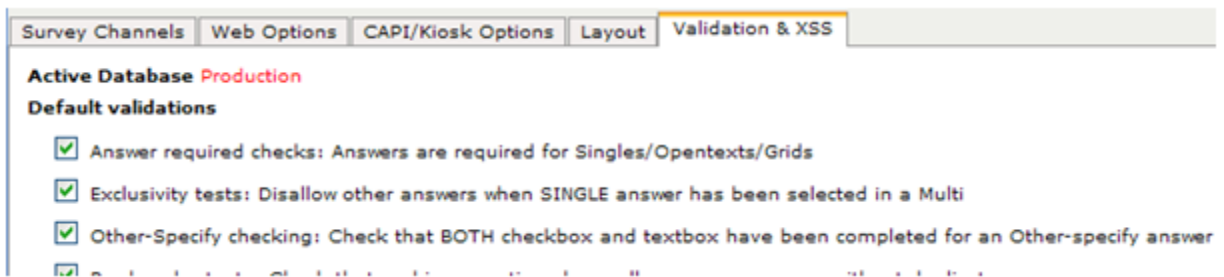
13.3.5. members

```
s1.members()
```

`members` is used to convert a set to an array.

Validating "Other, specify" in a 3D Grid

For grids/singles/multiples it is possible to automatically validate Other-specify by checking the "Other - Specify checking..." setting in **Project Management > Survey Settings > Validation & XSS** tab:



However this setting does not apply to 3D grids since Forsta cannot deduce which question within a 3D grid should be validated with the Other-specify; instead it is necessary to use some manual validation code.

The question ID to refer to an Other-specify within a 3D grid is:

```
3d-grid-id_code_other
```

For example, we have a 3D grid (g1) containing a multi (q1) and a rating grid (q2); the 3d grid has answers/codes 1-4 with the 4th code being an Other specify.

| 3d Grid | | Please rate the brand | | | | |
|--------------|------------------------------|-----------------------|--------------------------|-----------------------|-----------------------|-----------------------|
| | Select brands you have tried | Excellent | Good | Neutral | Bad | Terrible |
| | | Brand 1 | <input type="checkbox"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Brand 2 | <input type="checkbox"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Brand 3 | <input type="checkbox"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Other brand: | <input type="checkbox"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

We wish to validate so that the respondent is forced to add Other-specify text if they select this option in the multi q1. The validation code for this is:

```

var codes = a("q1").diff(set("97","98")).members();
if(f('q1').inc('4') && !f('g1_4_other').toBoolean() )
{
  RaiseError();
  SetQuestionErrorMessage(LangIDs.en,"Please specify in the Other Specify
box");
}
if(!f('q1').inc('4') && f('g1_4_other').toBoolean())
{
  RaiseError();
  SetQuestionErrorMessage(LangIDs.en,"Please do not specify in the Other
Specify box without selecting this answer");
}

```

13.3.6. add and remove

To add and remove items from a set, there are two methods available: `add` and `remove`.

```
s1.add(code); s1.remove(code);
```

`add` will add `code` to the set `s1`. If `code` is already in the set `s1`, the set will not be changed. `remove` will remove `code` from the set `s1`. If `code` is not in the set `s1`, the set will not be changed.

These methods are not defined for the form objects (returned from the `f` function), only for the set object.

Using a Function to Filter an Answer List Based on the Answers on a Grid

If you have a grid where you give some elements a rating from 1-5, you may for example want the next question to use only the elements that get a score of 4 or 5. This can be achieved with a function like this defined in a script node:

```

function ScoreFilter(qID)
{
  var form = f(qID);
  var codes = form.domainValues();
  var s = new Set();
  var i : int;
  for(i=0;i<codes.length;i++)
  {
    var code = codes[i];
    if(form[code].get() == "4" || form[code].get() == "5")
    {
      s.add(code);
    }
  }
  return s;
}

```

This function returns a set with the codes of the items that have received a score of "4" or "5". In the code mask where you want to use it, call this function with the question ID of the grid (for example `q3`) as argument:

```
ScoreFilter("q3")
```

Note: If the respondent does not score any grid elements "4" or "5", then `ScoreFilter()` will return an empty set/mask and the respondent will be presented with an empty question (since all answers are masked out). It would therefore be reasonable to also include a question mask (or condition node):

```
ScoreFilter("q3").size()>0
```

Then, if the question is 'empty', it will be skipped.

13.3.7. .any, .all and .none

These methods can be used to check whether a set includes specific codes:

```

s1.any(code1, code2, ..., codeN);
s1.all(code1, code2, ..., codeN);
s1.none(code1, code2, ..., codeN);

```

any will return true if *any* of the codes listed can be found in the set s1.

all will return true if *all* of the codes listed can be found in the set s1.

none will return true if *none* of the codes listed can be found in the set s1.

13.4. User-Defined Functions in Code or Scale Masks

The previous example used a user-defined function in the code mask field. This is a convenient way of doing it, but there are a few pitfalls with this approach.

The code mask is called several times when you go through the questionnaire, not only when the question is displayed. Every time you use the f function on a question with a code mask, the code mask is evaluated. So the function in the code mask of a question will be called every time there is a reference to the question in scripts elsewhere in the survey.

Due to this, the time it takes for the respondent to load the survey pages will increase slightly because there are more scripts to execute.

You are therefore recommended to be cautious when using functions in code masks. An alternative approach is to set a hidden multi question and filter on that instead. This hidden multi question can also be useful for reporting purposes.

Using a Hidden Multi to Filter an Answer List Based on a Grid

As described previously (see add and remove on page 179 for more information), we have a grid where the elements are given a 1-5 rating, and we want the next question to use only the elements that are given a score of "4" or "5". Now let us use a script to set a hidden multi question, *scorefilter*, instead of using a function. The grid has question ID *carrating*.

```
var form = f("carrating");
var codes = form.domainValues();
var i : int;
for(i=0;i<codes.length;i++)
{
    var code = codes[i];
    if(form[code].get() == "4" || form[code].get() == "5")
    {
        f("scorefilter")[code].set("1");
    }
    else
    {
        f("scorefilter")[code].set("0");
    }
}
```

Then the code mask uses *scorefilter* instead of the function call:

```
f("scorefilter")
```

14. Some Useful JScript .NET Objects

This chapter describes some of the objects provided in JScript .NET. The objects that are most useful for scripting in Forsta, and the properties and methods that are most frequently used, are presented. For descriptions of other JScript .NET Objects, consult a JScript .NET reference manual.

14.1. The Date Object

The `Date` object enables basic storage and retrieval of dates and times, and can be used to set timestamps, do calculations of time differences and to validate dates in the respondent's answers.

The `Date` object type of JScript .NET provides a common set of methods for working with dates and times, either the Local Time or Universal Coordinated Time (UTC). Since we are working with scripts that run on the Forsta servers (server-side), not on the respondent's PC (client-side), **Local Time** means the time on the Forsta servers you are working on. **Universal Coordinated Time (UTC)** (sometimes also called "Zulu Time") was formerly called Greenwich Mean Time (GMT) and is the mean solar time at the prime meridian (0° longitude).

Date values are stored internally as the number of milliseconds since January 1, 1970 UTC. For dates before this date, this will be a negative number. The range of dates that can be represented in an instance of the `Date` object is approximately 285,616 years on either side of January 1, 1970. This should be sufficient for most of us.

14.1.1. Constructors

You can create a new instance of the `Date` object in three ways:

```
dateObj = new Date();
dateObj = new Date(dateVal);
dateObj = new Date(year, month, date{, hours{, minutes{,
seconds{,ms}}});
```

If you just use the constructor `Date()`, the instance of the `Date` object will be set to current date and time.

If you use `Date(dateVal)` and `dateVal` is an integer, `dateVal` represents the number of milliseconds since midnight January 1, 1970 Universal Coordinated Time. Negative numbers indicate dates prior to 1970. If `dateVal` is a string, `dateVal` is parsed according to the rules in the parse method (see parse on page 182 for more information)).

Here are two ways of getting an instance of the `Date` Object that is set to midnight 2000 (UTC):

```
d = new Date(946684800000);
d = new Date("Sat, 1 Jan 2000 00:00:00 UTC");
```

When you use `Date(year, month, date{, hours{, minutes{, seconds{,ms}}})`, the first three arguments are required. `year` has to be the full year, for example 1984 (and not just 84). `month` is an integer between 0 and 11 (This means that January is 0, December is 11. This is similar to how we have seen that arrays are indexed, where 0 is the first element). `date` is an integer between 1 and 31.

The next arguments are optional (that's what the curly brackets indicate), but when one of them is included, all preceding arguments must be supplied. This means that if you specify `seconds`, it has to be preceded by `hours` and `minutes`. `hour` is an integer from 0 to 23 (midnight to 11pm). `minutes` and `seconds` are integers from 0 to 59 and `milliseconds` is an integer from 0 to 999. Here is an example:

```
d = new Date(2000,0,1,0,0,0,0);
```

This may or may not be equal to the two examples above using the other constructors. It depends on the server settings on the Forsta server. The two examples above both use UTC. With this last constructor, the time zone cannot be specified. The time zone of the Forsta server will be used.

If an argument is greater than its range or is a negative number, other stored values are modified accordingly. So 150 seconds will be redefined as 2 minutes and 30 seconds. The 2 minutes will be added to the `minutes` value. If this exceeds 60 minutes, hours will be modified and so on.

14.1.2. Date Object Methods

The `Date` object has two **static** methods. They are called static because they are called without creating an instance of the `Date` object. They are `parse` and `UTC`. The other methods are invoked as methods of a created instance of the `Date` object. In code below `dateObj` is an instance of a `Date` object.

14.1.2.1. Static Methods

14.1.2.1.1. parse

Parses a string containing a date, and returns the number of milliseconds between that date and midnight, January 1, 1970.

```
Date.parse(dateVal)
```

`dateVal` is a string containing a date.

The `parse` method returns an integer value representing the number of milliseconds between midnight, January 1, 1970 and the date supplied in `dateVal`.

The `parse` method is a static method of the `Date` object. Because it is a static method, it is invoked as shown in the following example, rather than invoked as a method of a created `Date` object.

```
Date.parse("January 1, 2000 00:00 AM")
```

The following rules govern what the `parse` method can successfully parse:

- Short dates can use either a "/" or "-" date separator, but must follow the month/day/year format, for example "7/20/96".
- Long dates of the form "July 10 1995" can be given with the year, month, and day in any order, and the year in 2-digit or 4-digit form. If you use the 2-digit form, the year must be greater than or equal to 70.
- Any text inside parentheses is treated as a comment. These parentheses may be nested.
- Both commas and spaces are treated as delimiters. Multiple delimiters are permitted.
- Month and day names must have two or more characters. Two character names that are not unique are resolved as the last match. For example, "Ju" is resolved as July, not June.
- The stated day of the week is ignored if it is incorrect given the remainder of the supplied date. For example, "Tuesday November 9 1996" is accepted and parsed even though that date actually falls on a Friday. The resulting `Date` object contains "Friday November 9 1996".
- JScript .NET handles all standard time zones, as well as Universal Coordinated Time (UTC) and Greenwich Mean Time (GMT).
- Hours, minutes, and seconds are separated by colons, although all need not be specified. "10:", "10:11", and "10:11:12" are all valid.
- If the 24-hour clock is used, it is an error to specify "PM" for times later than 12 noon. For example, "23:15 PM" is an error.
- A string containing an invalid date is an error. For example, a string containing two years or two months is an error.

14.1.2.1.2. UTC

`UTC` returns the number of milliseconds between midnight, January 1, 1970 Universal Coordinated Time (UTC) (or GMT) and the supplied date.

```
Date.UTC(year, month, day{, hours{, minutes{, seconds{,ms}}})
```

The arguments are equal to those of the `Date(year, month, day{, hours{, minutes{, seconds{,ms}}})` constructor (see Constructors on page 181 for more information).

If the value of an argument is greater than its range, or is a negative number, other stored values are modified accordingly. For example, if you specify 150 seconds, JScript .NET redefines that number as two minutes and 30 seconds.

The difference between the `UTC` method and the corresponding `Date` object constructor is that the `UTC` method assumes UTC, and the `Date` object constructor assumes local time. (Local time when doing server side scripting will be the time zone of the Forsta servers, not the time zone of the client (the PC of the respondent)).

The `UTC` method is a static method. Therefore, a `Date` object does not have to be created before it can be used.

```
Date.UTC(2000,0,1,0,0,0,0)
```

14.1.2.2. Methods for Setting or Retrieving Values of Parts of Dates

The methods with UTC in the method name use Universal Coordinated Time. The other methods use local time, and as we are dealing with server-side scripts that will be the time of the Forsta server. The following table show these methods grouped based on the date part they operate on. Curly brackets, { and }, are used to indicate optional arguments.

| | | | |
|----------------------------------|-----------------------------------|---|--|
| <code>getFullYear()</code> | <code>getUTCFullYear()</code> | <code>setFullYear(numYear{, numMonth{, numDate}})</code> | <code>setUTCFullYear(numYear{, numMonth{, numDate}})</code> |
| <code>getMonth()</code> | <code>getUTCMonth()</code> | <code>setMonth(numMonth{, numDate})</code> | <code>setUTCMonth(numMonth{, numDate})</code> |
| <code>getDay()</code> | <code>getUTCDay()</code> | | |
| <code>getDate()</code> | <code>getUTCDate()</code> | <code>setDate(numDate)</code> | <code>setUTCDate(numDate)</code> |
| <code>getHours()</code> | <code>getUTCHours()</code> | <code>setHours(numHours{, numMinutes{, numSeconds{, numMilliseconds}})</code> | <code>setUTCHours(numHours{, numMinutes{, numSeconds{, numMilliseconds}})</code> |
| <code>getMinutes()</code> | <code>getUTCMinutes()</code> | <code>setMinutes(numMinutes{, numSeconds{, numMilliseconds}})</code> | <code>setUTCMinutes(numMinutes{, numSeconds{, numMilliseconds}})</code> |
| <code>getSeconds()</code> | <code>getUTCSeconds()</code> | <code>setSeconds(numSeconds{, numMilliseconds})</code> | <code>setUTCSeconds(numSeconds{, numMilliseconds})</code> |
| <code>getMilliseconds()</code> | <code>getUTCMilliseconds()</code> | <code>setMilliseconds(numMilliseconds)</code> | <code>setUTCMilliseconds(numMilliseconds)</code> |
| <code>getTime()</code> | | <code>setTime(milliseconds)</code> | |
| <code>getTimezoneOffset()</code> | | | |

For the methods that set date parts, the other parts of the date are modified accordingly if the value of an argument is greater than its range or is a negative number. So, if you for example use the `setMinutes` method with 62 as argument, minutes will be set to 2 and hours will be increased with 1. If this makes hours exceed its limit, date is changed to the next day, and so on. This gives a very efficient way of working with dates in scripts.

For all methods with `numMonth` as argument, remember that JScript .NET months use the numbers 0 to 11. 0 is January and 11 is December.

14.1.2.2.1. `getFullYear`, `getUTCFullYear`, `setFullYear` and `setUTCFullYear`

```
dateObj.getFullYear()
dateObj.getUTCFullYear()
```

`getFullYear` and `getUTCFullYear` return the year value in the `Date` object as an absolute number, thus avoiding the Y2K problem.

```
dateObj.setFullYear(numYear{, numMonth{, numDate}})
dateObj.setUTCFullYear(numYear{, numMonth{, numDate}})
```

`setFullYear` and `setUTCFullYear` set the year value in the `Date` object.

`numYear` is required and is a numeric value equal to the year.

numMonth and *numDate* are both optional. If *numDate* is supplied, *numMonth* must also be supplied. *numMonth* is a numeric value equal to the month (0-11). *numDate* is a numeric value equal to the date (1-31).

If you do not specify the optional arguments, the value will be retrieved from the corresponding get method. For example, if *numMonth* is not specified, JScript .NET uses the value returned from the *getMonth* or *getUTCMonth* method.

If the value of an argument is greater than its range or is a negative number, other stored values are modified accordingly.

There are two methods called *getYear* and *setYear*. They are obsolete and kept for backwards compability only. It is **not** recommended to use them, because of Y2K problems. Use the *FullYear* methods instead.

14.1.2.2.2. getMonth, getUTCMonth, setMonth and setUTCMonth

```
dateObj.getMonth()
dateObj.getUTCMonth()
```

getMonth and *getUTCMonth* return the month value in the *Date* object. The value returned is an integer between 0 and 11 indicating the month value in the *Date* object. Note that this is different from the conventional way of numbering months (1-12). The numeric value for January is 0 and for December the value is 11, one less than the usual way of numbering the months. If "Jan 1, 2000 00:00:00" is stored in a *Date* object, *getMonth* returns 0.

```
dateObj.setMonth(numMonth[, dateVal]) dateObj.setUTCMonth(numMonth[,
dateVal])
```

setMonth and *setUTCMonth* set the month value in the *Date* object. *numMonth* is required, and is a numeric value equal to the month (0-11).

dateVal is optional. It is a numeric value representing the date. If not supplied, the value from a call to the *getDate* or *getUTCDate* method is used.

If the value of *numMonth* is greater than 11 or is a negative number, the stored year is modified accordingly. For example, if the stored date is "Jan 1, 2000" and *setMonth*(14) is called, the date is changed to "Mar 1, 2001."

14.1.2.2.3. getDay and getUTCDay

```
dateObj.getDay()
dateObj.getUTCDay()
```

getDay and *getUTCDay* return the day of the week of the *Date* object.

The value returned from the *getDay* method is an integer between 0 and 6 representing the day of the week and corresponds to a day of the week as follows:

| Value | Day of the Week |
|-------|-----------------|
| 0 | Sunday |
| 1 | Monday |
| 2 | Tuesday |
| 3 | Wednesday |
| 4 | Thursday |
| 5 | Friday |

| | |
|---|----------|
| 6 | Saturday |
|---|----------|

14.1.2.2.4. getDate, getUTCDate, setDate and setUTCDate

```
dateObj.getDate()
dateObj.getUTCDate()
```

`getDate` and `getUTCDate` return the day of the month value in a `Date` object. The return value is an integer between 1 and 31 that represents the date value in the `Date` object.

```
dateObj.setDate(numDate) dateObj.setUTCDate(numDate)
```

`setDate` and `setUTCDate` set the day of month value of the `Date` object.

`numDate` is a numeric value equal to the day of month value. If the value is outside the number of days in the month stored in the `Date` object or a negative number, the other values are modified accordingly, e.g. so that if the date of the object is January 1st 2000 and you use `setUTCDate(32)` on that object, you get February 1st 2000.

14.1.2.2.5. getHours, getUTCHours, setHours and setUTCHours

```
dateObj.getHours()
dateObj.getUTCHours()
```

`getHours` and `getUTCHours` return the hours value in a `Date` object.

The value returned is an integer between 0 and 23, indicating the number of hours since midnight.

```
dateObj.setHours(numHours{, numMin{, numSec{,
numMilli}}}) dateObj.setUTCHours(numHours{, numMin{, numSec{, numMilli}}})
```

`setHours` and `setUTCHours` set the hours value in a `Date` object.

The only required argument is `numHours`, which is a numeric value equal to the hours value.

The rest of the arguments are optional. If they are not included, the results from using the corresponding get functions are used. For example, if `numMin` is not provided, the result from `getMinutes` or `getUTCMinutes` is used. All preceding arguments must be included if one of the optional arguments is included. For example, if `numSec` is used, `numMin` must also be included in the method call.

`numMin` is a numeric value equal to the minutes value, `numSec` is a numeric value equal to the seconds value and `numMilli` is a numeric value equal to the milliseconds value.

If the value of an argument is greater than its range or is a negative number, other stored values are modified accordingly. For example, if the stored date is "Jan 1, 2000 00:00:00", and `setHours(30)` is called, the date is changed to "Jan 2, 2000 06:00:00." Negative numbers have a similar behavior.

14.1.2.2.6. getMinutes, getUTCMinutes, setMinutes and setUTCMinutes

```
dateObj.getMinutes()
dateObj.getUTCMinutes()
```

`getMinutes` and `getUTCMinutes` return the minutes value in a `Date` object.

The value returned is an integer between 0 and 59 equal to the minutes value stored in the `Date` object.

```
dateObj.setMinutes(numMin{, numSec{,
numMilli}}) dateObj.setUTCMinutes(numMin{, numSec{, numMilli}})
```

`setMinutes` and `setUTCMinutes` set the minutes value in a `Date` object.

The only required argument is `numMinutes`, which is a numeric value equal to the minutes value.

The rest of the arguments are optional. If they are not included, the results from using the corresponding get functions are used. For example, if *numSec* is not provided, the result from `getSeconds` or `getUTCSeconds` is used. All the preceding arguments must be included if one of the optional arguments is included. If *numMilli* is used, *numSec* must also be included in the method call.

numSec is a numeric value equal to the seconds value and *numMilli* is a numeric value equal to the milliseconds value.

If the value of an argument is greater than its range or is a negative number, other stored values are modified accordingly. For example, if the stored date is "Jan 1, 2000 00:00:00", and `setMinutes(62)` is called, the date is changed to "Jan 1, 2000 01:02:00." Negative numbers have a similar behavior.

14.1.2.2.7. `getSeconds`, `getUTCSeconds`, `setSeconds` and `setUTCSeconds`

```
dateObj.getSeconds()
dateObj.getUTCSeconds()
```

`getSeconds` and `getUTCSeconds` return the seconds value in a `Date` object.

The value returned is an integer between 0 and 59 equal to the seconds value stored in the `Date` object.

```
dateObj.setSeconds(numSeconds{,
numMilli}) dateObj.setUTCSeconds(numSeconds{, numMilli})
```

`setSeconds` and `setUTCSeconds` set the seconds value in a `Date` object.

The only required argument is *numSeconds*, which is a numeric value equal to the seconds value.

numMilli is optional. If it is not included, the results from using the corresponding get functions are used (`getMillieconds` or `getUTCMillieconds`).

numMilli is a numeric value equal to the milliseconds value.

If the value of an argument is greater than its range or is a negative number, other stored values are modified accordingly. For example, if the stored date is "Jan 1, 2000 00:00:00", and `setSeconds(124)` is called, the date is changed to "Jan 1, 2000 00:02:04." Negative numbers have a similar behavior.

14.1.2.2.8. `getMilliseconds`, `getUTCMilliseconds`, `setMilliseconds` and `setUTCMilliseconds`

```
dateObj.getMilliseconds()
dateObj.getUTCMilliseconds()
```

`getMilliseconds` and `getUTCMilliseconds` return the milliseconds value in a `Date` object.

The millisecond value is an integer from 0 to 999.

```
dateObj.setMilliseconds(numMilli) dateObj.setUTCMilliseconds(numMilli)
```

`setMilliseconds` and `setUTCMilliseconds` set the milliseconds value in the `Date` object.

numMilli is a numeric value equal to the milliseconds value.

If the value of *numMilli* is greater than 999 or is a negative number, the stored number of seconds (and minutes, hours, and so forth if necessary) is modified accordingly.

14.1.2.2.9. `getTime` and `setTime`

```
dateObj.getTime()
```

`getTime` returns an integer value representing the number of milliseconds between midnight, January 1, 1970 UTC and the time value in the `Date` object. Negative numbers indicate dates prior to 1970.

```
dateObj.setTime(milliseconds)
```

`setTime` sets the date and time of the instance of the `Date` object. *milliseconds* is an integer value representing the number of elapsed seconds since midnight, January 1, 1970 UTC. If *milliseconds* is negative, it indicates a date before 1970.

14.1.2.2.10. getTimezoneOffset

```
dateObj.getTimezoneOffset()
```

Returns the difference in minutes between the time on the host computer (the Forsta server when doing server-side scripting) and Universal Coordinated Time (UTC). This number will be positive if you are behind UTC (e.g., Pacific Daylight Time), and negative if you are ahead of UTC (e.g., Japan).

14.1.2.3. Date Conversion Methods

Two conversion methods are available for dates.

14.1.2.3.1. valueOf

```
dateObj.valueOf()
```

valueOf returns the stored time value in milliseconds since midnight, January 1, 1970 UTC.

14.1.2.3.2. toLocaleString, toString and toUTCString

```
dateObj.toLocaleString()
```

toLocaleString returns a date converted to a string using the current locale. This mean that it will give the Forsta server time, and the date is formatted according to the Regional Settings on the server.

```
dateObj.toUTCString()
```

toUTCString returns a string that contains the date formatted using Universal Coordinated Time (UTC) convention.

```
dateObj.toString()
```

toString returns the textual representation of the date, in the time of the Forsta server, but not reflecting the locale settings.

Here is an example of the output from the three different methods from a server with English (United States) as locale and where the time zone is EST (such as Forsta's Forsta ASP servers):

| Method | Output |
|----------------|--------------------------------------|
| toUTCString | Sat, 1 Jan 2000 00:00:00 UTC |
| toLocaleString | Friday, December 31, 1999 7:00:00 PM |
| toString | Fri Dec 31 19:00:00 EST 1999 |

There also exists a method called toGMTString, which returns a date converted to a string using Greenwich Mean Time(GMT). This method is obsolete, and it is recommended that you use the toUTCString method instead.

14.1.3. Date Functions and Date Questions

Forsta provides six functions for working with dates. InterviewStart and InterviewEnd return the interview_start and interview_end time stamps automatically recorded when the respondent starts the interview and reach the end of the interview or a stop node (the end page). SetInterviewStart and SetInterviewEnd set these timestamps. IsDate and IsDateFmt are used for validation of dates.

Such date variables can be used both in the surveys when asking respondents for dates (for examples date of birth), and also as "hidden" variables to set and store dates through scripting. The date question type has built in validation and a calendar pop-up interface, so it is not necessary to use the IsDate and IsDateFmt functions for validation of the respondent's answer when using this question type.

14.1.3.1. InterviewStart and InterviewEnd

Both of these functions return dates, however they will return the dates as strings. The syntax you can use to get instances of the JScript .NET Date object from InterviewStart and InterviewEnd is as below:

```
dateObj = InterviewStart();
dateObj = InterviewEnd();
```

Calculating Time Spent

You can calculate the response time of the respondents on specific pages or sections of the survey by using the Date object. Assume you want to calculate the number of seconds the respondent has spent from the beginning to a specific point in the interview and store that in a numeric question with hidden property (*time_part1*).

```
if(!f("time_part1").toBoolean())
{
  var d1 = InterviewStart()
  var d2 = new Date()

  var diff = (d2.getTime() - d1.getTime())/1000
  f("time_part1").set(diff)
}
```

The if-condition is there to ensure that the time is only calculated the first time the respondent goes through the questionnaire (if he or she is allowed to modify previous responses), when no value has been set in the hidden *time_part1* question.

You must ensure you use the correct settings on the hidden numeric question. Decimal places should be set to 3 (3 digits after the decimal point) since `getTime` returns milliseconds. We divide the number of milliseconds with 1000 to get the answer stored as seconds. Total digits has to be set high enough to be able to store both the 3 digits after the decimal point and the highest number of seconds a respondent will use.

If you want to calculate the response time for the next part of the questionnaire as well, you can for example use the following script to set that in another hidden numeric question (*time_part2*):

```
if(!f("time_part2").toBoolean())
{
  var d1 = InterviewStart();
  var d2 = new Date();

  var diff = ((d2.getTime() - d1.getTime())/1000) -
f("time_part1").toNumber();
  f("time_part2").set(diff);
}
```

14.1.3.2. IsDateFmt and IsDate

These functions are also described in IsDateFmtAndIsDate. Here we will look closer at the properties of the objects returned from them and provide some examples on how to use the functions together with the JScript Date object.

If you have a string with day, month and year in some format (for example from an open text question) and you want to check if it is a valid date, you can use the IsDateFmt function.

```
dObj = IsDateFmt( argument, format );
```

If you have three values, one for day, one for month and one for year, (for example from three questions), you can use IsDate to check if it is a valid date.

```
dObj = IsDate( day, month, year );
```

Both IsDateFmt and IsDate return an object with the properties `day`, `month` and `year` if the date is valid, `null` otherwise. The object returned is not a Date object – it has none of the methods of the Date object, just these three properties.

```
dObj.day
```

returns the day part of the date as an integer in the range 1-31.

```
dObj.month
```

returns the month part of the date as an integer in the range 1-12.

Important:
Note that this is different from the `Date` object, where `getMonth` and `getUTCMonth` return an integer in the range 0-11.

```
dObj.year
```

returns the year part of the date as an integer (4 digits).

In this example we have an open text question and want the respondent to enter a date in the format YYYY-MM-DD. We want to validate that the format is correct and that the date is a valid date, and also that the date is not after the current date.

This can be done with the following script in the validation code field of the open text question (*date1*).

```
var d = IsDateFmt (f ("date1") .get () , "YYYY-MM-DD");

if (!d)
{
  RaiseError ();
  SetQuestionErrorMessage (LangIDs.en, "Invalid date. Please correct using
the format YYYY-MM-DD");
}
else
{
  var dt = new Date ();
  dt.setFullYear (d.year, d.month-1, d.day);
  var current = new Date ();
  if (dt.valueOf () > current.valueOf ())
  {
    RaiseError ();
    SetQuestionErrorMessage (LangIDs.en, "Please do not enter a date after
the current date.");
  }
}
```

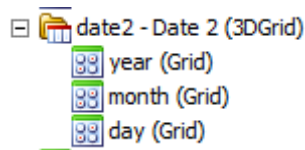
If the date provided is not valid, `IsDateFmt (f ("date1") .get () , "YYYY-MM-DD")` will return `null`. Used in a condition `null` will yield the Boolean value `false`. If the date is valid, `IsDateFmt` will return an object. Used in a condition this will yield `true`. So the first `if` condition, with `!d`, makes sure there will come an error message only when the date is invalid or wrong format is used.

It is important that we include the rest of the script in an `else` branch because the properties `year`, `month` and `day` are not defined if `null` is returned. So we need to make sure that that part of the script only is run when we have an object in the variable `d`, to prevent script errors.

Then we introduce two instances of the `Date` object, and set one of them (`dt`) to the date answered, and the other (`current`) to the current date. We use the `setFullYear` method to set the date. Observe that we have to subtract 1 from the month, since the `Date` object uses the integers 0-11 for month, whereas the `month` property in the object returned from `IsDateFmt` uses the more conventional integers 1-12.

Validating that a Date with Drop-downs is within the next two Weeks

You can also set up the date with three questions, one for *year*, one for *month* and one for *day*. This can for example be set up in a 3D grid with 3 grid questions as drop-downs like this:



Course date

When do you wish to participate?

| | Year | Month | Day |
|-------|------|-------|-----|
| Date: | 2002 | April | 12 |

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>>

12
 13
 14
 15
 16
 17
 18
 19
 20
 21
 22

Note: The codes of the questions must be numeric and the same as the legal year/month/day values. For year the codes must be the full value (e.g. 2002), for month they must be numbers between 1 and 12, and for day they must be numbers between 1 and 31 (see `IsDateFmt` and `IsDate` on page 146 for more information).

Let us say that we want to check that the answer is a valid date (so that e.g. February 30th is not allowed), and that it is a date in the next two weeks from the current date.

```

var d =
IsDate(f("day")["1"].get(), f("month")["1"].get(), f("year")["1"].get());

if(!d)
{
  RaiseError();
  SetQuestionErrorMessage(LangIDs.en, "Invalid date. Please correct.");
}
else
{
  var dt = new Date();
  dt.setFullYear
(d.year, d.month-1, d.day);
  var current = new Date();
  var limit = new Date();
  limit.setDate(current.getDate()+14)
  if(dt.valueOf() < current.valueOf() || dt.valueOf() > limit.valueOf())
  {
    RaiseError();
    SetQuestionErrorMessage(LangIDs.en, "Please select a date within the
next two weeks.");
  }
}

```

This script takes advantage of the fact that when using `setDate`, the month and possibly also year value will automatically be updated if the value for date is outside the limit for the month. So if the result of `current.getDate()+14` is a number larger than the number of days in a month, `limit` will be set to a date in the next month. For example, if current date is April 20th 2002, the limit will be 4th of May 2002 (April 20th + 14 days).

Finding the Weekday

You can use the `Date` object to make a small application in Forsta to find the weekday of a specific date. Start with an open text question (`date3`) asking for a date. The validation can be done like this:

```
var d = IsDateFmt(f("date3").get(), "YYYY-MM-DD");
if(!d)
{
  RaiseError();
  SetQuestionErrorMessage(LangIDs.en, "Invalid date. Please correct. Use the format YYYY-MM-DD");
}
```

Then you can have a script node with the following function:

```
function FindDay(qID) : String
{
  var d = IsDateFmt(f(qID).get(), "YYYY-MM-DD");
  var dt = new Date();
  dt.setFullYear(d.year, d.month-1, d.day);
  var days = new Array
  ("Sunday", "Monday", "Tuesday", "Wednesday", "Thursday", "Friday", "Saturday")
  return days[dt.getDay()]
}
```

After the open text question you can have an info node like this:

| English | |
|---------|--|
| Title | |
| Result | |
| Text | The weekday of ^f("date3")^: ^FindDay("date3")^. |

This will for example give this output if the answer on the date question was 2002-04-20:

| Result |
|--------------------------------------|
| The weekday of 2002-04-20: Saturday. |

Exercise 7: Course Registration

Let us say you want to build a questionnaire where people can register for weekly courses that are held on Mondays. You want the respondents to provide the date they want to register for in an Open Text Question, but have to validate the date format (which should be "MM/DD YYYY") and check that the date provided is a Monday and it is after the current date.

Write a validation script for this question. Question ID is `date4`.

The answer is given in APPENDIX A Answers to Exercises.

Converting Data of Birth into Age (in number of years)

If you have an open text question *dob* where respondents insert their date of birth, you can calculate the respondent's age and set it in a hidden question *age* with the following script, which is placed in the validation code of the question:

```
var d = IsDateFmt(f("dob").get(), "YYYY-MM-DD");
if(!d)
{
  RaiseError();
  SetQuestionErrorMessage(LangIDs.en, "Invalid date. Please use the format YYYY-MM-DD");
}
else
{
  var birthday = new Date();
  birthday.setFullYear(d.year, d.month-1, d.day);
  var today = new Date();
  var years = today.getFullYear() - birthday.getFullYear();
  birthday.setYear(today.getFullYear());
  // If your birthday hasn't occurred yet this year, subtract 1.
  if(today < birthday)
  {
    years-- ;
  }
  f("age").set(years);
}
```

14.1.3.3. The Date Question Type

A date question type is available that will give both a respondent interface for selecting a date and storing it in the response database as a datetime variable,

The methods and properties available on the form object returned from `f("q1")` when *q1* is a date question, are described previously in chapters Conversion Methods in Forsta (see Conversion Methods in Forsta on page 24 for more information), Methods of the Form Objects (see Methods of the Form Objects on page 42 for more information) and The `f` Function (see The `f` Function on page 165 for more information). This section provides some examples of using these methods.

Note: The Date question type is only available when using the Optimized Database format.

Set Current Date

If you would like to set current date in a hidden date question *today*, this can be done with the following script:

```
if(!f("today").toBoolean())
{
  f("today").set(new Date());
}
```

Validating that Date answered is not after Current Date

In this example we have a date question *date1*. We want to validate that the date is not after the current date. This can be done with the following script in the validation code field of the date question (*date1*):

```
var dt = new Date(f("date1").year(), f("date1").month()-1, f("date1").day());
var current = new Date();
if(dt.valueOf() > current.valueOf())
{
  RaiseError();
  SetQuestionErrorMessage(LangIDs.en, "Please do not enter a date after the current date.");
}
```

Here we declare two instances of the Date object, and set one of them (*dt*) to the date answered, and the other (*current*) to the current date.

Converting Date of Birth into Age (in number of years)

If you have an date question *dob* where respondents insert their date of birth, you can calculate the respondent's age and set it in a hidden question age with the following script, which is placed in the validation code of the question:

```
var birthday = new Date(f("dob").year(), f("dob").month() - 1, f("dob").day());
var today = new Date();
var years = today.getFullYear() - birthday.getFullYear();
birthday.setYear(today.getFullYear());
// If your birthday hasn't occurred yet this year, subtract 1
if(today < birthday)
{
  years-- ;
}
f("age").set(years);
```

14.2. The Math Object

The `Math` object provides a standard library of mathematical constants and functions. The `Math` object cannot be created using the `new` operator, and gives an error if you attempt to do so. This is because it is a built-in object and not an object type. Most of the properties and methods are different mathematical constants and functions that you will seldom need to use in your questionnaires. The most important methods are the rounding methods (see Rounding on page 194 for more information) and the random method (see Random on page 195 for more information).

14.2.1. Properties

The properties of the `Math` object are different mathematical constants.

```
Math.E
```

Euler's constant, the base of natural logarithms. The `E` property is approximately equal to 2.718.

```
Math.LN2
```

The natural logarithm of 2. The `LN2` property is approximately equal to 0.693.

```
Math.LN10
```

The natural logarithm of 10. The `LN10` property is approximately equal to 2.302.

```
Math.LOG2E
```

The base-2 logarithm of e, Euler's constant. The `LOG2E` property is approximately equal to 1.442.

```
Math.LOG10E
```

The base-10 logarithm of e, Euler's constant. The `LOG10E` property is approximately equal to 0.434.

```
Math.PI
```

π , the ratio of the circumference of a circle to its diameter, approximately 3.141592653589793.

```
Math.SQRT1_2
```

The square root of $\frac{1}{2}$, or one divided by the square root of 2. The `SQRT1_2` property is approximately equal to 0.707.

```
Math.SQRT2
```

The square root of 2. The `SQRT2` property is approximately equal to 1.414.

14.2.2. Math Object Methods

14.2.2.1. Trigonometric Functions

```
Math.cos(x)
```

returns the cosine of a numeric expression *x*.

```
Math.sin(x)
```

returns the sine of a numeric expression *x*.

```
Math.tan(x)
```

returns the tangent of a numeric expression x .

```
Math.acos(x)
```

returns the arc cosine of a numeric expression x .

```
Math.asin(x)
```

returns the arc sine of a numeric expression x .

```
Math.atan(x)
```

returns the arctangent of a numeric expression x .

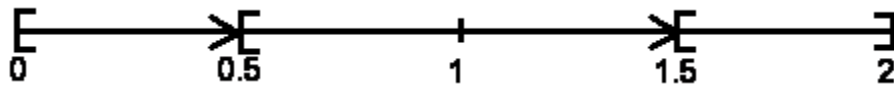
```
Math.atan2(x, y)
```

Returns the angle of the polar coordinate corresponding to (x,y)

14.2.2.2. Rounding

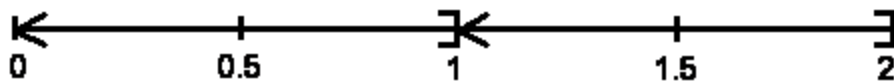
```
Math.round(x)
```

returns a supplied numeric expression x rounded to the nearest integer. If the decimal portion of the number is 0.5 or greater, the return value is equal to the smallest integer greater than the number. Otherwise, round returns the largest integer less than or equal to the number. This is exactly as conventional rounding. For example, if we have a floating point number between 0 and 2, values from 0 and up to but not including 0.5, will be rounded to 0. Values from and including 0.5 and up to but not including 1.5 will be rounded to 1. Values from and including 1.5 up to and including 2, will be rounded to 2.



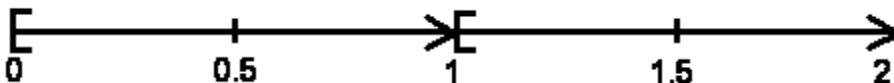
```
Math.ceil(x)
```

returns the smallest integer greater than or equal to its numeric argument x , i.e. rounding **up** to the nearest integer. For example, if we have a floating-point number between 0 and 2, the value 0 will be rounded to 0, and all values greater than 0 and up to and including 1 will be rounded to 1. All values greater than 1 and up to and including 2 will be rounded to 2.



```
Math.floor(x)
```

returns the greatest integer less than or equal to its numeric argument x , i.e. rounding **down** to the nearest integer. For example, if we have a floating point number between 0 and 2, all values from 0 and up to, but not including 1, will be rounded to 0. The value 1 and all values from 1 and up to but not including 2, will be rounded to 1, and the value 2 will be rounded to 2.



Rounding to a Number with Two Digits

If we ask people to provide their yearly salary and we want to compute the monthly salary, this can be done by dividing the yearly salary by 12. However this might result in a number with many decimals. If for example we want the result with an accuracy of two digits and need to round it, we can do that by multiplying the result by 100, then do the rounding, and then divide the result with 100. Let us say the yearly salary is in the question *yearly* and the monthly salary should be stored in the question *monthly*. Then we can use a script as below to set the *monthly* value:

```
var yearly : int = f("yearly").toNumber();
var monthly : float = yearly/12;
f("monthly").set(Math.round(monthly*100)/100);
```

14.2.2.3. Random

```
Math.random()
```

returns a random number between 0 and 1 (float), e.g. 0.523. The number generated is from 0 (inclusive) to 1 (exclusive), that is, the returned number can be zero, but it will always be less than one.

This is an extremely powerful feature to use in your surveys when you want to pick responses randomly, or send random respondents to different parts of the questionnaire. Combined with conditions and arithmetic operations you can program extremely powerful solutions for the selections (see *SetRandomCategories* on page 88 for more information).

Picking n Random Items from the Answers to a Multi Question

If you have a multi question where the respondent picks some brands and want to proceed with more detailed questions on some of the brands the respondent chooses, but not all, you can use a script to randomly pick some of the brands the respondent selected. Let's say the multi question has question ID *brands*, and we have a hidden multi question with the same answer list that has question ID *random_brands*.

```
var fromForm = f("brands");
var toForm = f("random_brands");
const numberOfItems : int = 3;

var available = new Set();
available = available.union(fromForm);
var selected = new Set();
if(available.size() <= numberOfItems)
{
    selected = available;
}
else
{
    while(selected.size() < numberOfItems)
    {
        var codes = available.members();
        var randomNumber : float = Math.random()*codes.length;
        var randomIndex : int = Math.floor(randomNumber);
        var selectedCode = codes[randomIndex];
        available.remove(selectedCode);
        selected.add(selectedCode);
    }
}

toForm.set(selected);
```

In this script we pick responses from a set of available responses (the answers to the multi question *brands*, stored in the variable *available*) and add them to the set stored in the variable *selected*. At the end we set the selected answers in the *random_brands* multi.

If there number of responses is less than or equal to *numberOfItems* (here: 3), we obviously include all those responses. But if there are more than 3 responses, we have to pick random responses from the answers given.

The random picking is done in this *while* loop:

```

while(selected.size() < numberOfItems)
{
    var codes = available.members();
    var randomNumber : float = Math.random()*codes.length;
    var randomIndex : int = Math.floor(randomNumber);
    var selectedCode = codes[randomIndex];
    available.remove(selectedCode);
    selected.add(selectedCode);
}

```

We run through the loop until we have `numberOfItems` responses (here 3) in the `selected` set. When a random response is selected, we remove its code from the `available` set and insert it into the `selected` set. So `available` will at any time hold the responses that have not been picked yet. At the start of each iteration inside the loop we build an array `codes` with the available codes. The `members` method converts a set to an array.

Let us say we start with the codes "1","3","4" and "8". The array `codes` will consist of the following items in the first iteration:

```

codes[0] = "1"
codes[1] = "3"
codes[2] = "4"
codes[3] = "8"

```

`Math.random` will give a number between 0 (inclusive) and 1 (exclusive). When this is multiplied with `codes.length` (4 in our example), `randomNumber` will be set to a number between 0 (inclusive) and `codes.length` (4) (exclusive):

```

0<=randomNumber<codes.length
i.e.
0<=randomNumber<4

```

in our example. Let us say that the number returned from `Math.random` is 0.6283. Then `randomNumber` will be $4 * 0.6283 = 2.5132$.

This number is rounded down to the nearest integer by using the `Math.floor` method in the next step:

```

var randomIndex : int = Math.floor(randomNumber);

```

This means that `randomIndex` will be one of 0,1,2,...,`codes.length`-1, i.e. 0,1,2,3.

Important

`Math.floor` must be used, not `Math.round` or `Math.ceil`. Using `Math.floor` is the only way to ensure that the probability of selecting the indexes is the same for all of them and that you get no errors.

`Math.round` would extend the set of possible picks with the index `codes.length` (i.e. the number 4 in our example). This would cause problems because 4 is not an index in the array. If we used `Math.ceil`, we would round up to the numbers 1,2,3 and 4, and could subtract 1 from these numbers to get the index. However, even though the probability of this happening is extremely small, there is a small chance the number 0 would be returned from `Math.random()`. And using `Math.ceil` on 0 would yield 0, and this would again cause problems.

In our example, where `randomNumber` was calculated to 2.5132, `randomIndex` will get the value 2.

`codes[2]` is "4", so the code 4 will be removed from the `available` set and added to the `selected` set.

The while loop will now continue to the next iteration with the remaining three codes, so in our example `codes` will be have the following items in the next iteration:

```

codes[0] = "1"
codes[1] = "3"
codes[2] = "8"

```

Then the script will randomly pick one of these, and continue with this process until 3 items are selected.

Picking random items like this is best suited for surveys where the respondent is not allowed to modify previous answers. If the respondent goes back to the *brands* question and then forwards again, the script is run again, possibly resulting in a different set. So then the respondent will get questions for other brands. This may be confusing and cause irritation for the respondent.

Randomly Assigning which Part of a Survey the Respondents Should Answer

To limit the number of questions each respondent has to answer in a long survey, you may want to split the survey into different parts, and randomly pick which part a particular respondent should answer.

This can be done by randomly setting the response to a hidden single question, and then route the respondents to their questions with conditions on this hidden question.

Let us say the hidden single question has question ID *part*. *part* can be set at the beginning of the survey with a script like this:

```
var form = f("part");
if(!form.toBoolean())
{
  var codes = form.domainValues();
  var randomNumber : float = Math.random()*codes.length;
  var randomIndex : int = Math.floor(randomNumber);
  var code = codes[randomIndex];
  form.set(code);
}
```

This is very similar to the previous example. Here we pick the code from an array of all codes from the answer list of the hidden single question *part* (using `domainValues`).

The condition with `toBoolean` is used so that the single question is set only the first time the script is run. So this solution will work even when the respondent is allowed to modify previous answers.

See also the built-in function `SetRandomCategories` (see `SetRandomCategories` on page 88 for more information).

14.2.2.4. Maximum and Minimum

```
Math.max({number1{, number2{...{, numberN}}}})
Math.min({number1{, number2{...{, numberN}}}})
```

`max` returns the greater of zero or more supplied numeric expressions. `min` returns the lesser of zero or more supplied numeric expressions. The curly brackets are used to indicate that the numerical expressions $number_1, \dots, number_N$ are optional.

If no arguments are provided, the return value is equal to negative infinity for `max` and positive infinity for `min`. If any argument is `NaN`, the return value is also `NaN` (Not a Number).

However, we would recommend using the Forsta functions `Max` and `Min` (see `Max` and `Min` on page 77 for more information) when working on questions, since these functions automatically converts the answers to numbers.

14.2.2.5. Absolute value

```
Math.abs(number)
```

`abs` returns the absolute value of a numeric expression number.

`abs` can for example be used when you want the difference between two numbers as a positive number, no matter which of them is the highest number.

```
Math.abs(x-y)
```

If x is 10 and y is 4, $x-y$ will return 6. If x is 4 and y is 10, $x-y$ will return -6 . The absolute value will be 6 for both.

14.2.2.6. Exponents, Logarithms and Square Root

```
Math.exp(number)
```

`exp` returns e (the base of natural logarithms) raised to a power, e^{number} .

e is Euler's constant, approximately equal to 2.178.

```
Math.log(number)
```

`log` returns the natural logarithm of a *number*. The base is e , Euler's constant, approximately equal to 2.178.

```
Math.pow(base, exponent)
```

`pow` returns the value of a base expression taken to a specified power, $\text{base}^{\text{exponent}}$.

```
Math.sqrt(number)
```

Returns the square root of a numeric expression number. If *number* is negative, the return value is zero.

14.3. The String Object

The `String` object type allows strings to be accessed as objects. It allows manipulation and formatting of text strings and determination and location of sub-strings within strings.

14.3.1. Constructors

An instance of the `String` object can be created like this:

```
newString = new String({"stringLiteral"});
```

The curly brackets are used to indicate that the string literal is optional.

`String` objects can also be created implicitly using string literals.

```
newString = "{stringLiteral}";
```

or

```
newString : String = "{stringLiteral}";
```

14.3.2. Properties

```
strVariable.length  
"String Literal".length
```

`length` returns the length of a `String` object, an integer with the number of characters in the `String` object.

14.3.3. Index

Many of the methods of the `String` object refer to **index** on a string. The index is used to refer to a characters position within a string. If you have the string

```
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15  
"This is a string"
```

the character `a` has index 8, because the index starts at 0 for first character. The index of the last character will always be 1 less than the string's length. This is similar to indexing in arrays.

14.3.4. Converting to String from Other Types

Often you want to convert variables of different types to string to use some of the string methods to manipulate on the content. The easiest way of converting a variable to a string, is to concatenate it with an empty string using the `+` operator:

```
variable+""
```

Since string has higher order of precedence than other types, this will convert the variable to type string. You can also use the `.toString()` method.

14.3.5. Methods for String Objects

Some methods for the string objects that use Regular Expressions are described elsewhere in the manual (see `String Object Methods that Use Regular Expression Objects` on page 213 for more information). The remainder are described below.

14.3.5.1. Methods Returning a Character or a Character Code at a Specific Index

```
strObj.charAt(index)
```

`charAt` returns the character at the specified *index*. Valid values for *index* are between 0 and the length of the string minus 1. `charAt` with an index out of valid range returns an empty string.

```
strObj.charCodeAt(index)
```

`charCodeAt` returns an integer representing the Unicode encoding of the character at the specified `index`. `index` is a number between 0 and the length of the string minus 1. If there is no character at the specified index, NaN is returned.

14.3.5.2. Building a String from a Number of Unicode Characters

```
String.fromCharCode({code1{, code2{, ...{, codeN}}})
```

`fromCharCode` returns a string from a number of Unicode character values. If no arguments are supplied, the result is the empty string.

A String object need not be created before calling `fromCharCode`. The method can be applied directly on the object type.

In the following example, `txt` is set to the string "Confirmit":

```
var txt = String.fromCharCode(67,111,110,102,105,114,109,105,116);
```

This is a way to be able to set Unicode text in scripts.

14.3.5.3. Changing Case

```
strObj.toLowerCase()
```

`toLowerCase` returns a string where all alphabetic characters have been converted to lowercase.

```
strObj.toUpperCase()
```

`toUpperCase` returns a string where all alphabetic characters have been converted to uppercase.

Both of these methods have no effect on non-alphabetic characters.

Checking a User Name and Password where Username is Case Insensitive

You can password-protect an open survey with a password and user name combination that is the same for all respondents. This can be used when you do not upload any respondent list before starting the survey, but still want to limit the access to the survey. You should be aware that this would not stop the respondents from accessing the survey more than once (see Validation Code on page 8 for more information).

The user name and password can be given in two open text questions, `username` and `password`, the latter with the password property. If you want the password to be case sensitive, but not the username you can use a validation code like this:

```
if(f("username").get().toUpperCase() != "USERNAME" || f("password").get()
!= "Password")
{
  RaiseError();
  SetQuestionErrorMessage(LangIDs.en,"Wrong username or password. Please
try again.");
}
```

14.3.5.4. Searching for a Substring within a String

```
strObj.indexOf(subString{, startIndex})
```

`indexOf` returns the character position of the first occurrence of a string `subString` within a String object. `startIndex` is optional, and is an integer value specifying the index to begin the search. If omitted, searching starts at the beginning of the string. If the `subString` is not found, -1 is returned.

If `startIndex` is negative, `startIndex` is treated as zero. If it is larger than the greatest character position index, it is treated as the largest possible index.

Searching is performed from left to right.

```
strObj.lastIndexOf(substring{, startindex})
```

returns the character position of the last occurrence of a *subString* within a *String* object. *startIndex* is optional, and is an integer value specifying the index to begin searching within the *String* object. If omitted, searching begins at the end of the string. If the *subString* is not found, a-1 is returned.

If *startIndex* is negative, *startIndex* is treated as zero. If it is larger than the greatest character position index, it is treated as the largest possible index.

Searching is performed right to left.

On the Fly Recoding

You may use the `indexOf` method to search for strings within a text. This can be done to simplify the coding. For example if you have an open text question about car brands you can search for strings like VOLVO or FORD as below:

```
if(f("openbrands").get().toUpperCase().indexOf("FORD") != -1)
{
  f("brands")["1"].set("1");
}
if(f("openbrands").get().toUpperCase().indexOf("MERCEDES") != -1)
{
  f("brands")["2"].set("1");
}
if(f("openbrands").get().toUpperCase().indexOf("VOLVO") != -1)
{
  f("brands")["3"].set("1");
}
```

and so on. (*openbrands* is here the open text question, and *brands* is a hidden multi question used e.g. for reporting).

Here we use `toUpperCase` to convert case to make the search case insensitive, so that the strings "Volvo", "volvo" and "VOLVO" all will be recognized.

If `indexOf` returns anything different from -1, it means that the string has been found in the *openbrands* question.

The problem with this solution is respondents who spell brand names wrongly. You can of course check for different common misspellings ("VOVLO" etc.) but usually you will need some form of manual coding as well.

14.3.5.5. Retrieving a Section of a String (Substring)

```
stringObj.slice(start, {end})
```

returns a section of a string. *start* is required and is the index of the first character in the section of *stringObj*. *end* is optional and is the index after the last character in the section of *stringObj*. The `slice` method copies up to, but not including, the element indicated by *end*.

In this example:

```
var txt = "The methods of the String Object can be used for text
manipulation.";
var section = txt.slice(19,32);
```

section will be set to the substring

```
"String Object"
```

If *start* is negative, it is treated as $length+start$ where *length* is the length of the string. If *end* is negative, it is treated as $length+end$ where *length* is the length of the string. If *end* is omitted, extraction continues to the end of *stringObj*. If *end* occurs before *start*, no characters are copied to the new string.

```
stringObj.substr(start {, length })
```

returns a substring beginning at a specified location *start* and having a specified *length*.

start is required, and is the starting position (index) of the desired substring. *length* is optional and is the number of characters to include in the returned substring.

If *length* is zero or negative, an empty string is returned. If not specified, the substring continues to the end of the string.

```
stringObj.substring(start, end)
```

returns the substring at the specified location within a `String` object.

`start` is the index indicating the beginning of the substring and `end` is the index indicating the end of the substring. The `substring` method returns a string containing the substring from `start` up to, but not including, `end`.

The `substring` method uses the lower value of `start` and `end` as the beginning point of the substring. For example, `stringObj.substring(0,3)` and `stringObj.substring(3,0)` return the same substring.

If either `start` or `end` is NaN or negative, it is replaced with zero.

The length of the substring is equal to the absolute value of the difference between `start` and `end`. For example, the length of the substring returned in `stringObj.substring(0,3)` and `stringObj.substring(3,0)` is three.

Replacing Last Comma with "and" in a Listing of Answers

If you refer to a multi question, e.g. `brands`, in response piping with `^s` in a question text, then the last two items in the listing are separated with "and" in English.

```
^f("brands")^
```

If the brands "Ford","Mercedes","Volvo" are answers to the brands question, the string returned will be "Ford, Mercedes and Volvo".

However, when you refer to

```
f("brands").categoryLabels()
```

in a script node, e.g. to include the answers in an email text, the result will be an array with the elements. When this is converted to a string (for example by adding it to a string expression), you get a string that lists the elements separated with commas, but not with "and" between the last two elements: "Ford,Mercedes,Volvo".

The following script will replace the last comma with " and ". (Observe the spaces in front of and after and).

```
var body : String = "";
body += "Here are the answers on the brands question:\n\n"

var form = f("brands");
body += form.categoryLabels();

if(form.size() > 1)
{
    body = body.substring(0,body.lastIndexOf(",")+1) + " and " +
    body.substring(body.lastIndexOf(",")+1,body.length);
}

SendMail("interviewer@confirmit.com",f("email"),"Answers",body);
```

If there are two answers or more, the answers string will be set to the substring from the beginning of the `answers` string to (but excluding) the last comma, the string " and " and the substring from the character after the last comma to the end of the `answers` string.

14.3.5.6. Splitting and Joining Strings

```
stringObj.split({separator[, limit]})
```

`split` returns the array of strings that results when a string is separated into substrings. `separator` is a string or an instance of a Regular Expression object (see The Regular Expression Object on page 212 for more information) identifying one or more characters to use in separating the string. If omitted, a single-element array containing the entire string is returned. `limit` is a value used to limit the number of elements returned in the array. The result of the `split` method is an array of strings split at each point where `separator` occurs in `stringObj`. `stringObj` itself is not modified. The `separator` is not returned as part of any array element.

```
string1.concat({string2[, string3[, . . . [, stringN]]]})
```

`concat` returns a string value containing the concatenation of two or more supplied strings. The result of the `concat` method is equivalent to:

```
string1 + string2 + string3 + ... + stringN.
```

Generating an Array from a String with Values

Let us say you send in information of what products the respondent uses with the url to an open survey, for example like this:

```
http://survey.confirmit.com/wix/pXXXXXXXXX.aspx?products=1x15x17x19
http://survey.confirmit.com/wix/pXXXXXXXXX.aspx?products=6x11x20
```

1, 6, 11, 15, 17, 19 and 20 are different product codes, and the respondent can have any number of these. Sending them in like this gives more condensed urls than sending in one value (yes/no) for each product. It could possibly be a very long list of products.

In the Forsta survey we capture the products list with `Request` (see Request on page 228 for more information), and want to set a hidden multi question products with the values sent in with the url. The *products* multi question uses codes that are equal to the product codes that are sent in with the url.

To be able to set the *products* question, we have to split the string returned from `Request("products")` with "x" as delimiter to get an array with the product codes sent in:

```
var txt : String = Request("products")+"";
var productArray = txt.split("x");
f("products").set(productArray);
```

14.3.5.7. Retrieving the String Value

```
strObj.toString()
strObj.valueOf()
```

Both `toString` and `valueOf` returns the string value of the `String` object.

14.3.5.8. Methods that Add HTML Tags to a String

There are a number of methods available that adds HTML code to your strings. They are listed in the table below. They may for example be used in your error messages, or in expressions that will be displayed in info or question titles, texts or answers (with response piping).

| Method | Equivalent to |
|---|---|
| <code>strVariable.anchor(anchorString)</code> | <code>strVariable = '' + strVariable + ''</code> |
| <code>strVariable.big()</code> | <code>strVariable = '<BIG>' + strVariable + '</BIG>'</code> |
| <code>strVariable.blink()</code> | <code>strVariable = '<BLINK>' + strVariable + '</BLINK>'</code> |
| <code>strVariable.bold()</code> | <code>strVariable = '' + strVariable + ''</code> |
| <code>strVariable.fixed()</code> | <code>strVariable = '<TT>' + strVariable + '</TT>'</code> |
| <code>strVariable.fontcolor(colorVal)</code> | <code>strVariable = '' + strVariable + ''</code> |
| <code>strVariable.fontSize(intSize)</code> | <code>strVariable = '' + strVariable + ''</code> |
| <code>strVariable.italics()</code> | <code>strVariable = '<I>' + strVariable + '</I>'</code> |
| <code>strVariable.link(linkstring)</code> | <code>strVariable = '' + strVariable + ''</code> |

| | |
|-----------------------------------|---|
| <code>strVariable.small()</code> | <code>strVariable = '<SMALL>' + strVariable + '</SMALL>'</code> |
| <code>strVariable.strike()</code> | <code>strVariable = '<STRIKE>' + strVariable + '</STRIKE>'</code> |
| <code>strVariable.sub()</code> | <code>strVariable = '<SUB>' + strVariable + '</SUB>'</code> |
| <code>strVariable.sup()</code> | <code>strVariable = '<SUP>' + strVariable + '</SUP>'</code> |

14.3.5.9. Removing Leading/Trailing White Space Characters

```
strObj.Trim()
```

This method returns a string with all leading/trailing white-space characters removed from the String object. Note that it returns a new string object rather than modifying the existing object. For example in order to remove the leading/trailing spaces from a respondent's Open Text answer the following can be used:

```
f(qid).set(f(qid).get().Trim())
```

14.4. Regular Expressions

Regular Expressions are character-matching patterns that are used to find and/or replace character patterns in strings.

With Regular Expressions, you can:

- Test for a pattern within a string. For example, you can test an input string to see if a telephone number pattern or a credit card number pattern occurs within the string.
- Replace text. You can use a Regular Expression to identify specific text in a string and either remove it completely or replace it with other text.
- Extract a substring from a string based upon a pattern match.

The syntax of Regular Expressions is not easy to understand. If you have problems understanding it, you are advised to check the examples, try to modify them and test what the differences are. The Perl scripting language popularized Regular Expressions, and JScript's support of Regular Expressions is based on that of Perl. So for further reading about Regular Expressions, you may search for Perl documentation in addition to JScript .NET documentation.

Regular Expressions are implemented as Regular Expression objects, and are created as follows:

```
var re = /pattern/{flags};
```

(similar to Regular Expressions in Perl) or

```
var re = new RegExp("pattern",{"flags"});
```

(similar to normal syntax for instantiating an object in JScript .NET)

pattern is the pattern to be matched and the optional *flags* is a string containing *i*, and/or *m*. The *i* stands for **ignore case** and the *m* for **multi-line search**.

Important

When defining a Regular Expression with the syntax `/pattern/flags`, do not use quotation marks around the strings. However when using the other notation you must use them.

```
var re = new RegExp("Forsta","i");
```

is the same as

```
var re = /Forsta/i;
```

This matches all occurrences of "Forsta".

14.4.1. Regular Expression Syntax

A Regular Expression is a pattern of text that consists of ordinary characters (for example, letters a through z) and special characters, known as meta characters. The pattern describes one or more strings to match when searching a body of text. The Regular Expression serves as a template for matching a character pattern to the string being searched. This is similar to the expressions used for example when searching in the project list in Forsta. However, Regular Expressions are far more flexible and complex than that.

14.4.1.1. Ordinary Characters

Ordinary characters consist of all characters that are not explicitly designated as meta characters. This includes:

- all upper- and lowercase alphabetic characters,
- all digits,
- all punctuation marks,
- some symbols.

The simplest form of a Regular Expression is a single, ordinary character that matches itself in a searched string. For example, the single-character pattern

```
/a/
```

matches the letter a wherever it appears in the searched string.

You can combine a number of single characters together to form a larger expression.

```
/arm/
```

This expression describes a pattern with these three characters joined together. Note that there is no concatenation operator. All that is required is that you put one character after another.

The match will be found in the string

```
"Those people are harmless."
```

but not in the string

```
"Those people are my family."
```

Even though the second string has the characters a, r and m, they are not joined together, so no match is found.

14.4.1.2. Special Characters

There are a number of meta characters that require special treatment when trying to match them. To match these special characters, you must first escape them, that is, precede them with a backslash character (\).

The table below shows those special characters and their meanings. More detailed explanations are given in the following sections.

| Special Character | Comment |
|-------------------|---|
| \$ | Matches the position at the end of an input string. If the multi-line (m) property is set, \$ also matches the position preceding \n or \r. (newline or carriage return). |
| () | Marks the beginning and end of a sub expression. Sub expressions can be captured for later use. |
| * | Matches the preceding sub expression zero or more times. |
| + | Matches the preceding sub expression one or more times. |

| | |
|---|---|
| . | Matches any single character except the newline character \n. |
| [| Marks the beginning of a bracket expression. |
| ? | Matches the preceding sub expression zero or one time, or indicates a "non-greedy" quantifier. |
| \ | Marks the next character as a special character, a literal, a back-reference, or an octal escape. |
| ^ | Matches the position at the beginning of an input string except when used in a bracket expression where it negates the character set. If the multi-line property is set, ^ also matches the position following \n or \r (newline or carriage return). |
| { | Marks the beginning of a quantifier expression. |
| | Indicates a choice between two items (or). |

To match any of these characters themselves, they must be preceded with \:

| Expression | Matches |
|------------|---------|
| \\$ | \$ |
| \(| (|
| \) |) |
| * | * |
| \+ | + |
| \. | . |
| \[| [|
| \? | ? |
| \\ | \ |
| \^ | ^ |
| \{ | { |
| \ | |

```
/Forsta\?/
```

matches the string "Forsta?"

14.4.1.3. Non-Printable Characters

A number of useful non-printing characters are occasionally used. The table below shows the escape sequences used to represent those non-printing characters:

| Character | Meaning |
|------------------|--|
| <code>\cx</code> | Matches the control character indicated by x. For example, <code>\cM</code> matches a Control-M or a carriage return character. The value of x must be in the range of A-Z or a-z. If not, c is assumed to be a literal 'c' character. |
| <code>\f</code> | Matches a form-feed character. |
| <code>\n</code> | Matches a newline character. |
| <code>\r</code> | Matches a carriage return character. |
| <code>\s</code> | Matches any white space character including space, tab, form-feed, etc. |
| <code>\S</code> | Matches any non-white space character. |
| <code>\t</code> | Matches a tab character. |
| <code>\v</code> | Matches a vertical tab character. |

x represents a character in the range A-Z or a-z.

14.4.1.4. Bracket Expressions

Many times, it's useful to match specified characters from a list. For example, you may want to search a string for chapter headings that are expressed as Chapter 1, Chapter 2, etc.

You can create a list of matching characters by placing one or more individual characters within square brackets ([and]). When characters are enclosed in brackets, the list is called a **bracket expression**.

Within brackets, as anywhere else, ordinary characters represent themselves, that is, they match an occurrence of themselves in the input text. Most special characters lose their meaning when they occur inside a bracket expression. There are some exceptions:

The] character ends a list if it is not the first item. To match the] character in a list, place it first, immediately following the opening [.

The \ character continues to be the escape character. To match the \ character itself, use \\.

Characters enclosed in a bracket expression match only a single character for the position in the Regular Expression where the bracket expression appears. The following Regular Expression matches 'Chapter 1', 'Chapter 2', 'Chapter 3', 'Chapter 4', and 'Chapter 5':

```
/Chapter [12345]/
```

If you want to express the matching characters using a range instead of the characters themselves, you can separate the beginning and ending characters in the range using the hyphen (-) character. The Unicode character value of the individual characters determines their relative order within a range. The following Regular Expression is equivalent to the bracketed list shown above.

```
/Chapter [1-5]/
```

When a range is specified in this manner, both the starting and ending values are included in the range. It is important to note that the starting value must precede the ending value in Unicode sort order.

If you want to include the hyphen character (-) in your bracket expression, you must do one of the following:

Escape it with a backslash:

```
[\\-]
```

Put the hyphen character at the beginning or the end of the bracketed list. The following expressions match all lowercase letters and the hyphen:

```
[-a-z] [a-z-]
```

Create a range where the beginning character value is lower than the hyphen character and the ending character value is equal to or greater than the hyphen. Both of the following Regular Expressions satisfy this requirement:

```
[!--] [!~]
```

i.e. characters from ! to - or from ! to ~.

If you want to find all the characters not in the list or range, you can place the caret (^) character at the beginning of the list. If the caret character appears in any other position within the list, it matches itself, that is, it has no special meaning. The following Regular Expression matches chapter headings with numbers different from 1,2,3,4 and 5 (and any other characters different from 1,2,3,4 and 5):

```
/Chapter [^12345]/
```

The same expressions above can be represented using the hyphen character (-).

```
/Chapter [^1-5]/
```

A typical use of a bracket expression is to specify matches of any upper- or lowercase alphabetic characters or any digits. The following JScript .NET expression specifies such a match:

```
/[A-Za-z0-9]/
```

| Character | Description |
|-----------|--|
| [xyz] | A character set. Matches any one of the enclosed characters. |
| [^xyz] | A negative character set. Matches any character not enclosed. |
| [a-z] | A range of characters. Matches any character in the specified range. |
| [^a-z] | A negative range characters. Matches any character not in the specified range. |

a, x, y and z represent characters.

14.4.1.5. Quantifiers

Sometimes, you don't know how many characters there are to match. In order to accommodate that kind of uncertainty, Regular Expressions support the concept of **quantifiers**. These quantifiers let you specify how many times a given component of your Regular Expression must occur for your match to be true.

The following table illustrates the various quantifiers and their meanings:

| Character | Description |
|-----------|-------------|
|-----------|-------------|

| | |
|-------|--|
| * | Matches the preceding sub-expression zero or more times . |
| + | Matches the preceding sub-expression one or more times . |
| ? | Matches the preceding sub-expression zero or one time . |
| {n} | Matches exactly n times, where n is a non-negative integer.. |
| {n,} | Matches at least n times, where n is a non-negative integer |
| {n,m} | Matches at least n and at most m times. m and n are non-negative integers, where n <= m. |

n and m are integers.

With a large input document, chapter numbers could easily exceed nine, so you need a way to handle chapter numbers with more than one digit. Quantifiers give you that capability. The following JScript .NET Regular Expression matches chapter headings with any number of digits:

```
/Chapter [1-9][0-9]*/
```

The first bracket expression [1-9] makes sure that the first digit is in the range 1-9. The second bracket expression with quantifier [0-9]* searches for 0 or more digits in the range 0-9. The quantifier (*) appears after the range expression.

14.4.1.6. Anchors

All the examples so far have recognized patterns anywhere in a string. But you may want the patterns to match only if they e.g. appear at the beginning of the string. **Anchors** provide that capability.

Anchors allow you to fix a Regular Expression to either the beginning or end of a string. They also allow you to create Regular Expressions that occur either within a word or at the beginning or end of a word. The following table contains the list of Regular Expression anchors and their meanings:

| Character | Description |
|-----------|--|
| ^ | Matches the position at the beginning of the input string. If the multi-line property is set, ^ also matches the position following \n or \r (newline or carriage return). |
| \$ | Matches the position at the end of the input string. If the multi-line property is set, \$ also matches the position preceding \n or \r (newline or carriage return). |
| \b | Matches a word boundary, that is, the position between a word and a space. |
| \B | Matches a non-word boundary. |

You cannot use a quantifier with an anchor. Since you cannot have more than one position immediately before or after a newline or word boundary, expressions such as ^* are not permitted.

To match text at the beginning of a line of text, use the ^ character at the beginning of the Regular Expression. This is different from using the ^ within a bracket expression.

To match text at the end of a line of text, use the \$ character at the end of the Regular Expression.

To use anchors when searching for chapter headings, the following JScript .NET Regular Expression matches a chapter heading with up to two following digits that occur at the beginning of a line and where there is no text after the heading:

```
/^Chapter [1-9][0-9]?$/
```

Matching word boundaries is a little different but adds a very important capability to Regular Expressions. A word boundary is the position between a word and a space. A non-word boundary is any other position. The following JScript .NET expression matches the first three characters of the word 'Chapter' because they appear following a word boundary:

```
/\bCha/
```

The position of the 'b' operator is critical here. If it's positioned at the beginning of a string to be matched, it looks for the match at the beginning of the word; if it's positioned at the end of the string, it looks for the match at the end of the word. For example, the following expressions match 'ter' in the word 'Chapter' because it appears before a word boundary:

```
/ter\b/
```

14.4.1.7. Alternation and Grouping

Alternation allows use of the | (pipe) character to allow a choice between two or more alternatives, a bit similar to or in Boolean expressions. Expanding the chapter heading Regular Expression, you can expand it to cover more than just chapter headings – for example sections as well. However, it's not as straightforward as you might think. You might think that the following expressions match one or two digits after either 'Chapter' or 'Section', between the beginning and ending of a line:

```
/^Chapter|Section [1-9][0-9]?$/
```

Unfortunately, what happens is that the Regular Expressions shown above will have two different parts, so this will be equal to getting a match on either of these two expressions:

```
/^Chapter/
```

or

```
/Section [1-9][0-9]?$/
```

So it will match either the word 'Chapter' at the beginning of a line, or 'Section' and 1-2 numbers at the end of the line.

You can use parentheses to limit the scope of the alternation, that is, make sure that the alternation applies only to the two words, 'Chapter' and 'Section'. However, parentheses are tricky as well, because they are also used to create **sub expressions**. By taking the Regular Expressions shown above and adding parentheses in the appropriate places, you can make the Regular Expression match either 'Chapter 1' or 'Section 3'.

```
/^(Chapter|Section) [1-9][0-9]?$/
```

These expressions work properly except that a by-product occurs. Placing parentheses around 'Chapter|Section' establishes the proper grouping, but it also causes either of the two matching words to be captured for future use. So a sub match is captured. In this example we really do not need that sub match.

In the examples shown above, all you really want to do is use the parentheses for grouping a choice between the words 'Chapter' or 'Section'. You do not necessarily want to refer to that match later. We recommend that unless you really need to capture sub matches, do not use them. Your Regular Expressions will be more efficient since they will not have to take the time and memory to store those sub matches.

You can use ?: before the Regular Expression pattern inside the parentheses to prevent the match from being saved for possible later use. The following modification of the Regular Expressions shown above provides the same capability without saving the sub match.

```
/^(?:Chapter|Section) [1-9][0-9]?$/
```

There are times you'd like to be able to test for a pattern without including that text in the match. For instance, you might want to match the protocol in a URL (like http or ftp), but only if that URL ends with .com. Or maybe you want to match the protocol only if the URL does not end with .edu. In cases like those, you'd like to "look ahead" and see how the URL ends. A **lookahead** assertion is handy here.

There are two non-capturing meta characters used for **lookahead** matches:

A **positive lookahead**, specified using `?=`, matches the search string at any point where a matching Regular Expression pattern in parentheses begins.

A **negative lookahead**, specified using `?!`, matches the search string at any point where a string not matching the Regular Expression pattern begins.

If you want to search for the protocol in a url like "http://www.confirm.com", but only if it ends with .com:

```
/^ [^: ]+ (?:=.*\ .com$) /
```

Because of the anchor `^`, the match is found at the beginning of the string. Then the first part

```
[^: ] +
```

searches for one or more characters different from `:`. One or more because of the quantifier `+`, different from `:` because of the bracket expression `[^:]`

Then there is a positive lookahead:

```
(?:=.*\ .com$)
```

which searches through the string to find a match for

```
.* \ .com$
```

Because of the anchor `$` this has to be at the end of the string. `.` matches any character except the newline character, and because of the quantifier `*` we can have 0 or more of these characters before the last part, which is the character `.` (which has to be escaped with backslash `\`) followed by `com` – i.e. ".com".

But the match will be for the first part of the string, i.e. "http" in "http://www.confirm.com".

Similarly, the expression

```
/^ [^: ]* (?!.*\ .edu$) /
```

will search for the first characters until `:` is reached in a string not ending with ".edu".

| Character | Description |
|-------------|---|
| (pattern) | Matches pattern and captures the match. The captured match can be retrieved from the resulting Matches collection, using the \$0...\$9 properties in JScript .NET. |
| (?:pattern) | Matches pattern but does not capture the match (it is not stored for possible later use). |
| (?=pattern) | Positive look-ahead matches the search string at any point where a string-matching pattern begins. The match is not captured for possible later use. After a match occurs, the search for the next match begins immediately following the last match, not after the characters that comprised the look-ahead. |
| (?!pattern) | Negative look-ahead matches the search string at any point where a string not matching pattern begins. The match is not captured for possible later use. After a match occurs, the search for the next match begins immediately following the last match, not after the characters that comprised the look-ahead. |

14.4.1.8. Back-References

You can store a part of a matched pattern for later reuse. Placing parentheses around a Regular Expression pattern or part of a pattern causes that part of the expression to be stored into a temporary buffer.

Each captured sub-match is stored as it is encountered from left to right in a Regular Expressions pattern. The sub-matches are numbered beginning at 1 and continuing up to a maximum of 99 sub-matches. Each different buffer can be accessed using

```
\n
```

where *n* is one or two decimal digits identifying a specific buffer, e.g. \1.

For example, back-references can be used to check for double occurrences of the same words, e.g. in a string such as:

```
Scripting is is fun!
```

The following JScript .NET Regular Expression uses a single sub-expression to check for duplicates:

```
/\b([a-z]+) \1\b/gim
```

The sub-expression is everything between parentheses. That captured expression includes one or more alphabetic characters, as specified by `[a-z]+`. The second part of the Regular Expression (`\1`) is the reference to the previously captured sub-match, that is, the second occurrence of the word. `\b` is used for word boundary, so that the check is done on complete words.

14.4.1.9. Digits and Word Characters

| Character | Description |
|-----------|--|
| \d | Matches a digit character. Equivalent to [0-9]. |
| \D | Matches a non-digit character. Equivalent to [^0-9]. |
| \w | Matches any word character including underscore. Equivalent to A-Za-z0-9_. |
| \W | Matches any non-word character. Equivalent to [^A-Za-z0-9_]. |

14.4.1.10. Hexadecimal and Octal Escape Values and Unicode Characters

| Character | Description |
|-----------|---|
| \xn | Matches <i>n</i> , where <i>n</i> is a hexadecimal escape value. Hexadecimal escape values must be exactly two digits long. For example, '\x41' matches "A". '\x041' is equivalent to '\x04' & "1". Allows ASCII codes to be used in Regular Expressions. |
| \num | Identifies either an octal escape value or a back-reference (see Back-References on page 210 for more information). |
| \un | Matches <i>n</i> , where <i>n</i> is a Unicode character expressed as four hexadecimal digits. For example, \u00A9 matches the copyright symbol (©). |

Since \ followed by a number *num* can represent both octal escape values and back-references, the following rules apply:

If *num* has one digit and \num is preceded by at least *num* captured sub expressions, *num* is a back-reference. Otherwise, *num* is an octal escape value if *num* is an octal digit (0-7).

If *num* has two digits and `\num` is preceded by at least *num* captured sub expressions, *num* is a back-reference. If the first digit is *n*, and `\num` is preceded by at least *n* captures, *n* is a back-reference followed by a literal, the second digit. If neither of these applies, `\num` matches an octal escape value when the number is an octal (both digits in the range 0-7).

If *num* has three digits, it matches an octal escape value when the first digit is 0-3 and the two last digits are octal digits (0-7).

14.4.2. Order of Precedence

Once you have constructed a Regular Expression, it is evaluated much like an arithmetic expression, that is, it is evaluated from left to right and follows an **order of precedence**. The following table illustrates, from highest to lowest, the order of precedence of the various Regular Expression operators:

| Operator(s) | Description |
|---------------------------|--------------------------|
| \ | Escape |
| (), (?:), (?=), [] | Parentheses and Brackets |
| *, +, ?, {n}, {n,}, {n,m} | Quantifiers |
| ^, \$, \anymetacharacter | Anchors and Sequences |
| | Alternation |

14.4.3. The Regular Expression Object

We have already seen the two ways of instantiating a Regular Expression object:

```
var re = /pattern/{flags}
```

and

```
var re = new RegExp("pattern", {"flags"})
```

Regular Expression objects store patterns used when searching strings for character combinations. After the Regular Expression object is created, it is either passed to a `String` method, or a string is passed to one of the Regular Expression methods.

14.4.3.1. Regular Expression Methods

```
rgExp.exec(str)
```

`exec` executes a search on a string *str* using a Regular Expression pattern defined in an instance of a Regular Expression object *rgExp*, and returns an array containing the results of that search.

If the `exec` method does not find a match, it returns `null`. If it finds a match, `exec` returns an array. Element zero of the array contains the entire match, while elements 1 – *n* contain any sub matches that have occurred within the match.

```
rgExp.test(str)
```

`test` returns a Boolean value (`true` or `false`) that indicates whether or not a pattern defined in the Regular Expression *rgExp* exists in a searched string *str*.

The `test` method returns `true` if the pattern exists in the string, and `false` otherwise.

Validation of the Format of a Phone Number

Let us say you want the respondent to specify his phone number in a particular format, allowing a digit or + as the first character and spaces between number sets, but no other characters. The following validation code uses a Regular Expression to check the formatting of the phone number, provided that the phone number is applied in an open text question with question ID *phone*:

```
var num : String = f("phone").get();
var re = /^(?:\d|\+)(?:\d| )+$/;
if(!re.test(num))
{
  RaiseError();
  SetQuestionErrorMessage(LangIDs.en,"Please provide your phone number,
only using digits and space, and with + before your country code if it is
a foreign number.");
}
```

The Regular Expression starts the search at the beginning of the string (^). Then the first character should be either a digit or + (?:\d|\+). Because of ?: this sub expression is not stored. Then the rest of the string consists of one or more digits or spaces (?:\d|) until the end of the string is reached (\$).

In this script there are no restrictions on number of spaces or digits.

Exercise 8: Restricting the Number of Digits in a Phone Number

Based on the previous example, please modify the Regular Expression so that it checks that the phone number is on the format xxx xxx xxxx – i.e. 3 groups of 3+3+4 digits separated with space. (This time with no + for country code).

The answer is given in APPENDIX A Answers to Exercises.

14.4.4. String Object Methods that Use Regular Expression Objects

There are three methods of the *String* Object that uses Regular Expressions as input.

```
stringObj.match(rgExp)
```

match executes a search on a string using a Regular Expression pattern, and returns an array containing the results of that search.

If the *match* method does not find a match, it returns *null*.

If it finds a match, *match* returns an array. If the global flag (g) is not set, element zero of the array contains the entire match, while elements 1 – n contain any sub matches that have occurred within the match. If the global flag is set, elements 0 - n contain all matches that occurred.

```
stringObj.replace(rgExp, replaceText)
```

replace returns a copy of a string with *rgExp* replaced with *replaceText*. The string *stringObj* is not modified by the *replace* method.

rgExp can be an instance of a Regular Expression object or a String object or literal. If *rgExp* is not an instance of a Regular Expression object, it is converted to a string, and an exact search is made for the results; no attempt is made to convert the string into a Regular Expression.

replaceText is a String object or string literal containing the text to replace for every successful match of *rgExp* in *stringObj*. It can also be a function that returns the replacement text.

Returned from the *replace* method is a copy of *stringObj* after the specified replacements have been made.

```
stringObj.search(rgExp)
```

search returns the position of the first substring match in a Regular Expression search using the Regular Expression object *rgExp*.

The *search* method indicates if a match is present or not. If a match is found, *search* returns an integer value that indicates the index from where the match occurred. If no match is found, it returns -1.

Using Regular Expression to Replace Commas With Line Breaks

If you want to send an email and in the email text list the answers to a multi question from the survey, you can use `categoryLabels`. Converted into a string this will give the items separated by commas. If you want to have the answers on one line each instead of separated by commas you have to replace the commas with line breaks. If the email is sent as plain text, you then have to replace the commas with the special character `\n`.

This script will replace the commas in a listing of the answers given on a multi question brands:

```
var body : String = "";
body += "Here are the answers on the brands question:\r\n\r\n"

var brandsAnswers = f("brands").categoryLabels();
brandsAnswers = brandsAnswers.toString();
brandsAnswers = brandsAnswers.replace(/,/g, "\r\n");

body += brandsAnswers

SendMail("interviewer@confirmit.com", f("email"), "Answers", body);
```

If the mail is sent as HTML, you have to replace the commas with the HTML `
` tag instead:

```
var body : String = "";
body += "Here are the answers on the brands question:<br><br>"

var brandsAnswers = f("brands").categoryLabels();
brandsAnswers = brandsAnswers.toString();
brandsAnswers = brandsAnswers.replace(/,/g, "<br>");

body += brandsAnswers

SendMail("interviewer@confirmit.com", f("email"), "Answers", body, "", "", 0, 0);
```

Post Codes in the United Kingdom

Post codes in the UK can be in the following formats:

```
LN NLL
LLN NLL
LNN NLL
LLNN NLL
LLNL NLL
LNL NLL
```

where L is a letter and N is a number. A post code is one or two letters, followed by either one number and an optional letter or by two numbers, AND then a space and a number and two letters.

A validation script for post codes for the UK could be as shown below, with the open text question *postalcode*:

```
var pcode : String = f("postalcode").get();
var re = /^(?:(?:[a-z]{1,2}\d{1,2}|[a-z]{2}\d[a-z]|[a-z]\d[a-z]) \d[a-z]{2})$/i;
if(pcode.search(re) == -1)
{
  RaiseError();
  SetQuestionErrorMessage(LangIDs.en, "Please provide a post code using a valid format.");
}
```

We allow both upper and lower case letters (i). The first half of the valid formats are covered by `(?:[a-z]{1,2}\d{1,2}|[a-z]{2}\d[a-z]| [a-z]\d[a-z])`. Within this, there are three possibilities for the first part before the blank: The first being a combination of 1-2 letters and 1-2 digits (LN, LLN, LNN or LLNN), the second being 2 letters, 1 digit and 1 letter (LLNL), and the third being 1 letter, 1 digit and 1 letter (LNL). The end of the string must always be NLL which is taken care of by the sub expression `\d[a-z]{2})$`.

Note that not all letters are valid in all positions, so this regular expression will accept some invalid postal codes, but it will at least help the respondent to comply with the basic format of the postal codes.

Exercise 9:

Make a script to validate a US zip code. Question ID: *zipcode*. US zip codes are 5 digit codes. So it is tempting to set up a numeric question with total digits 5, and let the default validation do the work. However, the first number can be a zero (0), and to make sure that it is not removed when the value is stored (as it would for numeric questions), the question should be set up as an open text question with field width 5 instead of as a numeric. The easiest way to validate that all 5 characters are digits, is to use a Regular Expression.

The answer is given in APPENDIX A Answers to Exercises.

14.5. The Array Object

The `Array` object has been used previously in the manual. There are two types of arrays – typed arrays and JScript arrays (see Arrays on page 39 for more information). The methods and properties here can be used on both types.

Typed arrays can be declared as below:

```
var arrayName : type[] = [value0, value1, ..., valuen]
or
var arrayName : type[arrayLength];
```

or

```
var arrayName : type[];
arrayName = new type[arrayLength];
```

JScript arrays can be declared as follows:

```
var arrayName = [value0, value1, ..., valuen]
```

or

```
var arrayName = new Array(value0, value1, ..., valuen);
```

or

```
var arrayName = new Array();
```

or

```
var weekday = new Array(arrayLength);
```

The `Array` Object has one property, the length of the array (number of items in the array):

```
arrayName.length
```

The methods of the `Array` object are described in this section.

14.5.1. Combining Arrays

```
arrayName.concat({item1{, item2{, . . . {, itemN}}}})
```

`concat` returns a new array consisting of a combination of `arrayName` and any other supplied items. The items to be added (`item1, . . . , itemN`) to the array are added, in order, from left to right. If one of the items is an array, its contents are added to the end of `arrayName`. If the item is anything other than an array, it is added to the end of the array as a single array element.

Combining arrays with codes answered on two questions into one array

If you have two multi questions and would like to create an array consisting of all the codes answered on the two multi questions, one possible way is to combine the two arrays you get from the `categories` method:

```
var q8 = f('q8').categories();
var q9 = f('q9').categories();
var codes = q8.concat(q9);
```

14.5.2. Converting Arrays to Strings

```
array.join(separator)
```

join returns a string value consisting of all the elements of an array concatenated and separated by the specified separator character. If separator is omitted, the array elements are separated with a comma. If any element of the array is undefined or null, it is treated as an empty string ("").

```
array.toString()
array.valueOf()
```

Both toString and valueOf converts elements of an array to strings. The resulting strings are concatenated, separated by commas. This is the same as using join without specifying a separator (or specifying comma as separator).

Converting an Array to a String with Line Breaks between Elements

This example is similar to using categoryLabels to list the answers to a multi question and include them in an email text (see String Object Methods that Use Regular Expression Objects on page 213 for more information). Instead of the default commas between the items listed in the array returned from categoryLabels, we want line breaks. If the email is sent as plain text, you then have to replace the commas with the special character \n.

This script will convert the array to a string and use line breaks as delimiter between the elements of a multi question brands:

```
var body : String = "";
body += "Here are the answers on the brands question:\n\n"

var brandsAnswers = f("brands").categoryLabels();
brandsAnswers = brandsAnswers.join("\n");

body += brandsAnswers

SendMail("interviewer@confirmit.com", f("email"), "Answers", body);
```

If the mail is sent as HTML, you must replace the commas with the HTML
 tag:

```
var body : String = "";
body += "Here are the answers on the brands question:<br><br>"

var brandsAnswers = f("brands").categoryLabels();
brandsAnswers = brandsAnswers.join("<br>");

body += brandsAnswers

SendMail("interviewer@confirmit.com", f("email"), "Answers", body, "", "", 0, 0)
;
```

14.5.3. Removing and Adding Elements

```
array.pop( )
```

pop removes the last element from an array and returns it. If the array is empty, undefined is returned.

```
array.push({item1 {item2 {... {itemN}}}})
```

push appends new elements (item₁, ..., item_N) to an array, and returns the new length of the array. The push method appends elements in the order in which they appear. If one of the arguments is an array, it is added as a single element. Use the concat method to join the elements from two or more arrays.

```
array.shift( )
```

shift removes the first element from an array and returns it.

```
array.unshift({item1{, item2 {, ... {, itemN}}}})
```

unshift returns an array with specified elements (item₁, ..., item_N) inserted at the beginning. The items will appear in the same order in which they appear in the argument list.

14.5.4. Changing the Order of the Elements

```
array.reverse( )
```

`reverse` returns an `Array` object with the elements reversed. The method reverses the elements of the `Array` object in place (`array`). It does not create a new `Array` object during execution. If the array is not contiguous, the `reverse` method creates elements in the array that fill the gaps in the array. Each of these created elements has the value `undefined`.

```
array.sort({this.sortFunction})
```

`sort` returns an `Array` object with the elements sorted. `sortFunction` is optional and is the name of the function used to determine the order of the elements. Because Forsta script nodes are wrapped inside a class, you have to use the keyword `this` to refer to the current instance (`this.sortFunction`). If the sorting function is omitted, the elements are sorted in ascending, ASCII character order. The `sort` method sorts the `Array` object in place; no new `Array` object is created during execution.

If you supply a function in the `this.sortFunction` argument, it must return one of the following values:

- A negative value if the first argument passed is less than the second argument.
- Zero if the two arguments are equivalent.
- A positive value if the first argument is greater than the second argument.

Validating Grid with "Other, specify" Alternatives

Assume you have a grid `q1` with two "other, specify"-items:

| Quality | | | | | |
|---|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| Please give us your impression of the quality of the products provided by these PC manufacturers: | | | | | |
| | 1 Low quality | 2 | 3 | 4 | 5 High quality |
| Apple | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Compaq | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Dell | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| HP | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| IBM | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Other provider 1: <input type="text"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Other provider 2: <input type="text"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

In a question such as this, the "other, specify" items will usually not be required, whereas the remaining items will be required. To achieve this, we must set the "Not required" property on the grid question, and provide our own validation code instead.

There should also be validation checking that text is provided if a rating is provided for an "other, specify" field and vice versa. For this, the standard "Other Specify Checking" can be used (just ensure it is turned on when generating web interview files). However, if the respondent accidentally rates one of the "other" items, there is no way for the respondent to unselect that row. We must therefore include a removal of the radio button selection for the "other" items when they are not answered correctly.

Here is the answer list of this question with codes used:

| Text | Answers | Scale | Validation | Masking | Preview |
|---|---------|--------------------------|-------------------------------------|---------|---------|
|  | Add | Add Predefined | Add Loop Reference | Add | |
| English | Code | KeepPos | Other | | |
| Apple | 1 | <input type="checkbox"/> | <input type="checkbox"/> | | |
| Compaq | 2 | <input type="checkbox"/> | <input type="checkbox"/> | | |
| Dell | 3 | <input type="checkbox"/> | <input type="checkbox"/> | | |
| HP | 4 | <input type="checkbox"/> | <input type="checkbox"/> | | |
| IBM | 5 | <input type="checkbox"/> | <input type="checkbox"/> | | |
| Other provider 1: | 97 | <input type="checkbox"/> | <input checked="" type="checkbox"/> | | |
| Other provider 2: | 98 | <input type="checkbox"/> | <input checked="" type="checkbox"/> | | |

Below is a validation code that can be used on such a question:

```

var form = f("q1");
var codes = a("q1").diff(set("97","98")).members(); //all codes except
"other"

var codes = codes.sort(this.NumSort); //sort the codes so the items are
checked in the same order as they are displayed

var notAnswered = new Array(); //array to hold text of not answered items

for(var i : int = 0;i<codes.length;i++)
{
  var code = codes[i];
  if(!form[code].toBoolean())
  {
    //add the label of not answered element to the array:
    notAnswered.push(form[code].label());
  }
}

codes = new Array("97","98"); //codes of "other, specify"-elements

for(i=0;i<codes.length;i++)
{
  code = codes[i];
  if(form[code].toBoolean() && !f("q1_"+code+"_other").toBoolean())
  {
    //remove answer
    form[code].set(null);
  }
}

if(notAnswered.length > 0)
{
  RaiseError();
  SetQuestionErrorMessage(LangIDs.en,"Please answer for all providers.
Answers are missing for:<br>" + notAnswered.toString());
}

//helper function for sorting
function NumSort(a,b)
{
  var x = parseInt(a,10);
  var y = parseInt(b,10);
  return x-y;
}

```

This example uses the `push` method to add elements to the end of an array. We use the `sort` method to sort the array. When the `codes` array is set with the statement

```
var codes = a("q1").diff(set("97","98")).members();
```

it is built from set expressions, and as we have learnt the order of the items within a set is insignificant. So the order the elements come in the array after using this expression is not necessarily the same order as in the answer list. To make sure we get them in the same order as in the answer list, so the listing in the error message does not become confusing to the respondents, we use the `sort` method with the helper function `NumSort` that converts its parameters (the codes in the array) to numbers and then do subtraction and return the result. If the result is negative, the first code is less than the second, if it is 0 they are equal and if the result is positive the first one is greater than the second. This is just as the description of the `sortFunction` above.

14.5.5. slice and splice

```
array.slice(start, {end})
```

`slice` returns a section of an array. `start` is the index to the beginning of the specified portion of the array. `end` is optional and is the index to the end of the specified portion of `arrayObj`. The `slice` method copies up to, but not including, the element indicated by `end`. If `start` is negative, it is treated as `length+start` where `length` is the length of the array. If `end` is negative, it is treated as `length+end` where `length` is the length of the array. If `end` is omitted, extraction continues to the end of `arrayObj`. If `end` occurs before `start`, no elements are copied to the new array.

```
array.splice(start, deleteCount, {item1}, {item2}, ... {,itemN}{})
```

`splice` removes elements from an array and, if necessary, inserts new elements in their place, returning the deleted elements. `start` is the index from which to start removing elements. `deleteCount` is the number of elements to remove. `item1, ..., itemN` are optional elements to insert into the array in place of the deleted elements.

The `splice` method modifies array by removing the specified number of elements from position `start` and inserting new elements. The deleted elements are returned as a new `Array` object.

15. Customizing Standard Error Messages

We have seen numerous examples on how to add your own validation code to your surveys. This chapter looks into how you can add your own texts to the standard answer checks that are provided in Forsta.

The following standard answer checks (validations) are available in Forsta:

- **Answer required checks** - All questions (except for ordinary multi questions without an exclusive item ("None of the above")) are by default required. You can set a question to be "Not required" in the properties of the question, or you can turn off the checking for all questions by deselecting "Answer required checks" when generating WI.
- **Exclusivity tests** - An "exclusive item" in the answer list of a multi question is an answer alternative with the "single punch" property set. (Typically a "None of the above" or "Don't know" answer alternative.) This means that the answer alternative cannot be answered in combination with any of the other items. The exclusivity check makes sure that the question has at least one answer, and that no exclusive item is selected in combination with other answers. This checking can be turned off by deselecting "Exclusivity tests" when generating WI.
- **Other-specify checking** - When the "other" property is set for an item in an answer list, a text box is included next to that item. The "other-specify" checking makes sure that there is a correspondence so that the text box has an answer only if that answer alternative is selected and visa versa. It can be turned off globally by deselecting "Other-specify checking" when generating WI.
- **Rank order tests** - For a ranking question or a grid question with the "ordered" property set, the system checks that the answers constitute a set of consecutive integers starting at 1, and that all items have a rank. This default checking can be turned off globally by deselecting "Rank order tests".
- **Answer size tests for fixed-width fields** - If a field width is defined for a question, the system checks that the respondent's answer is within the limit. This cannot be turned off globally, because the database is set up according to the field width definitions, so the database cannot accept answers above this limit.
- **Numeric validation** - For numeric and numeric list questions, the system checks that the answer consists of the symbols 0 to 9 only, and is within the limits defined in total digits, decimal places as well as lower and upper limit. This validation cannot be turned off globally because the database is set up according to these settings and cannot accept non-numeric answers that do not correspond to these settings.

All of these types of validation have their own error messages provided in Forsta. These error messages are provided in a number of languages, but are the same for all users of an installation. They can be changed globally on a Forsta server installation, but not for individual surveys.

If you want something other than the standard error messages, you must add code in the validation code field of the question where the validation applies. This chapter explains a number of functions that make it easier to build customized error messages for the default answer checks.

15.1. Functions for Standard Validation

The following functions can be used to find out if any of the standard validation in Forsta has found an error in the respondent's answer(s):

| Function | Description |
|------------------------|---|
| QuestionErrors() | returns true if an error has been raised during any validation, false otherwise. |
| MissingRequiredError() | returns true if one or more required answers to a question are missing, false otherwise. |
| ExclusivityError() | returns true if an exclusive answer ("single punch") in a multi has been selected together with any other alternative, false otherwise. |

| | |
|---------------------|--|
| NotSpecifiedError() | returns true if an alternative in an Other-Specify construct has been selected/answered without filling in the associated "Specify" text box, false otherwise. |
| NotSelectedError() | returns true if a "Specify" value has been entered in the text box of an Other-Specify construct without selecting/answering the associated alternative, false otherwise. |
| RankError() | returns true if the "Ordered" property has been selected for the form and the answers to the questions are non-numeric, do not start at 1 or are non-consecutive, false otherwise. |
| SizeError() | returns true if one or more open-ended answers exceeded the maximum length specified in field width, false otherwise. |
| NumericError() | returns true if the "Numeric" property has been selected and the answer is not numeric, false otherwise. |
| PrecisionError() | returns true if the "Numeric" property has been selected and the answer cannot be stored within the defined total digits, false otherwise. |
| ScaleError() | returns true if the "Numeric" property has been selected and the answer contains more decimals than in the defined decimal places, false otherwise. |
| RangeError() | returns true if the "Numeric" property has been selected and the answer is outside the defined range, false otherwise. |
| PasswordError() | used on a opentext panel variable with the password property set. Returns true if any of the password validation settings for the panel (in panel settings) have not been satisfied. |

Example:

```
if(MissingRequiredError())
{
    SetQuestionErrorMessage(LangIDs.en,"Please provide an answer.");
}
```

When one of these functions returns true, an error situation has already been flagged, so you do not have to use the RaiseError function.

15.2. Template Based Error Messages

The system allows you to use templates for your error messages in custom validation. For each error type, various elements are filled in that can improve the information content of the messages you report to the respondents. Instead of simply using fixed strings for error messages, the ErrorTemplate function can be used to "plug in" information about the current question, like question texts, current answers etc.

```
ErrorTemplate(spec)
```

spec is a string with the template specification. Inside the spec string you may use different elements that are singled out with caret (^) as pre- and suffix, e.g.

```
^MISSING^
```

Example:

```
SetQuestionErrorMessage(LangIDs.en, ErrorTemplate("^MISSING^ has not been answered."));
```

This will set the text of the error message to "label(s) has not been answered"

Templates are available for all the standard validation. There are usually several versions of the templates, which differ in how they separate words when they are listed. Some only use commas, some use commas, but "and" or "or" between the last two items. "and"/"or" is also available in several languages, so e.g. in German they will be replaced with "und"/"oder" and so on.

15.2.1. Answer Required Checks

```
MissingRequiredError()
```

returns true when one or more required answers to a question are missing. The following template elements can be used when MissingRequiredError returns true:

| Template | Description |
|-------------|---|
| MISSING | Labels of all questions that lack answers, comma separated. |
| MISSING_AND | Same as above, but with the word "and" separating the two last items. |
| MISSING_OR | Same as above, but with the word "or" separating the two last items. |

Example:

```
if(MissingRequiredError())
{
    SetQuestionErrorMessage(LangIDs.en,
        ErrorTemplate("Please select an answer for ^MISSING_AND^."));
}
```

15.2.2. Exclusivity Tests

```
ExclusivityError()
```

returns true if an exclusive answer ("single punch") in a multi has been selected together with any other alternative. The following template elements can be used when ExclusivityError returns true:

| Template | Description |
|---------------|---|
| SEL_EXCL | The labels of all exclusive (single punch) answers that were selected. |
| SEL_EXCL_AND | Same as above, but with the word "and" separating the two last items. |
| SEL_EXCL_OR | Same as above, but with the word "or" separating the two last items. |
| SEL_NEXCL | The labels of all non-exclusive (multi punch) answers that were selected. |
| SEL_NEXCL_AND | Same as above, but with the word "and" separating the two last items. |
| SEL_NEXCL_OR | Same as above, but with the word "or" separating the two last items. |
| DEF_EXCL | The labels of all exclusive (single punch) answers, regardless of which of them that were selected. |

| | |
|---------------|--|
| DEF_EXCL_AND | Same as above, but with the word “and” separating the two last items. |
| DEF_EXCL_OR | Same as above, but with the word “or” separating the two last items. |
| DEF_NEXCL | The labels of all non-exclusive (multi punch) answers, regardless of which of them that were selected. |
| DEF_NEXCL_AND | Same as above, but with the word “and” separating the two last items. |
| DEF_NEXCL_OR | Same as above, but with the word “or” separating the two last items. |

Examples:

```

if(ExclusivityError())
{
    SetQuestionErrorMessage(LangIDs.en,
        ErrorTemplate("Please do not check ^SEL_EXCL_OR^ if you check other
answers to the question."));
}

if(ExclusivityError())
{
    SetQuestionErrorMessage(LangIDs.en,
        ErrorTemplate("^DEF_EXCL_AND^ can not be combined with any of the other
answers."));
}

```

15.2.3. Other-Specify Checking

Note: These two functions will ONLY work when the option “Other-Specify checking: Check that BOTH checkbox and textbox have been completed for an Other-specify answer” has been selected in survey settings.

```
NotSpecifiedError()
```

returns true if an alternative in an Other-Specify construct has been selected/answered without filling in the associated "Specify" text box.

```
NotSelectedError()
```

returns true if a "Specify" value has been entered in the text box of an Other-Specify construct without selecting/answering the associated answer alternative.

The following template elements are defined when one of these functions returns true:

| Template | Description |
|----------|---|
| OTHER | Label of the alternative/input that requires specification in an Other-Specify construct. |
| SPEC | The specification |

Examples:

```

if(NotSpecifiedError())
{
  SetQuestionErrorMessage(LangIDs.en,ErrorTemplate("Please specify if
^OTHER^ is chosen.));
}
if(NotSelectedError())
{
  SetQuestionErrorMessage(LangIDs.en,
  ErrorTemplate("If you specify ^OTHER^ then please select the ^OTHER^
option.));
}

```

15.2.4. Rank Order Tests

```
RankError()
```

returns true if the "Ordered" property has been selected for the form and the answers to the questions are non-numeric, do not start at 1 or are non-consecutive. The following template elements are defined when RankError returns true:

| Template | Description |
|----------|---|
| RANK_MIN | The label of the first member of the ranking scale, or 1 if the question is open ended. |
| RANK_MAX | The label of the nth member of the ranking scale, or n if the question is open ended, where n is the number of items to rank. |

Example:

```

if(RankError())
{
  SetQuestionErrorMessage(LangIDs.en,
  ErrorTemplate("Please enter consecutive answers in the range ^RANK_MIN^
to ^RANK_MAX^."));
}

```

15.2.5. Answer Size For Fixed-Width Fields

```
SizeError()
```

returns true if one or more open-ended answers exceeds the maximum length specified in the field width. The following template elements are defined when SizeError returns true:

| Template | Description |
|--------------|---|
| TOO_LONG | The labels of the inputs that were too long. |
| TOO_LONG_AND | Same as above, but with the word "and" separating the two last items. |
| MAX_SIZE | The maximum allowed size. |

Example:

```

if(SizeError())
{
  SetQuestionErrorMessage(LangIDs.en,
    ErrorTemplate("The answers to ^TOO_LONG_AND^ were longer than
^MAX_SIZE^ characters and have been truncated. Please review."));
}

```

15.2.6. Numeric Validation

```
NumericError()
```

returns true if the "Numeric" property has been selected and the answer is not numeric. The following template elements are defined when NumericError returns true:

| Template | Description |
|--------------------|---|
| NUMERIC_ERRORS | The labels of all elements with a numeric error. |
| NUMERIC_ERRORS_AND | Same as above, but with the word "and" separating the two last items. |

Example:

```

if(NumericError())
{
  SetQuestionErrorMessage(LangIDs.en,
    ErrorTemplate("Please make sure that the answers to ^NUMERIC_ERRORS^
are numbers only."));
}

```

15.2.7. Precision Error Tests

```
PrecisionError()
```

returns true if the "Numeric" property has been selected and the answer cannot be stored within the defined total digits. The following template elements are defined when PrecisionError returns true:

| Template | Description |
|----------------------|---|
| PRECISION | The defined total digits |
| PRECISION_ERRORS | The labels of all elements with a total digits error. |
| PRECISION_ERRORS_AND | Same as above, but with the word "and" separating the two last items. |

Example:

```

if(PrecisionError())
{
  SetQuestionErrorMessage(LangIDs.en,
    ErrorTemplate("Please enter a number with no more than ^PRECISION^
digits for ^PRECISION_ERRORS^."));
}

```

15.2.8. Scale Error Tests

```
ScaleError()
```

returns true if the "Numeric" property has been selected and the answer contains more decimals than in the defined decimal places. The following template elements are defined when ScaleError returns true:

| Template | Description |
|------------------|---|
| SCALE | The defined decimal places |
| SCALE_ERRORS | The labels of all elements with too many decimals. |
| SCALE_ERRORS_AND | Same as above, but with the word "and" separating the two last items. |

Example:

```
if (ScaleError())
{
    SetQuestionErrorMessage(LangIDs.en,
        ErrorTemplate("Please enter answers with no more than ^SCALE^ decimals
for ^SCALE_ERRORS_AND^."));
}
```

15.2.9. Range Error Tests

```
RangeError()
```

returns true if the "Numeric" property has been selected and the answer is outside the defined range. The following template elements are defined when RangeError returns true:

| Template | Description |
|------------------|---|
| RANGE_MIN | The label of the defined minimum value. |
| RANGE_MAX | The label of the defined maximum value. |
| RANGE_ERRORS | The labels of all elements with too many decimals. |
| RANGE_ERRORS_AND | Same as above, but with the word "and" separating the two last items. |

Example:

```
if (RangeError())
{
    SetQuestionErrorMessage(LangIDs.en,
        ErrorTemplate("Please enter answers in the range ^RANGE_MIN^ to
^RANGE_MAX^."));
}
```

Note: If the survey is using a responsive layout, the client-side validation (which does not have details of numeric range boundaries) is executed before any custom validation. These template elements will therefore not function and the default error messages will be presented.

15.2.10. Columns in 3D grid

In 3D grids the CTITLE primitive is available to give the possibility of including the column header (question text) of the question in the error message.

| Template | Description |
|----------|--|
| CTITLE | The column header (question text) for the question in the 3D grid. |

Example:

```
if(f("q1").size() < 5)
{
  SetQuestionErrorMessage(LangIDs.en,
    ErrorTemplate("Please select at least 5 items for ^CTITLE^."));
}
```

16. Useful ASP.NET Intrinsic Objects

This chapter contains examples of some ASP.NET objects that you may find useful in your scripts, with examples of how they can be used. It is not intended as a comprehensive description of them. For more information, consult an ASP.NET reference manual.

16.1. Request

Information can be sent in to the server from the user either from a web form (as the questions in the survey), passed in with the web address URL or stored in a cookie. This, as well as other information about the incoming request can be retrieved using the Request object.

We will look into some of the properties of the Request object. All of these return values of the type `NameValueCollection`. This is a type that represents a sorted collection of associated `String` keys and `String` values that can be accessed either with the key or with the index (integer from 0). This means that their values can be referenced in the same way as you refer to values in an `Array` (see Arrays on page 39 for more information), but also using their `String` key, for example:

```
var aValue = Request("arg");
```

This will look through all values sent in with the request to find a key that matches the name specified in `arg` and return the corresponding value. If there is no match for `arg`, `null` will be returned. This means that you can use the expression

```
Request("arg") != null
```

to check if it exists before using the value returned.

Note: Survey links in hitlists can have parameters added to the link. Two functions are available to receive the value from the link; Request and UserParameters (see UserParameters on page 89 for more information). The function you must use depends on the link's "Link type" setting. Request() will only be able to retrieve the value from the hitlist link when "Link type" in the Hitlist Field Properties page is set to "Unencrypted URL parameters". Refer to the separate Reportal User Guide for further details.

A more robust approach than using the `Request` object directly is to use the separate properties of the `Request` object to prevent naming conflicts. In the next chapters we will describe some of the most useful properties.

Note: Request and Request.Form are not supported by CAPI or AskMe App. Use RequestForm (see RequestForm on page 228 for more information).

16.1.1. Request.Form

```
Request.Form
```

will give the collection of form values submitted using "POST".

16.1.2. RequestForm

```
RequestForm
```

This was created because `Request.Form` and `Request` are not supported by CAPI or AskMe App. `RequestForm` functions in the same way as `Request.Form` (see `Request.Form` on page 228 for more information).

16.1.3. QueryString

```
Request.QueryString()
```

will give the collection of values supplied on the URL or from a form submitted with "GET". If you want to send values into the survey with the url, they can be included after the question mark after `project_ID.aspx`, separated by ampersands (&), e.g.

```
http://survey.confirmit.com/wix/project_ID.aspx?variable1=value1&variable2=value2
```

The keys here are `variable1` and `variable2`, so using the key `variable1` as in

```
Request.QueryString("variable1")
```

with the url above will return the value *value1*.

16.1.4. Request.Cookies

```
Request.Cookies
```

will return the cookies stored from the of the Forsta server domain. It returns an `HttpCookieCollection` object (see Cookies on page 232 for more information).

16.1.5. ServerVariables

```
Request.ServerVariables
```

will give the information sent in the header or internal server values.

Here is a table listing an extract of the possible server variables in the collection returned from the `ServerVariables` property:

| Variable | Meaning |
|----------------------|---|
| ALL_HTTP | All HTTP headers sent by the client., with their names capitalized and prefixed with <code>HTTP_</code> |
| ALL_RAW | Retrieves all headers in raw form (the form they were sent to the server by the client). |
| CONTENT_LENGTH | The length of the content as given by the client. |
| CONTENT_TYPE | The MIME type of the request, such as <code>www-url-encoded</code> for a form being posted to the server. |
| GATEWAY_INTERFACE | The Common Gateway Interface (CGI) supported on the server. |
| HTTP_<HeaderName> | The value stored in the header <i>HeaderName</i> . Any header other than those listed in this table must be prefixed by <code>HTTP_</code> in order for the <code>ServerVariables</code> collection to retrieve its value. Note that the server interprets any underscore (<code>_</code>) characters in <i>HeaderName</i> as dashes in the actual header. For example if you specify <code>HTTP_MY_HEADER</code> , the server searches for a header sent as <code>MY-HEADER</code> . |
| HTTP_ACCEPT | The MIME types the client can accept. |
| HTTP_ACCEPT_LANGUAGE | The languages accepted by the client. |
| HTTP_ACCEPT_ENCODING | The compression encoding types supported by the client. |
| HTTP_CONNECTION | Indicates whether the connection allows keep-alive functionality. |
| HTTP_COOKIE | Returns the cookie string that was included with the request. |
| | |
| HTTP_USER_AGENT | Returns a string describing the browser that sent the request. See below for an example. |

| | |
|----------------------|---|
| HTTP_HOST | The host name of the server. |
| HTTPS | Returns "On" if HTTPS was used for the request and "Off" if not. |
| HTTPS_KEYSIZE | Number of bits in the encryption used to make the HTTPS connection. For example, 128. |
| HTTPS_SECRETKEYSIZE | Number of bits in server certificate private key. For example, 1024. |
| HTTPS_SERVER_ISSUER | Issuer field of the server certificate. |
| HTTPS_SERVER_SUBJECT | Subject field of the server certificate. |
| LOCAL_ADDR | The IP address of the server which is handling the request. |
| QUERY_STRING | Query information stored in the string following the question mark (?) in the HTTP request. |
| REMOTE_ADDR | The IP address of the remote host making the request. |
| REMOTE_HOST | The host name of the client making the request, if available. |
| REQUEST_METHOD | The type of the HTTP request made: "GET", "POST" or "HEAD". |
| SERVER_NAME | The server's host name, |
| SERVER_PORT | The port number to which the request was sent. |
| SERVER_PORT_SECURE | A string that contains either 0 or 1. If the request is being handled on the secure port, then this will be 1. Otherwise, it will be 0. |
| SERVER_PROTOCOL | The HTTP protocol and version in use on the server. |
| SERVER_SOFTWARE | The name and version of the web server software running on the server. |

Sending in Values with the URL

Assume you have a pop-up survey that is triggered from pop-up scripts on several sites. You want to identify which site the respondents were surfing when the pop-up appeared. In the pop-up scripts you should use different survey links for the different sites, as below:

```
http://survey.confirmit.com/wix/<project ID>.aspx?site=1
http://survey.confirmit.com/wix/<project ID>.aspx?site=2
http://survey.confirmit.com/wix/<project ID>.aspx?site=3
http://survey.confirmit.com/wix/<project ID>.aspx?site=4
```

Insert a hidden single question *source* in your questionnaire. The answer list should have the different sites you use and codes that correspond to the values you use in the URLs, for example:

| Text | Answers | Validation | Masking | Preview | Results |
|---|------------------|------------|---------|---------|---------|
| <div style="border: 1px solid blue; padding: 2px;"> Add Add Predefined Add Loop Reference Add Gro </div> | | | | | |
| | English | | | | Code : |
| | www.yahoo.com | | | | 1 |
| | www.google.com | | | | 2 |
| | www.bing.com | | | | 3 |
| | www.facebook.com | | | | 4 |
| | www.twitter.com | | | | 5 |

To set this hidden question based on the values sent in with the URL, use the code given below in a script node at the beginning of the questionnaire.

```
f("source").set(Request("site"));
```

Alternatively, you can use the `QueryString` property:

```
f("source").set(Request.QueryString("site"));
```

Important

The script node with `Request` must be the first node in the questionnaire, because once the respondent moves to the next page, the values are lost.

Now `source` can be used for reporting, quotas, logic etc. in the same way as an ordinary question.

Recording respondent's browser version and operating system

The system does not automatically save information about the respondent's user agent (browser version and type and operating system (OS)) into a survey. To get this information you must add a check function into the survey at a location before your respondents start to provide answers. For this you can use the function `Request.ServerVariables("HTTP_USER_AGENT")`. This will contain information about the respondent application name and version and the operating system.

If you have a hidden open text question with question id `UserAgent`, then the script will look like this:

```
var agentInfo = Request.ServerVariables("HTTP_USER_AGENT");
f("UserAgent").set(agentInfo);
```

Variable `UserAgent` will then contain string values that will look like this:

```
Mozilla/5.0 (Windows NT 6.1; WOW64) AppleWebKit/537.36 (KHTML, like
Gecko) Chrome/52.0.2743.116 Safari/537.36
```

More information about the different values returned can be found here: [https://msdn.microsoft.com/en-us/library/ms537503\(v=vs.85\).aspx](https://msdn.microsoft.com/en-us/library/ms537503(v=vs.85).aspx)

16.2. Response

Response is used to write content to the client (the respondent's browser), including headers and cookies. Here we will only cover the `Write` method and the property used to set cookies.

16.2.1. Write

```
Response.Write(arg)
```

You may use the `Write` method for debugging purposes, for example to get values of variables you are using in your script written to the screen when testing to help identifying why the script does not work as intended. For other purposes it is recommended to use response piping with `^s` inside one of the text fields of a question or an info instead, since you will then have better control of where on the page the text you output is placed.

`arg` can be any type of object, as it will be converted to a string when written to the client.

16.2.2. Cookies

```
Response.Cookies
```

The `Cookies` property indicates the cookies collection, which allows addition of cookies to the outgoing stream, adding cookies to the client from a Forsta survey. It can for example be used to prevent respondents of an open survey from taking the survey more than once, as showed in the example below.

The class `HttpCookiesCollection` provides a wrapper for a collection of cookies. You use this to set and modify properties and values in the cookies. Most useful for us is the `Add` method:

```
cookiesCollection.Add(cookie)
```

The `Add` method allows the addition of a single cookie to the collection. The parameter `cookie` is an object of the `HttpCookie` class. `HttpCookie` has two different constructors:

```
var cookie = new HttpCookie(string);
```

which creates and names a new cookie.

```
var cookie = new HttpCookie(string1, string2);
```

which creates, names (`string1`), and assigns a value (`string2`) to a new cookie.

There is currently a problem with the JScript.NET compiler that gives a type mismatch error when compiling with an `HttpCookie` object. For this reason the variable should be defined as `Object` to avoid this checking:

```
var cookie : Object = new HttpCookie(string);
```

or

```
var cookie : Object = new HttpCookie(string1, string2);
```

Here are the most relevant properties of `HttpCookie`:

```
cookie.Expires
```

The `Expires` property indicates the expiration date and time of the cookie, as a .NET `DateType` value (a bit different than the JScript .NET `Date` object. Consult a .NET reference for more details.) After this expiration date and time, the cookie will not be sent with the request, so you can not retrieve it anymore.

```
cookie.Name
```

Name indicates the name of the cookie.

```
cookie.Path
```

Cookies are specific to the site they originate from, so client browsers only send cookies to the DNS domain from which they were created – i.e. a www.microsoft.com cookie can not be picked up by survey.confirmit.com. But you can set a cookie to indicate the directory path on the domain that should receive it using the `Path` property. Using a Path of `"/"` indicates that all directory paths on the server should have access to the cookie.

```
cookie.Value
```

The `Value` property indicates the value for the cookie.

The majority of cookies are used as a single name and value. However, a cookie can have more than one value. The `Values` property allows you to set several values and also retrieve them again as a `NameValueCollection`:

```
cookie.Values
```

Here is an example on how to set a cookie:

```
var myCookie : Object = new HttpCookie("LastVisit");
var now : DateTime = DateTime.Now; //current time

myCookie.Value = now.ToString(); //convert to string
myCookie.Expires = now.AddMonths(6);
myCookie.Path = "/";
Response.Cookies.Add(myCookie);
```

The value of the cookie can later be fetched like this:

```
var myCookie : Object = Request.Cookies("LastVisit");
if(myCookie != null)
{
    var last = myCookie.Value;
    //The variable last will now have the timestamp of the last access
}
```

Using Cookies to Limit Access to an Open Survey

Sometimes the sample for a survey is not known in advance, so that you can not set up the survey as a limited survey with cryptic, individual links. Then you have to distribute the open link to the survey instead. However, you can use cookies to try to prevent the respondents from answering more than once. This is not a bullet-proof method of course, because respondents may have set their browsers to not accepting cookies, they may delete cookies and they may also respond from different PCs,

You can set the cookie from a script node anywhere in the survey depending on how far you think the respondents should have answered before not being allowed to reenter. A cookie using the project id as name can be set with this script:

```
var interval = 3;
var expiry = new Date();
expiry.setMonth(expiry.getMonth()+interval);

var objCookieObject : HttpCookie;
objCookieObject = new HttpCookie(CurrentPID());
objCookieObject.Value = "true";
objCookieObject.Expires = expiry.getVarDate();
objCookieObject.Path = "/" ;
Response.Cookies.Add(objCookieObject);
```

In the beginning of the survey you may then have a condition that uses this expression to check if the cookie is present:

```
Request.Cookies[CurrentPID()] != null
```

If we also wanted to check the value we would also add that to the expression (not really necessary in this scenario):

```
Request.Cookies[CurrentPID()] != null &&
Request.Cookies[CurrentPID()].Value == "true"
```

17. Scripting in Reportal

The Reportal scripting capability enables developers to leverage the power of Reportal with greater flexibility for report interface customization. Scripting functionality is added to Reportal to enable the user to, for example:

- Perform custom permission control.
- Build aggregated table definitions based for example on user information (e.g. enduser role or company) or parameter values (e.g. selected project and question/question type).
- Build the domain (valid values) of parameters dynamically.
- Mask a parameter domain dynamically, based for example on information about the user (usertype, company or role).
- Send email.

The target audience for using Reportal Scripting is developers familiar with programming in Microsoft developer tools. The scripting Language is Microsoft JScript.NET.

A syntax highlighter is enabled by default in all areas in Reportal where scripts can be written (see The Syntax Highlighter on page 12 for more information). If the BETA CodeCompletion component is not enabled, this syntax highlighting will be used. When the syntax highlighter is in use, each time the **Tab** key is pressed, the current line of script is indented one step. Each press of the **Shift-Tab** keys removes one indent from the line. Note that the **Tab** key does not insert a tab in the text. To disable the syntax highlighting, in Survey Designer, go to the **Design page > Item Editor** menu and uncheck the “Syntax highlighting in editors” box. Refer to the Survey Designer User Guide for further details.

17.1. Where is Scripting Used in Reportal?

You can add scripts to a range of elements at various levels in Reportal:

- **Report level** - at the Report Level you can define your Permission script and implement common functions available in a Codelibrary script.
- **Page level** - at the Page level you can add a script that runs once the report page is submitted. This script is primarily used to validate values and combinations of values in input controls on the page. You can also use scripting to hide a page from, for example, a particular role.
- **Parameters** - parameters have domain scripts, mask scripts and filter summary scripts.
- **Visual Components** - all visual components have a Hide expression. Additionally, component definitions for the following components can be changed dynamically using a render script:
 - o Tables
 - o Charts
 - o Gauges
 - o Verbatim Tables
 - o Texts
 - o Hit Lists
 - o Admin menu
 - o Admin menu-like options in navigator
- **Filters** - filter expressions can be built dynamically from a script by adding Filter Scripts within the Filter Toolbox.

17.2. Caching of Tables

Using aggregated tables in data sources containing large data-sets will degrade performance. In Reportal, performance is improved by caching the data-sets used by the tables, and in View mode all tables are cached by default (tables are not cached in Preview mode).

Performance of affected tables can however be significantly improved. It is possible to explicitly enable caching for scripted tables by adding the following code to the table script:

```
table.Caching.Enabled = true;
table.Caching.CacheKey = "X"; //can use any string value
```

This code will function for most scripted tables. The table cache will then take into account any context that may affect the table, for example filters, report base, parameters and benchmark, and will cache different versions of the table for every variation of these. So even if the script modifies these properties, caching can still be enabled.

The `table.Caching.CacheKey` property can be used if you want to explicitly control the cache criteria for a table. This might be useful if the table is likely to vary by factors other than the properties mentioned above. Note that this property is not optional, so it must be set to a string value even when it is not used. The same value can be used for all tables.

To check whether caching will function for a table, enable caching and verify that the table dynamics (for example report base, filters, drilldowns etc.) still function correctly in View mode.

Note: It is possible to disable caching by setting `table.Caching.Enabled=false` in the table script.

Important

Caching should be used whenever possible as it will improve performance and take load off the system.

17.3. General Concepts

The following sections outline the concepts used in Reportal scripting.

17.3.1. Accessing Survey Content

There are two main approaches that can be used to retrieve Survey content, for example questions, ids, answers, texts etc. when scripting in Reportal:

- Access the Report's data source,
- Access a Project's definition.

In addition it is possible to access tables in Database Designer.

17.3.2. Methods

report.DataSource - provides access to the project(s) defined in the Report's data source. The input parameter is the data source nodeid(s).

confirmit.GetProject - provides access to a project by using the Project Id as input to the GetProject method.

confirmit.GetDBDesignerSchema - by using the schemaid as input to the GetDBDesignerSchema you can access information in Database Designer tables. The content of Database Designer tables can be used to mask or populate dynamic lists, or control access to various components of your report.

17.3.3. Guidelines

The parameter type **Project** in Reportal allows you to use projects that are not in the Reportal data source . This may be useful if you have a portal that is used for new projects that are added on a regular basis. In this case there are three things you must do:

1. Add projects to the domain of a project parameter from the parameter domain script.
2. Grant users access to "your" (report designer's) projects.
3. Explicitly grant access to projects from the report permission script.

When granting users access to your projects, it is important that sufficient access measures are included in the permission script to avoid unintentional access to variables in the projects that are available from the code.

17.3.4. Question Category

To combine multiple questions in a project into different categories, each question in a survey can be defined to belong to one or more Question Categories. The Question Category can be used to display the questions in a drop-down menu, grouped by the defined Category, as shown in the example. Note that this is a way to group your questions by category, and no calculations will be applied to your questions by category.



Figure 8 Example of the Question Category drop-down

To set this up, you must first create a resource survey which will hold the question categories. Proceed as follows:

1. Create a project in Professional Authoring, and insert a single question type which can be called Categories.
2. Enter the different categories in the Answers tab.

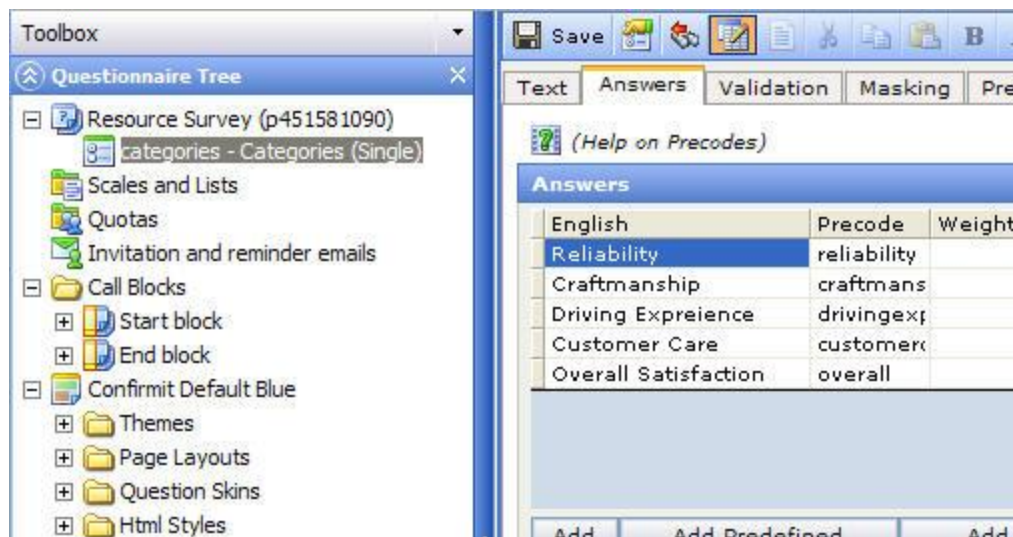


Figure 9 The Resource survey

When the resource survey is in place, you can define in your projects which category the questions belong to.

3. Under Question Properties for your Grid, Multi or Single question, you have a Question Category field. Enter into this field the code of the Category to which the question is to belong. Note that if a question is to belong to several categories, you must enter the codes separated by semi-colons. Ensure there are no spaces between the categories and semi-colons.

| | |
|------------------------|----------------------------------|
| Default answer precode | <input type="text"/> |
| Refused answer precode | <input type="text"/> |
| Question Category | reliability;customercare;overall |
| Exclude translation | <input type="checkbox"/> |
| Related | <input type="checkbox"/> |

Figure 10 The Question Category property

When all questions have been categorized in the survey, the report can be setup.

4. Create a parameter in the Report toolbox, and name it for example **p_category**.

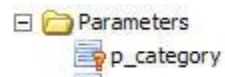


Figure 11 The Parameter

The Parameter Values folder for this parameter should be empty.

5. Under Properties, set the Type to **Fixed Questionnaire Element**.

Figure 12 The Parameter properties

You must now script the functionality for this parameter.

6. Right-click on the **p_category** element and select **Script**. Enter a customized script based on the following:

```

Domain
Disable Code Completion BETA
1 var resourceProject : Project = this.report.DataSource.GetProject("resource_survey");
2 parameter.Items.AddRange(project.GetQElementsGroupedByCategory(resourceProject, "categories", false));
3

```

Figure 13 Example of the Category script

The GetProject method, will take in as a parameter either the data source name (which is named resource_survey in the example), or the project id. The GetQElementsGroupedByCategory method will take in as parameters the defined resource project, the question id of the categories question. The third parameter is a Boolean, where you can select if the Grid questions included in a parameter should be collapsed or expanded.

When the Parameter is in place, it must be included in a List element. The List element can be included on a Query report page where the report viewer can select a report query.

7. Drag the **p_category** parameter to the List object.



Figure 14 The Parameter in the List object

8. Right-click on the List object, and select **Properties**, then set up the properties as required.

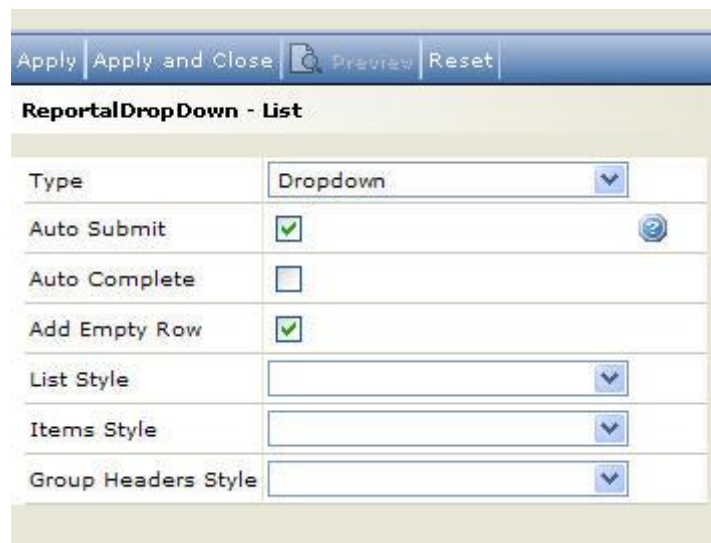


Figure 15 The List properties

The List properties are as follows:

- **Type** - defines the List type you would like to display.
- **Auto Submit** - should be selected if there are other elements on the page that depend on the selection made on in this List. The page will then refresh when a selection is made.
- **Auto Complete** - includes a type-in-box, where the letters you type in will display the list that matches.
- If Type (above) is set to Drop-down, you can add an **Empty Row** which will be shown by default before a selection is made; check the box as required.
- **List Style** - defines the style of the list frame.
- **Items Style** - is the style of the elements within a Category.
- **Group Headers Style** - is the style of the Header elements in your List.

17.3.5. The Role Column

A Role column is included in maintenance screens for Reportal end-users and panelists. This column enables you to allocate a role to a user or panelist, giving you another method of specifying access to the report.

Note: The only place this role can be used is within Reportal scripts, by calling the user.HasRole method.

17.4. Script Types

The script types available in Reportal Scripting are described in the following sections. For each of the script types the following structure is used:

- Where do I find the script editor for this script?
- What's the main purpose of this script?
- Short description of the script type.
- Some simple examples of the script type.

For a full list of all methods, the Reportal Scripting Object Model is described in the document "Reportal Scripting". You can download this from the User Manual page in the Forsta Extranet (<http://extranet.confirmit.com>).

17.4.1. Report Level Scripts

Report Level scripts comprise:

- Code Library scripts
- Permission script

17.4.1.1. Codelibrary Script

| | |
|---|--|
| <p>Editor: Report Menu > Codelibrary Script</p> | <p>Main purpose: Write common script classes available from any other scripts in the report. Multiple Codelibrary scripts can be added to a report, stored in the Codelibrary Script folder node in the Report toolbox. Many classes can be added to each script.</p> |
| <p>Description: In this script you can write your own classes. These classes will typically be used as follows:</p> <ul style="list-style-type: none"> • When you have some common logic that should be used from several of the other scripts in the report. • When the logic in a hide script is too complex to be expressed in an expression, you can implement this logic in a common class and just call this method from the hide script. <p>If you want to use any of the objects available in other scripts, you must pass them as parameters to the code library script.</p> <p>To add a new script, in the Report toolbox right-click on the Codelibrary Script folder node and select Add Codelibrary Script.</p> | |
| <p>Example - Codelibrary:</p> <pre>class MyLib { function MultiplyBy100(value : Decimal) : Decimal {</pre> | |

| |
|---|
| <pre> return value * 100; } } </pre> |
| <p>Example - Use the library in a Text component:</p> <pre> if(!state.Parameters.IsNull("p_decimal")) { var lib : ReportCommon.MyLib = new ReportCommon.MyLib(); var val : Decimal = state.Parameters.GetDecimal("p_decimal"); output.Append(lib.MultiplyBy100(val)); } </pre> |

All Codelibrary scripts will be stored in the Codelibrary Script folder node in the Report toolbox.

17.4.1.2. Permission Script

| | |
|--|---|
| <p>Editor: Permissions > Permission Script</p> | <p>Main purpose: Validate that the current user really has permission to all current values of all parameters. Can also be used to initialize required values for report parameters.</p> |
| <p>Description:</p> <p>This script is always called first for each page in the report and before exporting any object to MS Office or other format for that report.</p> <p>Even though you for example mask content of a parameter used in a dropdown to limit the user's access to specific values, you should also write a permission script taking care of the permission control, for the following reasons:</p> <ul style="list-style-type: none"> • Even though input controls are masked, hostile users may try to hack the report using a tool to post other values to the input controls. • If a report user for example has access to a specific parameter value on a certain point of time, he can save a page with the given value to one of his private folders (Viewer Presentation component). As report designer, you may want to revoke this access at some point of time. If so, the permission script will deny this user access to the previously saved page. <p>In some cases you may want to design a report using projects that are not in the report data source. This may be the case if you are continuously making new projects available to a report and do not want to modify the report and re-publish it each time. Two steps are required to achieve this:</p> <ol style="list-style-type: none"> 1. Go to the Viewer Project Permission page and grant access to projects outside data source. 2. Explicitly grant access to required projects in this script. <p>If you like to initialize or change parameter values based on other parameter values, this can also be done in this script. Alternatively use the page script for this. These two scripts are the only scripts where you are allowed to change parameter values.</p> | |
| <p>Example - Allow access to project not in datasource:</p> | |

```
// Authorizes project outside datasource  
state.AuthorizeProjectAccess("p0559090");
```

Example – Raise permission denied:

```
var unit : String = state.Parameters.GetString("p_unit");  
if(user.UserId == "someuser" && unit != "someunit")  
    HasPermission = false;
```

Example – Derive a parameter from another

```
if(state.Parameters.IsNull("p_project"))  
    state.Parameters["p_question"] = null;
```

17.4.2. Page Level Scripts

Page Level scripts comprise:

- Page Validation scripts
- Page Hide scripts

To access the Page Script functionality:

1. Right-click on the report page in the Report toolbox and select **Script** from the drop-down menu.
The Page Script page opens.

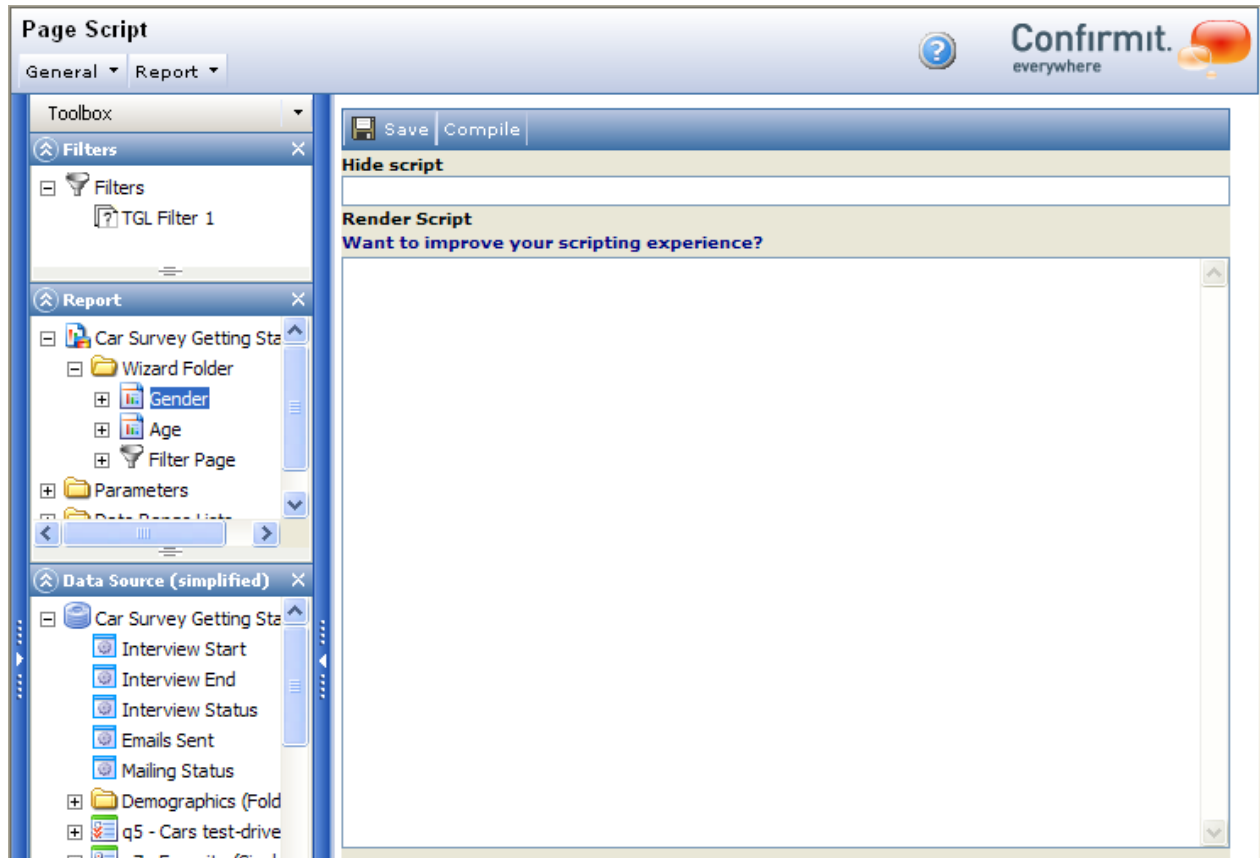


Figure 16 The Page Script page

2. Type the required script into the appropriate field, compile to test it, and save.

Note: All visual components on a page that have Hide scripts also have a Hide script in the Report Master.

17.4.2.1. Page Validation Script

| | |
|---|---|
| <p>Editor: Report Tree > Page > Script</p> | <p>Main purpose: Validate the inputs made on the page and stop users from moving to other pages if input is not valid.</p> |
| <p>Description: Some pages that you design in Reportal may sometimes have several input controls. Sometimes, it may be required to validate the combination of values in these controls. That should be done from this script. Add all validation errors into the validation error collection in the pageContext object. Then use these values from one or more Text controls to output these messages. If the validation error collection has any items, Reportal will stop any navigation away from this page.</p> | |
| <p>Example – Validate a page:</p> | |

```

if (page.IsSubmit)
{
    if (state.Parameters.IsNull("p_date_1") || state.Parameters.IsNull("p_date_2")) {
        this.pageContext.ValidationErrors.Add("Please fill both dates");
    }
    else {
        var d1 : DateTime = state.Parameters.GetDate("p_date_1");
        var d2 : DateTime = state.Parameters.GetDate("p_date_2");
        if (d2 < d1)
        {
            this.pageContext.ValidationErrors.Add("End date should after start date");
        }
    }
}
}

```

Example – Write validation error message from a Text component

```

for (var s in pageContext.ValidationErrors)
output.Append(s + "<br>");

```

17.4.2.2. Page Hide Script

You can use this functionality to hide a report page or a visual component on a page from, for example, a specific role. If the expression in the Hide Script field evaluates to TRUE, the page will be hidden.

Note: All visual components on a page that have Hide scripts also have a Hide script in the Report Master.

A possible scenario could be that you wish to selectively hide a report page based on the viewer's role. Note that you set the viewer's role in a text field under Enduser Permissions - refer to the separate Reportal User Guide for further details.

For this example assume that you have a number of end users. Some have the role of "Manager", while the others have the role of "Consultant". Assume you have created a page that you wish to be accessible only to those with the Manager role and you want to hide it from the end users with the Consultant role.

1. Right-click on the page in the Report toolbox and select **Script** from the drop-down menu.

The Page Script page opens, with the Hide Script field towards the top.

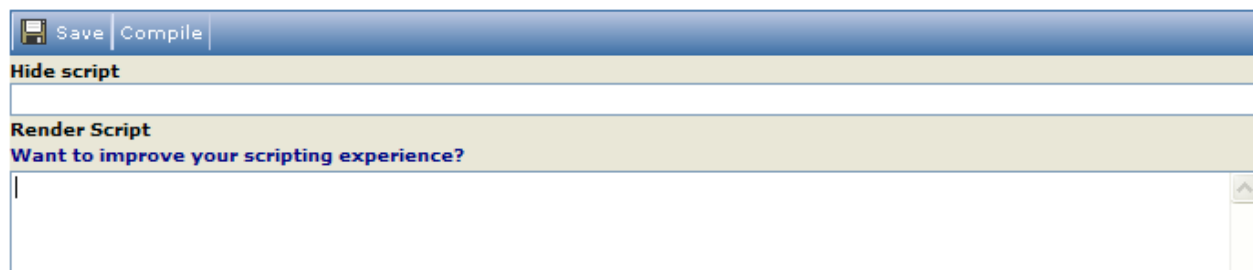


Figure 17 The Hide Script field

2. In the Hide Script field, enter the script `user.HasRole("Consultant")`.

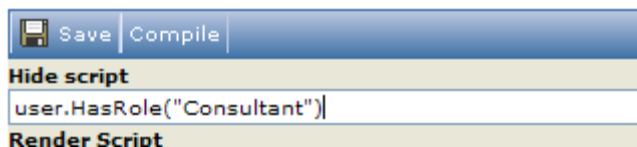


Figure 18 The script

For the managers this script will evaluate to FALSE, so they will be able to see the page. However for the consultants it will evaluate to TRUE, so the page will be hidden.

17.4.3. Parameter Scripts

Parameter scripts comprise:

- Domain script
- Mask script
- Filter Summary script

17.4.3.1. Domain Script

| | |
|--|--|
| <p>Editor: Report tree > A Parameter > Script > Domain</p> | <p>Main purpose: Load the domain for a parameter.</p> |
| <p>Description:</p> <p>Script used to build up the domain for a parameter. Without scripting, the domains for parameters are loaded different ways depending on parameter type:</p> <p>Projects - Connect the parameter to a question in a survey containing the project IDs that you want to load. Double-click the parameter to open the page where you can connect the project to a question.</p> <p>Questionnaire Elements - Manually build a hierarchical structure of questionnaire elements from the parameter designer page (double-click parameter to get there).</p> <p>Segments - Do it the same way as for questionnaire element, except that you drag segments into the tree structure.</p> <p>String Response - Connect parameter to a question the same way as for the project parameters. This makes the domain implicitly load the answer list of that question.</p> <p>If you use a domain script for a parameter, you override the default way of loading the domain. You have to do this loading explicitly from within the script.</p> <p>The advantage is that you can then load the domain differently, for example depending who the user is and what other selections the user has made for other parameters. Typically, you can do this based on the user's role or some other information from a database designer table relating user's to elements in lists.</p> | |
| <p>Projects Example:</p> <p>To tie one or more projects to a report, include a parameter to your report.</p> <ol style="list-style-type: none"> 1. Under parameter properties, select Type Project. 2. Right-click on the parameter, and select Script. 3. To include projects to your report, add the following script: <pre>var p : Project = this.confirmit.GetProject('pxxxxxxx'); parameter.Items.AddProject(p); p = this.confirmit.GetProject('pxxxxxxx'); parameter.Items.AddProject(p);</pre> 4. In the GetProject method, include the id of your project. 5. To use this parameter, include a List element in your report. 6. Drag & drop the Questionnaire Elements Example project parameter. | |

The Questionnaire Elements can be used to include questions from a project into a drop-down menu. If you have several projects in your report, you can script which questions to display depending on the project selected in the project parameter (p_project).

7. Create a new parameter and rename it for example p_questions.

8. Right-click on it and select Script, then enter the following code:

```
if(state.Parameters.IsNull("p_project"))
return;
//Checks to see if a project has been selected. If not, nothing is
returned.

var pid : String = state.Parameters.GetProjectId("p_project");
var project : Project = confirmit.GetProject(pid);
//The project selected is defined

var questions : Question[] = project.GetQuestions();
parameter.Items.AddQuestions(questions);
//The questions in the project selected are included in the parameter.
```

If you do not wish to include OpenText and MultiOpen questions in the parameter, since these will not work in Aggregated Tables, the following code can be used instead of the last line;

```
parameter.Items.AddQuestions(questions);

for(var i : int=0; i<questions.length;i++)
{
if (questions[i].QuestionType != QuestionType.OpenText &&
questions[i].QuestionType != QuestionType.MultiOpen)
parameter.Items.AddQuestions(questions[i]);
}
```

This script will iterate through the questions, and check if they are QuestionType OpenText or MultiOpen. If not, they will be added to the questions parameter.

17.4.3.2. Mask Script

| | |
|---|---|
| <p>Editor: Report tree > A Parameter > Script > Mask</p> | <p>Main purpose: Mask the domain of a parameter.</p> |
| <p>Description:</p> <p>For these types of parameters, you can add a mask script to mask the parameter domain for example based on other selections. This script is typically used when the original domain can be loaded the default way, but the list of values should be masked in some way.</p> <p>You can choose whether to use inclusive or exclusive masks, i.e. whether the keys you add to the mask are those that should be included in or excluded from the domain.</p> <p>Mask script only applies to project, segment questionnaire element and string response parameter types.</p> | |
| <p>Example – Removing a question from domain:</p> <pre>mask.Access = ParameterAccessType.Exclusive; mask.Keys.Add("q4");</pre> | |

17.4.3.3. Filter Summary Script

| | |
|---|--|
| Editor: Report tree > A > Script > Filter summary | Main purpose: Customize the filter summary label of a parameter. |
| Description: For some parameters it will make sense not to have one line in filter summary for each parameter. For example, if you use one parameter to choose which question to filter by, and another to select the filter values. In these cases you can choose to hide one of the parameters from the filter summary and customize your own label for the other one to have the filter on one line. | |
| Example – Customize filter summary for filter: <pre> if(state.Parameters.IsNotNull("p_filter_q") state.Parameters.IsNotNull("p_filter")) return; var q : QuestionnaireElement = state.Parameters["p_filter_q"]; state.LoadParameterLabel("p_filter_q"); state.LoadParameterLabel("p_filter_a"); output.Append(q.Label + "("); var first : boolean = true; for(var r : ParameterValueResponse in a) { if(first) first = false; else output.Append(", "); output.Append(r.Label); } output.Append(")"); </pre> | |

17.4.4. Component Scripts

All visual components in Reportal have a "hide" expression. If this expression evaluates to true for a component, then this component is hidden from the report viewer. Additionally some components have "render" scripts used to dynamically modify the properties for the component before the component is rendered/displayed.

Note that you can use the **CTRL+S** keyboard shortcut to save changes when writing component scripts.

17.4.4.1. Render Scripts

Render scripts can be defined for the visual component types, to set properties for the components dynamically.

17.4.4.2. Hide Expression Script

Used to dynamically hide or show visual components on a report page.

| | |
|---|--|
| Editor: Report tree > A Component > Script > Hide | Main purpose: Hide a Reportal component conditionally. All components in Reportal can include a Hide expression. |
| Description: | |

A typical Hide expression could for example check whether or not a parameter is null. If more complex logic is required, consider using a script library function to implement this logic.

Example - Checking parameter:

```
state.Parameters.GetString("p_show_hide") == "hide"
```

Example – Calling a library function

```
new ReportCommon.MyLib().DoHide(state.Parameters)
```

Note: All visual components on a page that have Hide scripts also have a Hide script in the Report Master.

17.4.4.3. Aggregated Table Script

| | |
|---|--|
| <p>Editor: Report tree > A Table > Script > Render</p> | <p>Main purpose: Dynamically change the aggregated table based on for example parameter values or user information.</p> |
| <p>Description: Use this script to dynamically add, remove or change headers for aggregated tables. If a table already has a banner or a parameter header, this script is called after the banner header is substituted with the header from within the banner and the parameter headers are substituted with a header for the current value for that parameter.</p> | |
| <p>Example – Changing numbers of decimals:</p> <pre>if(!state.Parameters.IsNull("p_table_dec") { var pv : ParameterValueResponse = state.Parameters["p_table_dec"]; table.Decimals = pv.NumericValue; }</pre> | |
| <p>Example - Adding a header:</p> <pre>var hf : HeaderFormula = new HeaderFormula(); hf.Type = FormulaType.Expression; hf.Expression = "4"; table.RowHeaders.Add(hf);</pre> | |
| <p>Example – Changing a header:</p> <pre>var hf : HeaderFormula = table.RowHeaders[0]; hf.Expression = "9";</pre> | |

Note: If you add a script to a table, caching is disabled for that table (see [Caching of Tables](#) on page 234 for more information).

17.4.4.4. Verbatim Table Script

| | |
|---|--|
| Editor: Report tree > A Table > Script > Render | Main purpose: Dynamically change the verbatim table based on for example parameter values or user information. |
| Description: Most typical use of this script would be to dynamically set the questionnaire element of the table based on a parameter, but you can also change other properties of the verbatim table. | |
| Example – Set questionnaire element: <pre>var q : QuestionnaireElement = state.Parameters["p_question"]; verbatimTable.QuestionnaireElement = q;</pre> | |
| Example – Set sorting property: <pre>verbatimTable.Sorting = VerbatimSortingType.RespondentId;</pre> | |

17.4.4.5. Chart Script

| | |
|---|---|
| Editor: Report tree > A Table > Script > Render | Main purpose: Dynamically change the chart based on parameter values or user information. |
| Description: One way of using charts scripts is to allow the report user to decide dynamically the chart type and set the chart type based on a parameter in a script. If you set up a report in which the user can choose which question is to be used in tables and possibly also add one or more questions to the column headers, you may have to implement some logic regarding the parts of a table that are to be included in the chart. | |
| Example – Setting chart type: | |

```

if(!this.state.Parameters.IsNull("p_chart_type"))
{
var ct : String = this.state.Parameters.GetString("p_chart_type");
switch(ct)
{
case "pie":
chart.Series.SeriesDefault.ChartType = ChartTypes.Pie;
chart.SeriesInRows = true;
break;
case "column":
chart.Series.SeriesDefault.ChartType = ChartTypes.Column;
break;
case "bar":
chart.Series.SeriesDefault.ChartType = ChartTypes.Bar; break;
}
}
}

```

Example – Setting part of table:

```
chart.RowHeaderMask.AddHeader("benchmark");
```

17.4.4.6. Gauge Script

| | |
|--|---|
| Editor: Report tree > A Gauge > Script > Render | Main purpose: Dynamically change the gauge based on parameter values or user information. |
| Description: In this script you can add, remove or change exactly the same values as you can modify in the gauge style designer and gauge designer. | |
| Example – Changing size of an existing circular gauge: <pre> var cg : CircularGauge = gauges.GetGauge("Gauge1"); cg.Size.Height = 50; cg.Size.Width = 50; </pre> | |

17.4.4.7. Hit List Script

| | |
|--|----------------------|
| Editor: Report tree > A Hit List > Script > Render | Main purpose: |
|--|----------------------|

| | |
|---|--|
| | Dynamically change the Hit List based on for example parameter values or user information. |
| <p>Description:</p> <p>In this script you can add, remove or change columns of the Hit List, and you can change the properties of the Hit List itself.</p> | |
| <p>Example – Adding a column:</p> <pre>var column : HitListColumn = new HitListColumn(); column.QuestionnaireElement = state.Parameters["p_question"]; hitlist.Columns.Add(column);</pre> | |

17.4.4.8. Text Script

| | |
|---|--|
| <p>Editor:</p> <p>Report tree > A Table > Script > Render</p> | <p>Main purpose:</p> <p>Dynamically set the text of a Text component based for example on parameter values or user information.</p> |
| <p>Description:</p> <p>If a Text component has a script, any text set in the property sheet of the component will be overwritten. If your report is multilingual, you must also check the current language of the report to add the proper texts. One workaround for this may be to add your dynamic texts to an answer list in a multilingual survey and get the texts by using the project.GetQuestion() and question.GetAnswer methods.</p> | |
| <p>Example – Add some text:</p> <pre>if(report.CurrentLanguage == 9) text.Output.Append("XXX"); else if(report.CurrentLanguage == 20) text.Output.Append("YYY");</pre> | |
| <p>Example – Add some text based on an answer text:</p> <pre>var p : Project = report.DataSource.GetProject("ds0"); var q : Question = p.GetQuestion("q_text"); var t : Answer = q.GetAnswer("text1"); text.Output.Append(t.Text);</pre> | |

17.4.5. Filter Scripts

| | |
|---|---|
| <p>Editor: Filter tree > Insert a filter script > Script</p> | <p>Main purpose: Dynamically create a filter expression.</p> |
| <p>Description: Build your filter expression dynamically based on parameter values. Expression syntax is the same as for regular filter expressions.</p> | |
| <p>Example – Setting filter expression:</p> <pre>filter.Expression = "gender = \"male\"";</pre> | |

17.5. Validation

To avoid publishing reports that contain errors, Reportal has built-in features to verify that no scripts contain syntax errors.

On preview and compilation of a report, if script errors are found, an error frame will appear showing a list of the errors. The list contains links that lead to the page where the error is located. There is also a Debugging tab in the frame which will contain a list of any debugging errors found during preview.

1. To access the Validation functionality without publishing the report, go to the **Report > Quality Control > Validate Report** menu command or enter an element containing a script and choose **Compile** from the menu.

Reportal will start to run through the script(s) checking the code. A new pane opens in the lower-right part of the window, displaying the message "Please wait, loading list...". Once the checking process is finished, any errors discovered will be displayed in the pane.

The Question ID column displays the question ID or the script ID where the error is located. The Error column provides a short summary of the error type.

2. Click the error link to open the erroneous script, in the frame above the error pane.

Any errors are stored from when a report is published to the next time it is published, and from preview to preview. This applies to both Runtime and Validation errors.

You can at any time view a list of any errors that may have been discovered. Go to the **Report > Quality Control** menu command and select **Validation Errors**, **Runtime Errors** or **Debug Errors** as appropriate. Note that these are three tabs on the same page, so you can easily switch from one to the other.

18. Testing Survey Scripts

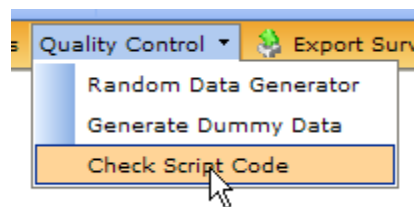
All scripts should be carefully tested before setting a survey live. Forsta provides a few helpful tools to use when testing scripts.

18.1. Testing in Professional Authoring

The following sections provide some guidelines for testing in Professional Authoring. For further information, refer to the separate Survey Designer user guide.

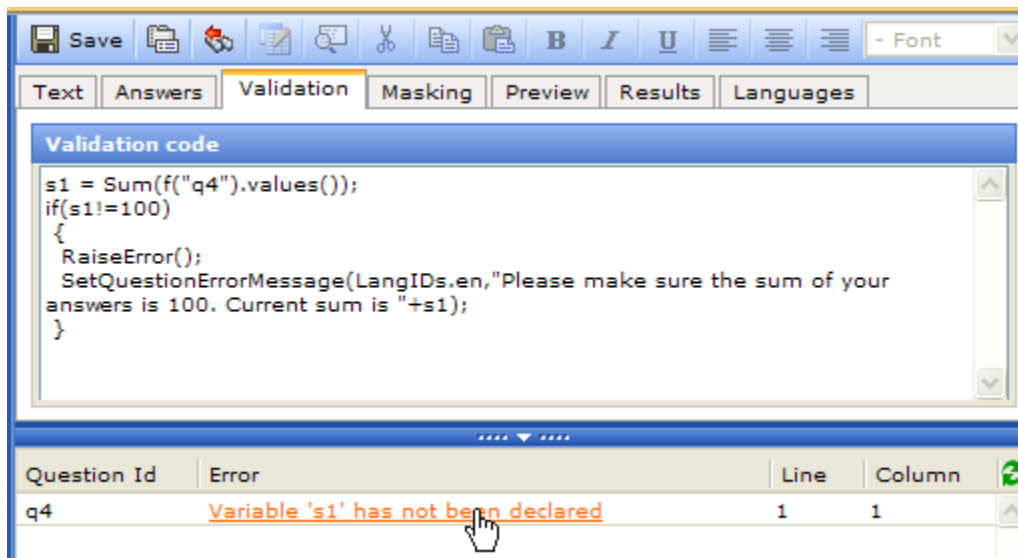
18.1.1. Check Script Code

In Professional Authoring, use the Check Script Code functionality to check for syntax errors in your script code. A check is also performed automatically when you launch the survey in test or production mode, but using this functionality gives you a faster way of checking the syntax because you do not have to generate the database and interview files.



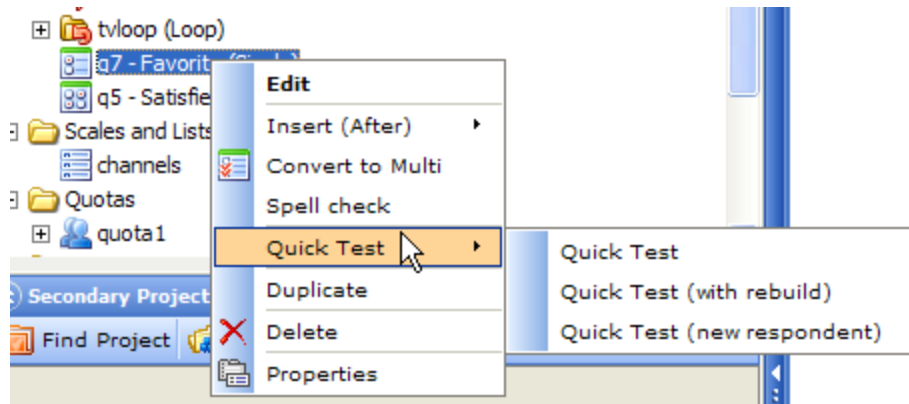
Typical syntax errors that may be found using the script checker are referencing undeclared variables and functions, brackets that do not match - [], { } or () - and similar.

The errors found will be listed at the bottom of the screen, and by clicking each error you can open the script node, question or condition containing the error.



18.1.2. Manual Testing

Professional Authoring offers two ways of manually testing the surveys. The first of these, Quick Test, allows you to open the survey within Professional Authoring at the question you select.



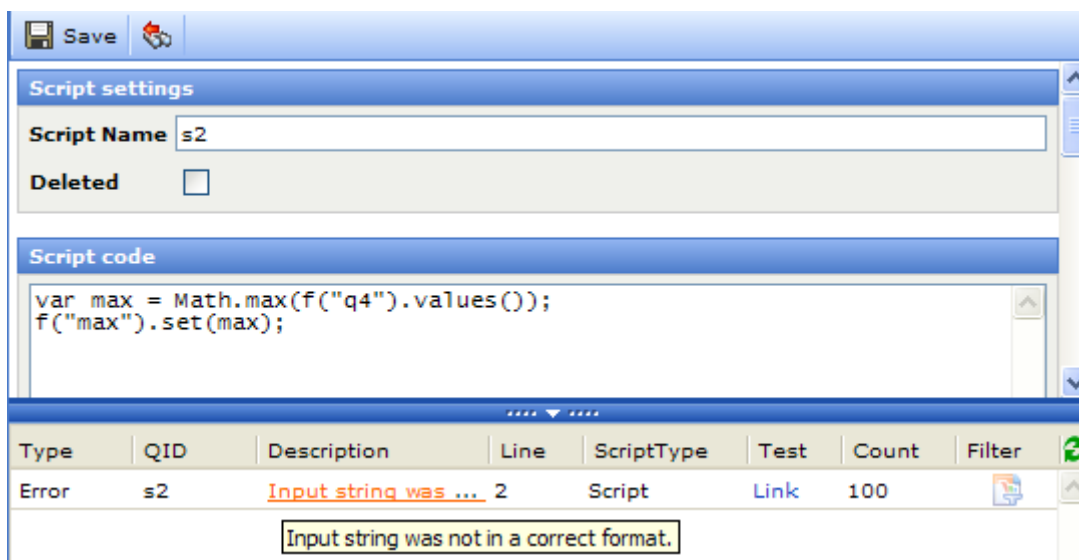
"Quick Test" compiles the survey code and runs it locally on your PC without writing data back to a database. Data is just kept in the current session. To recompile after making changes, choose the "with rebuild" option. "New respondent" removes the data kept in the session so that you will restart on a blank survey. Quick test is perfect to use when debugging scripts because the fact that it does not generate a database makes it fast. This means you can make small changes to a script and test them immediately with Quick Test (with rebuild).

If you need the test responses to be stored in a database, you can launch the survey in test mode and run the test interview. Refer to the separate Professional Authoring user guide for further details.

18.1.3. Random Data Generator

You may have scripts that are syntactically correct, but which will fail run-time. For example, this could be non-existing question ids as parameter in the f function or trying to set a string value in a numeric question. Often these errors happen only for certain combinations of answers. To be able to test out as many combinations as possible, you can use the Random Data Generator functionality. This is a Forsta add-on. If you do not have access to this functionality, please contact your Forsta account manager for more information.)

The Random Data Generator lets you run a number of automated test interviews with randomly selected responses. All script code in script nodes, masks, conditions, validation code and response piping will be executed, and any script errors will be recorded and listed for inspection at the end of the RDG run.



The list of errors from the random data generator is clickable, and clicking on the description will open the script, question or info where the error appeared.

In the example above, the problem is that the input to the `Math.max` method is not a list of numbers. In the code above that method returns `NaN` (not a number), which makes the script fail when attempting to set the question `max`, which has the numeric property. A better solution would be to use the Forsta `Max` function (see [Max and Min](#) on page 77 for more information), which automatically converts the values to numbers before finding the maximum.

To help debugging you can use the results tab on the questions to see top line results for each question. It is also possible to filter these results so that you see the results only for those that got a particular error by clicking the filter icon in the rightmost column. You can also click the link in the "Test" column to access the first interview that experienced the error.

18.1.4. Tips for Debugging

This section contains a few tips to assist you while debugging problem code.

18.1.4.1. *Response.Write*

It can sometimes be difficult to find out why a script is failing. In these cases it can help to use the `Response.Write()` method to output some variables to the screen. For example, in the script above which failed when trying to set the `max` question, we could comment out the last line and instead output the `max` variable to screen:

```
var max = Math.max(f("q4").values());
Response.Write("Max="+max);
//f("max").set(max);
```

The text from the `Response.Write` call will appear at the top of the page before any interview HTML. The result from the script above will look something like this:



If an error appears inside of a loop statement, it often helps to use `Response.Write` to help identify in which iteration the script fails:

```
for(var i : int = 0; i < codes.length; i++)
{
  Response.Write("i = "+i+"<br>");
  < ... >
}
```

Other tricks to simplify debugging is to use `/*` and `*/` to comment out part of the code to help identify exactly where the error occurs. This can be done as a "binary search": First you comment out ½ of the code in a script. If the error still occurs, you know that it is in the other half. Then you can comment out half of that section – and so on.

It can also be very helpful to use Top line reporting or the "results" tab on a question, the "Edit" functionality under "Survey Data" or doing a data export of the responses with "error" status to look into what answers actually are stored in the question(s) involved in the script code.

18.2. Testing in Survey Designer

You can test your survey without having to generate a database, allowing you to perform manual tests while avoiding time-consuming database generations.

The Test survey button and menu

Click the **Test survey** button in the toolbar to start the test at the beginning of the survey. Once the test system is running you can jump to any question by clicking on the desired question or node in the Survey pane. Click the **Test survey** down-arrow to open a menu of options.

- **Test - new respondent** - this mode clears any answers you may already have added to the survey in previous tests, and runs the survey.
- **Test - same respondent** - if you have already run a test and then perhaps made some changes to a question, using this test mode means any answers you have already added to the survey are remembered. You will then be able to move quickly through the survey to the question you wish to view, without having to add all the answers again.
- **Generate external test** - an externally accessible test link to the survey is generated, and you can then make this link available to people who do not have a Forsta User login.
- **View warnings and errors** - in the event errors are found when the test is run, these will be listed on the Warnings and Errors page until the errors are rectified. Select this option to view the list, and click on an error in the list to go to the question containing the error.

When you select **Test - new respondent** or **Test - same respondent**, the survey loads and opens at the first question in the main area of the screen as the respondent would see it. Note that the Survey pane changes color to pale blue to indicate you are in the Test mode.

Note also that the system will remember which test mode you last used for this survey. If you wish to use the other mode then you must change the mode using the drop-down menu.

Testing only a specific question

If you wish to test only a specific question, in the Survey pane move the pointer over the desired item and click its overflow icon to open the drop-down menu. The **Test with new respondent** and **Test with same respondent** options open the test functionality at the selected question. Once the test functionality is running, you can move through the survey as a respondent will be able to.

Testing for different modes

In the event you have selected more than one rendering mode in the **Overview > Settings** area, you can change the display mode for the survey test. You can then see how the survey will look to respondents using the various modes you have selected. To change the mode, in the Test area toolbar click the **Mode** button to open the drop-down menu, then select the desired display mode.

Testing for different languages

If your survey is multilingual, then you can select which language you run the test in. To change the language, in the Test area toolbar click the **Language** button to open a drop-down menu of the languages available, then select the desired language.

Additional Options

A number of additional options are available while testing - in the Test area toolbar click the **Options** icon to open a drop-down menu. Here you can select whether you wish to view background questions, panel questions and/or hidden questions while you are testing. Note that these settings only apply whilst you are in the test mode; they will not have any effect on the production survey. Your selections will be remembered and applied whenever this survey is in Test mode.

For further information, refer to the separate Survey Designer user guide.

19. Programming Conventions

Programming conventions are important to programmers because they make scripts easier to read and understand. Writing scripts that are easy to understand will make searching for errors easier, and will make it easier to re-use scripts. If programmers agree on a common way of writing scripts, it will be much easier to read the scripts of other programmers. Even the programmer that originally wrote a script may have problems understanding his or her own code after a few months unless it is written and commented in a way that makes it easy to read.

19.1. Comments

It is recommended to make extensive use of comments in your scripts. They will help you and others to more quickly understand the way your code works and how to use it (see Comments on page 15 for more information).

19.2. Naming Conventions

When naming variables and functions, always try to use as descriptive names as possible. If an array holds the codes from a question, call it something like codes or q1Codes or similar, not just e.g. a. Similarly, a function that copies a multi question should be called something like CopyMulti, not f1. There is no point in making short names in JScript .NET.

A variable name must start with a lower or upper case letter or underscore, and continue with letters, digits or underscore. However, it is recommended to follow the following naming conventions:

- variable names and names of methods and properties should start with a lowercase letter in the first word. The next words should open with an uppercase letter. Examples: gridCodes, availableCodes, randomNumber, indexOuterLoop.
- function names and names of objects should start with an uppercase in the first word, and have uppercase letters in the beginning of all subsequent words. Examples: CopyMulti, SelectItems, CalculateAverage.

19.3. Spaces and Line Breaks

Except from within string expressions, you can use line breaks and spaces as much as you like when writing JScript .NET code. Use these to make your code easier to read. Add spaces between different parts of your scripts, and use line breaks in if-then-else constructs and loops to make it easier to understand the routing in your scripts.

```
while (condition)
{
    <statements>
    if(condition)
    {
        <statements>    }
    else
    {
        <statements>
    }
    <statements> }
```

With a structure like this it is easier to see where the then- and else-branch of the if-condition ends, and which statements belong to the various parts.

19.4. Curly Brackets

It is recommended that you always use the curly brackets ({ and }) in the if, switch, while, do while, for and function statements. If you have just one statement inside the curly brackets, they are optional, but it is recommended that you make it a rule to always use them, limiting the possibility of making mistakes.

Example:

```
if(condition)
    <statement1>;
```

is the same as

```
if (condition)
{
  <statement1>;
}
```

so you may find it convenient to drop the curly brackets. But you may soon need to add another statement. If you add it like this:

```
if (condition)
  <statement1>;
  <statement2>;
```

or

```
if (condition)
  <statement1>; <statement2>;
```

it will be equivalent to

```
if (condition)
{
  <statement1>;
}
<statement2>;
```

This will be very different from

```
if (condition)
{
  <statement1>;
  <statement2>;
}
```

19.5. Semi Colon

Statements are separated with semi colon (;) in JScript .NET. However, if you have line breaks between the statements, the semi colon is not required. However, it is recommended to always use it anyway, in case a line break is removed. You may have observed that all examples in this documentation use semi colons between the statements.

However, when working with the if, switch, while, do while, for and function statements you have to be careful with the semi colon. For example, remember that the while statement includes the statements within the curly brackets. If you place a semicolon just after the condition, like this:

```
while (condition); { <statements> }
```

you will actually end up with a loop that never terminates. The semicolon will be interpreted as the end of an empty statement. It will be this empty statement that will be executed until the condition is false, not the statements within the curly brackets. The code that executes will be similar to this:

```
while (condition) { }<statements>
```

The condition is likely never to return false, since no statements are executed. This means that the loop will never terminate. This will cause a time-out for the respondent. But notice that there are no syntactical errors in the script, so you will not receive any error message on the script as such.

19.6. The Step by Step Approach

It is possible to do a lot of operations in one long statement. However, this makes the scripts hard to read.

Compare for example the following code, which randomly picks one of the codes in an array codes,

```
selectedCode = codes[Math.floor(Math.random()*codes.length)];
```

with this code:

```
randomNumber = Math.random()*codes.length;
randomIndex = Math.floor(randomNumber);
selectedCode = codes[randomIndex];
```

The first code will be a bit more efficient than the latter, because you do not have to store values in the variables `randomNumber` and `randomIndex`. However, because it will be much easier to understand what happens in the last one, that approach is recommended.

To increase readability, use temporary variables and do the calculations step by step.

19.7. Writing Efficient Code

Below are a few tips on how to write code that is efficient:

- Define types on your variables, constants and functions when possible.
- Always make sure that the script does not run through unnecessary iterations in a loop, or unnecessary statements in an iteration. Use `break` or `continue` to terminate or skip to the next iteration.
- If you need to call the `f` function for the same question more than once in a script, store it in a variable and refer to that variable instead.
- Avoid using calls to user-defined functions in code masks. Set a hidden multi question instead and refer to it with the `f` function.
- Use methods of the form objects like `domainValues` and `categories` when possible instead of hard coding codes(1,2,3,...) in your scripts.
- Use short-circuiting evaluations in expressions involving logical and (`&&`) and or (`||`): Place conditions most likely to be `true` first for the logical or (`||`) operator, and conditions most likely to be `false` first for the logical and operator (`&&`).
- Only use local variables in functions (use the `var` keyword).

20. Differences between JavaScript and JScript

There are a number of areas within Forsta where JavaScript can be used instead of JScript.Net. This chapter lists the differences between the two scripts and provides examples of usage.

A survey-level setting must be enabled to allow use of the JavaScript engine. The setting is located on the **Survey Settings > General Options** tab. When this setting is enabled JavaScript can operate in all channels (CAWI, CAPI, CATI, Self-completion/AskMe App). When the JavaScript engine is enabled, all script input areas (script nodes, masking, validation etc...) display a text box stating that the JavaScript engine is in use.

Note: For Offline Apps (CAPI, AskMe, the JavaScript engine MUST be used.

Note: Try-catch blocks must not be used in JavaScripts as errors will then be created.

20.1. Syntax and Behavior Differences

| JScript.NET code example | JavaScript code example | Comments |
|---|--|---|
| <pre>DeviceType.toString() == "Desktop" DeviceType == "Desktop"</pre> | <pre>DeviceType.toString() == "1" DeviceType == "Desktop"</pre> | toString() for enums returns it's integer value, not name. |
| <pre>f('q1').values().toString() == "1, 2" ^f('q1').values()^ returns "1,2"</pre> | <pre>f('q1').values().toString() == "System.Object[]" ^f('q1').values()^ returns "System.Object[]"</pre> | SurveyArrayList no longer exists, so standard .NET array is used. String representation of standard .NET types cannot be changed. |
| <pre>f('q1')['1'] f('q1')('1') f('q1').get_Item('1') Request.Form['q1'] Request.QueryString["test"] UserParameters[paramName]</pre> | <pre>f('q1').item(1) f('q1').item(1) f('q1').item(1) Request.Form.item('q1') Request.QueryString.item('test') UserParameters.item(paramName)</pre> | item() instead of .NET indexer []. |
| <pre>var h = new Hashtable() DateTime.Now HttpContext.Current.Response</pre> | N/A | .NET CLR types not supported. |
| <pre>var o : Date = new Date() function ImagenesURL():String { return " }</pre> | <pre>var o = new Date() function ImagenesURL() { return " }</pre> | No strict types declaration. |
| <pre>var s = new Set() var s = new SurveyArrayList() var h = new Hashtable()</pre> | <pre>var s = set() var s = [] var h = {}</pre> | |

| | Jscript.NET | JavaScript | Comments |
|---------------------|---|--------------------------|--|
| Catching exceptions | try { f('invalid-question-id') } catch { } | f('invalid-question-id') | JavaScript engine invocation exception cannot be caught. |

Differences between Jscript.Net code and JavaScript code for Offline Mobile Apps (CAPI, AskMe):

| | Jscript.NET code | JavaScript code | Comments |
|---------------------------------------|--|--|---|
| Referencing a COMPOUND question code: | f('Q1')['2'] == '1' f('Q1')['2'].set('1') | f('Q1').item('2') == '1' f('Q1').item('2').set('1') | Differences: item() instead of .NET indexer [] |
| Numeric lists and use of .values() | SUM(f('Q1')) SUM(f('Q1').values()) | SUM(f('Q1').values()) | Differences: .values() now required |
| Creating a set object | var s = new Set() | var s = set() | |
| Creating an array | var a = new Array(1,2,3,9,10); | var a = ['1','2','3','9','10']; | |

20.2. Usercode API Function Declaration Changes

The following sections list the usercode AIP Function Declaration changes.

20.2.1. Standard Code

Difference table

Note: Any methods and properties not listed here are the same for both scripts.

| JScript.NET function | JavaScript function |
|---|---|
| GetCatiRespondentUrl(String questionId, params string[] @params) | GetCatiRespondentUrl(String questionId) GetCatiRespondentUrl(String questionId, string[] @params) |
| GetRespondentUrl(String questionId, params String[] params) | GetRespondentUrl(String id) GetRespondentUrl(String id, Boolean isCallBlock, String userParameter, String[] params) |
| UserParameters[paramName] | UserParameters.item(paramName) |
| SetPanelistCredit(Int32 credit, String comment, String sectionId) | SetPanelistCreditBySectionId(Int32 credit, String comment, String sectionId) |
| SetPanelistCredit(Int32 credit, String comment, Int32 panelistId) | SetPanelistCreditByPanelistId(Int32 credit, String comment, Int32 panelistId) |
| SetPanelistCreditWithCustomVariables(Int32 credit, String comment, String sectionId, String[] fieldNames, String[] fieldValues) | SetPanelistCreditWithCustomVariablesBySectionId(Int32 credit, String comment, String sectionId, String[] fieldNames, String[] fieldValues) |
| SetPanelistCreditWithCustomVariables(Int32 credit, String comment, Int32 panelistId, String[] fieldNames, String[] fieldValues) | SetPanelistCreditWithCustomVariablesByPanelistId(Int32 credit, String comment, Int32 panelistId, String[] fieldNames, String[] fieldValues) |
| N/A | Cookies |
| N/A | CreateCookieObject(String name, String value) |

| | |
|---|-----|
| IsNet(object quadIP, object quadNet, object quadMask) | N/A |
|---|-----|

20.2.2. ExprObj

Difference table:

| JScript.NET example | JavaScript example |
|---------------------|--------------------|
| exprObj["q1"] | exprObj.item("q1") |

20.2.3. Set

Difference table:

| JScript.NET example | JavaScript example |
|---------------------|--------------------|
| setObj["2"] | setObj.item("2") |

20.2.4. Request

Note: Request is only supported for online interviewing; it is not available in off-line interviewing.

| JScript.NET function | JavaScript function |
|-------------------------------------|---|
| Int32 ContentLength | Int32 ContentLength |
| String ContentType | String ContentType |
| NameValueCollection Form | JavascriptNameValueCollection Form |
| NameValueCollection Headers | JavascriptNameValueCollection Headers |
| NameValueCollection Params | JavascriptNameValueCollection Params |
| String Path | String Path |
| String PhysicalPath | String PhysicalPath |
| NameValueCollection QueryString | JavascriptNameValueCollection QueryString |
| NameValueCollection ServerVariables | JavascriptNameValueCollection ServerVariables |
| Uri Url | Uri Url |
| String UserAgent | String UserAgent |
| index[key] | item(key) |
| Void ValidateInput() | Void ValidateInput() |

| | |
|---|-----|
| Void Abort() Byte[] BinaryRead(Int32 count) String[] AcceptTypes String AnonymousID String ApplicationPath String AppRelativeCurrentExecutionFilePath HttpClientCertificate ClientCertificate Encoding ContentEncoding HttpCookieCollection Cookies String CurrentExecutionFilePath String CurrentExecutionFilePathExtension String FilePath HttpFileCollection Files Stream Filter ChannelBinding HttpChannelBinding String HttpMethod Stream InputStream Boolean IsAuthenticated Boolean IsLocal Boolean IsSecureConnection String Item WindowsIdentity LogonUserIdentity String PathInfo String PhysicalApplicationPath String RawUrl ReadEntityBodyMode ReadEntityBodyMode RequestContext RequestContext String RequestType CancellationToken TimedOutToken Int32 TotalBytes UnvalidatedRequestValues Unvalidated Uri UriReferrer String UserHostAddress String UserHostName String[] UserLanguages Stream GetBufferedInputStream() Stream GetBufferlessInputStream() Stream GetBufferlessInputStream(Boolean disableMaxRequestLength) Void InsertEntityBody() Void InsertEntityBody(Byte[] buffer, Int32 offset, Int32 count) Int32[] MapImageCoordinates(String imageFieldName) String MapPath(String virtualPath) String MapPath(String virtualPath, String baseVirtualDir, Boolean allowCrossAppMapping) Double[] MapRawImageCoordinates(String imageFieldName) Void SaveAs(String filename, Boolean includeHeaders) String ToString() | N/A |
|---|-----|

Note: For Request.Cookies use the new Cookies object instead.

20.2.5. Response

Note: Response is only supported for online interviewing; it is not available in off-line interviewing.

| JScript.NET function | JavaScript function |
|---|--|
| Void Clear() | Void Clear() |
| Void Close() | Void Close() |
| Void End() | Void End() |
| Int32 Expires | Int32 Expires |
| NameValueCollection Headers | JavascriptNameValueCollection Headers |
| String Status | String Status |
| Void Redirect(String url) | Void Redirect(String url) |
| Void Redirect(String url, Boolean endResponse) | Void Redirect(String url, Boolean endResponse) |
| Void Write(Object obj) | Void Write(Object obj) |
| Void Write(Char[] buffer, Int32 index, Int32 count) | Void Write(Char[] buffer, Int32 index, Int32 count) |

| | |
|---|-----|
| Void AddCacheDependency(CacheDependency[] dependencies) Void AddCacheItemDependencies(ArrayList cacheKeys) Void AddCacheItemDependencies(String[] cacheKeys) Void AddCacheItemDependency(String cacheKey) Void AddFileDependencies(ArrayList filenames) Void AddFileDependencies(String[] filenames) Void AddFileDependency(String filename) Void AddHeader(String name, String value) ISubscriptionToken AddOnSendingHeaders(Action`1 callback) Void AppendCookie(HttpCookie cookie) Void AppendHeader(String name, String value) Void AppendToLog(String param) String ApplyAppPathModifier(String virtualPath) IAsyncResult BeginFlush(AsyncCallback callback, Object state) Void BinaryWrite(Byte[] buffer) Void ClearContent() Void ClearHeaders() Void DisableKernelCache() Void DisableUserCache() Void End() Void EndFlush(IAsyncResult asyncResult) Void Flush() Boolean Buffer Boolean BufferOutput HttpCachePolicy Cache String CacheControl String Charset CancellationToken ClientDisconnectedToken Encoding ContentEncoding String ContentType HttpCookieCollection Cookies DateTime ExpiresAbsolute Stream Filter Encoding HeaderEncoding Boolean HeadersWritten Boolean IsClientConnected Boolean IsRequestBeingRedirected TextWriter Output Stream OutputStream String RedirectLocation Int32 StatusCode String StatusDescription Int32 SubStatusCode Boolean SupportsAsyncFlush Boolean SuppressContent Boolean SuppressDefaultCacheControlHeader Boolean SuppressFormsAuthenticationRedirect Boolean TrySkipIsCustomErrors Void Pics(String value) Void RedirectPermanent(String url) Void RedirectPermanent(String url, Boolean endResponse) Void RedirectToRoute(Object routeValues) Void RedirectToRoute(String routeName) Void RedirectToRoute(RouteValueDictionary routeValues) Void RedirectToRoute(String routeName, Object routeValues) Void RedirectToRoute(String routeName, RouteValueDictionary routeValues) Void RedirectToRoutePermanent(Object routeValues) Void RedirectToRoutePermanent(String routeName) Void RedirectToRoutePermanent(RouteValueDictionary routeValues) | N/A |
|---|-----|

| | |
|--|--|
| Void RedirectToRoutePermanent(String routeName, Object routeValues) Void RedirectToRoutePermanent(String routeName, RouteValueDictionary routeValues) Void RemoveOutputCacheItem(String path) Void RemoveOutputCacheItem(String path, String providerName) Void SetCookie(HttpCookie cookie) String ToString() Void TransmitFile(String filename) Void TransmitFile(String filename, Int64 offset, Int64 length) Void WriteFile(String filename) Void WriteFile(String filename, Boolean readIntoMemory) Void WriteFile(String filename, Int64 offset, Int64 size) Void WriteFile(IntPtr fileHandle, Int64 offset, Int64 size) Void WriteSubstitution(HttpResponseSubstitutionCallback callback) | |
|--|--|

20.2.6. Server

| JScript.NET function | JavaScript function |
|-----------------------------|----------------------|
| String HtmlDecode(String s) | String |
| String HtmlEncode(String s) | HtmlDecode(String s) |
| String UriDecode(String s) | String |
| String UriEncode(String s) | HtmlEncode(String s) |
| | String |
| | UriDecode(String s) |
| | String |
| | UriEncode(String s) |

| | |
|---|-----|
| Void ClearError() Object CreateObject(String progID) Object CreateObject(Type type) Object CreateObjectFromClsid(String clsid) Void Execute(String path) Void Execute(String path, TextWriter writer) Void Execute(String path, Boolean preserveForm) Void Execute(String path, TextWriter writer, Boolean preserveForm) Void Execute(IHttpHandler handler, TextWriter writer, Boolean preserveForm) String MachineName Int32 ScriptTimeout Exception GetLastError() Void HtmlDecode(String s, TextWriter output) Void HtmlEncode(String s, TextWriter output) String MapPath(String path) String ToString() Void Transfer(String path) Void Transfer(String path, Boolean preserveForm) Void Transfer(IHttpHandler handler, Boolean preserveForm) Void TransferRequest(String path) Void TransferRequest(String path, Boolean preserveForm) Void TransferRequest(String path, Boolean preserveForm, String method, NameValueCollection headers) Void TransferRequest(String path, Boolean preserveForm, String method, NameValueCollection headers, Boolean preserveUser) Void UriDecode(String s, TextWriter output) Void UriEncode(String s, TextWriter output) String UriPathEncode(String s) Byte[] UriTokenDecode(String input) String UriTokenEncode(Byte[] input) | N/A |
|---|-----|

20.2.7. NameValueCollection

| JScript.NET function | JavaScript function |
|--|--|
| Void Add(NameValueCollection collection) Void Add(String name, String value) Void Clear() String Get(String name) String[] AllKeys String[] GetValues(String name) Boolean HasKeys() String index[name] Void Remove(String name) Void Set(String name, String value) | Void Add(NameValueCollection collection) Void Add(String name, String value) Void Clear() String Get(String name) String[] AllKeys String[] GetValues(String name) Boolean HasKeys() String index[name] Void Remove(String name) Void Set(String name, String value) |
| Void CopyTo(Array dest, Int32 index) String Get(Int32 index) Int32 Count String index[int key] KeysCollection Keys IEnumerator GetEnumerator() String GetKey(Int32 index) String[] GetValues(Int32 index) Void Set(String name, String value) String ToString() | N/A |

Note: NameValueCollection may be used in RequestForm, UserParameters, Request.Form, Request.QueryString, Request.ServerVariables.

20.2.8. Browser

Note: Browser is only supported for online interviewing; it is not available in off-line interviewing.

| JScript.NET function | JavaScript function |
|---------------------------------------|---------------------------------------|
| Boolean Beta | Boolean Beta |
| String Browser | String Browser |
| String Id | String Id |
| String InputType | String InputType |
| Boolean IsMobileDevice | Boolean IsMobileDevice |
| Boolean JavaScript | Boolean JavaScript |
| Boolean Tables | Boolean Tables |
| String Type | String Type |
| Boolean VBScript | Boolean VBScript |
| String Version | String Version |
| Boolean IsBrowser(String browserName) | Boolean IsBrowser(String browserName) |
| String index[String key] | String item(String key) |

| | |
|--|-----|
| Void AddBrowser(String browserName) HtmlTextWriter CreateHtmlTextWriter(TextWriter w) Void DisableOptimizedCacheKey() Boolean ActiveXControls IDictionary Adapters Boolean AOL Boolean BackgroundSounds ArrayList Browsers Boolean CanCombineFormsInDeck Boolean CanInitiateVoiceCall Boolean CanRenderAfterInputOrSelectElement Boolean CanRenderEmptySelects Boolean CanRenderInputAndSelectElementsTogether Boolean CanRenderMixedSelects Boolean CanRenderOneeventAndPrevElementsTogether Boolean CanRenderPostBackCards Boolean CanRenderSetvarZeroWithMultiSelectionList Boolean CanSendMail IDictionary Capabilities Boolean CDF Version ClrVersion Boolean Cookies Boolean Crawler Int32 DefaultSubmitButtonLimit Version EcmaScriptVersion Boolean Frames Int32 GatewayMajorVersion Double GatewayMinorVersion String GatewayVersion Boolean HasBackButton Boolean HidesRightAlignedMultiselectScrollbars String HtmlTextWriter Boolean IsColor Boolean JavaApplets Version JScriptVersion Int32 MajorVersion Int32 MaximumHrefLength Int32 MaximumRenderedPageSize Int32 MaximumSoftkeyLabelLength Double MinorVersion String MinorVersionString String MobileDeviceManufacturer String MobileDeviceModel Version MSDomVersion Int32 NumberOfSoftkeys String Platform String PreferredImageMime String PreferredRenderingMime String PreferredRenderingType String PreferredRequestEncoding String PreferredResponseEncoding Boolean RendersBreakBeforeWmlSelectAndInput Boolean RendersBreaksAfterHtmlLists Boolean RendersBreaksAfterWmlAnchor Boolean RendersBreaksAfterWmlInput Boolean RendersWmlDoAcceptsInline Boolean RendersWmlSelectsAsMenuCards String RequiredMetaTagNameValue Boolean RequiresAttributeColonSubstitution Boolean RequiresContentTypeMetaTag Boolean RequiresControlStateInSession Boolean RequiresDBCSCCharacter | N/A |
|--|-----|

| | |
|--|--|
| Boolean RequiresHtmlAdaptiveErrorReporting Boolean RequiresLeadingPageBreak Boolean RequiresNoBreakInFormatting Boolean RequiresOutputOptimization Boolean RequiresPhoneNumbersAsPlainText Boolean RequiresSpecialViewStateEncoding Boolean RequiresUniqueFilePathSuffix Boolean RequiresUniqueHtmlCheckboxNames Boolean RequiresUniqueHtmlInputNames Boolean RequiresUrlEncodedPostfieldValues Int32 ScreenBitDepth Int32 ScreenCharactersHeight Int32 ScreenCharactersWidth Int32 ScreenPixelsHeight Int32 ScreenPixelsWidth Boolean SupportsAccesskeyAttribute Boolean SupportsBodyColor Boolean SupportsBold Boolean SupportsCacheControlMetaTag Boolean SupportsCallback Boolean SupportsCss Boolean SupportsDivAlign Boolean SupportsDivNoWrap Boolean SupportsEmptyStringInCookieValue Boolean SupportsFontColor Boolean SupportsFontName Boolean SupportsFontSize Boolean SupportsImageSubmit Boolean SupportsIModeSymbols Boolean SupportsInputIStyle Boolean SupportsInputMode Boolean SupportsItalic Boolean SupportsJPhoneMultiMediaAttributes Boolean SupportsJPhoneSymbols Boolean SupportsQueryStringInFormAction Boolean SupportsRedirectWithCookie Boolean SupportsSelectMultiple Boolean SupportsUncheck Boolean SupportsXmlHttp Type TagWriter Boolean UseOptimizedCacheKey Version W3CDomVersion Boolean Win16 Boolean Win32 Version[] GetClrVersions() String ToString() | |
|--|--|

20.2.9. JavaScriptScriptingExtensionPoint

| JScript.NET function | JavaScript function |
|--|--|
| IScriptCallResultCollection GetRequest(string method); | JavascriptCallResultCollection GetRequest(string method) |
| IScriptCallResultCollection GetRequest(string method, int timeoutInMillisecond); | JavascriptCallResultCollection GetRequest(string method, int timeoutInMillisecond) |

| | |
|---|--|
| IScriptCallResultCollection GetRequest(string method, IDictionary parameters); | JavascriptCallResultCollection GetRequest(string method, JavascriptObject parameters) |
| IScriptCallResultCollection GetRequest(string method, IDictionary parameters, int timeoutInMillisecond); | JavascriptCallResultCollection GetRequest(string method, JavascriptObject parameters, int timeoutInMillisecond) |
| IScriptCallResultCollection PostRequest(string method); | JavascriptCallResultCollection PostRequest(string method) |
| IScriptCallResultCollection PostRequest(string method, int timeoutInMillisecond); | JavascriptCallResultCollection PostRequest(string method, int timeoutInMillisecond) |
| IScriptCallResultCollection PostRequest(string method, IDictionary parameters); | JavascriptCallResultCollection PostRequest(string method, JavascriptObject parameters) |
| IScriptCallResultCollection PostRequest(string method, IDictionary parameters, int timeoutInMillisecond); | JavascriptCallResultCollection PostRequest(string method, JavascriptObject parameters, int timeoutInMillisecond) |

20.2.10. JavaScriptCallResultCollection

| JScript.NET function | JavaScript function |
|--|--|
| string this[string key] { get; } | string item(string key) |
| Dictionary<string, string>.KeyCollection Keys { get; } | string[] Keys |
| Dictionary<string, string>.ValueCollection Values { get; } | string[] Values |
| IDictionary<string, string> GetDictionary(string key); | JavascriptObject GetDictionary(string key) |

20.2.11. Cookies

Note: This is a replacement for Request.Cookies. Note also that Cookies is only supported for online interviewing; it is not available in off-line interviewing.

| JScript.NET function | JavaScript function |
|-----------------------------|----------------------------|
| Void Add(HttpCookie cookie) | Void Save*(ICookie cookie) |
| HttpCookie Get(String name) | ICookie Get(String key) |
| String[] AllKeys | String[] AllKeys |
| Int32 Count | Int32 Count |
| this[String name] | ICookie item(String key) |
| Void Remove(String name) | Void Remove(String name) |
| Void Set(HttpCookie cookie) | Void Save*(ICookie cookie) |

| | |
|--|-----|
| Void CopyTo(Array dest, Int32 index) Void Clear() this[Int32 index] KeysCollection Keys IEnumerator GetEnumerator() String GetKey(Int32 index) String ToString() | N/A |
|--|-----|

* - You can get a cookie with the Cookies.Get method or create a new cookie with CreateCookieObject method. Note that in either case, on completion you must save the changes with the Cookies.Save method.

20.2.12. Cookie

Note: This is a replacement for Request.Cookies. Note also that Cookie is only supported for online interviewing; it is not available in off-line interviewing.

| JScript.NET function | JavaScript function |
|---|---|
| String Domain DateTime Expires Boolean HttpOnly String Name String Path Boolean Secure String Value | String Domain DateTime Expires Boolean HttpOnly String Name String Path Boolean Secure String Value |
| Boolean HasKeys this[String name] Boolean Shareable NameValueCollection Values String ToString() | N/A |

APPENDIX A: Answers to Exercises

Exercise 1:

```
"207 is not the same as 207, but this isn't really true"
```

Exercise 2:

1. x=5, y=9, z=0
2. x=5, y=9, z=8
3. x=4, y=33, z=8
4. x=35, y=35, z=8

Exercise 3:

1. Code sample 1: x=5 and y=5
Code sample 2: x=5 and y=6
2. Code sample 1: x=5 and y=5
Code sample 2: x=5 and y=5

Exercise 4:

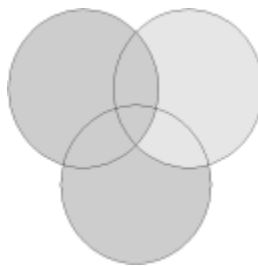
1. f("importance")["2"].valueLabel()
2. f("importance")["2"].label()

Exercise 5:

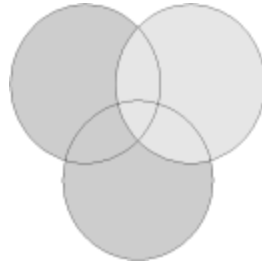
```
if(!f("q2").toBoolean())  
{  
  var codes = f("q2").domainValues();  
  for(var i : int = 0; i < codes.length; i++)  
  {  
    var code = codes[i];  
    f("q2")[code].set("3");  
  }  
}
```

Exercise 6:

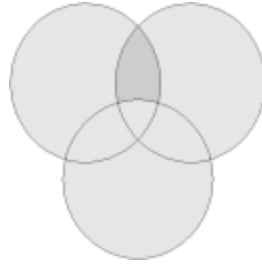
1,2,5,6,7,9,10,11,12



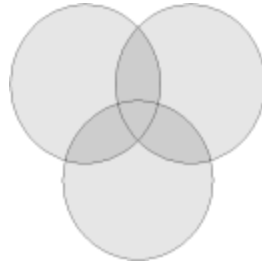
1,2,6,7,9,10,12



11



2,4,5,10,11



Exercise 7:

```
var d = IsDateFmt(f("date4").get(), "MM/DD YYYY");

if(!d)
{
    RaiseError();
    SetQuestionErrorMessage(LangIDs.en, "Invalid date. Please correct using
the format MM/DD YYYY");
}
else
{
    var dt = new Date();
    dt.setFullYear(d.year, d.month-1, d.day);
    var current = new Date();
    if(dt.valueOf() < current.valueOf())
    {
        RaiseError();
        SetQuestionErrorMessage(LangIDs.en, "Please enter a date after the
current date.");
    }
    else if(dt.getDay() != 1)
    {
        RaiseError();
        SetQuestionErrorMessage(LangIDs.en, f("date4")+ " is not a Monday.
Please register for Mondays only.");
    }
}
}
```

Exercise 8:

```
var num : String = f("phone").get();
var re = /^\\d{3} \\d{3} \\d{4}$/;
if(!re.test(num))
{
    RaiseError();
    SetQuestionErrorMessage(LangIDs.en, "Please provide your phone number on
the format xxx xxx xxxx");
}
```

Exercise 9:

```
var zipcode : String = f("zipcode").get();
var re = /^\\d{5}$/;
if(zipcode.search(re) == -1)
{
    RaiseError();
    SetQuestionErrorMessage(LangIDs.en, "Please provide a valid zip code
(digits only).");
}
```

APPENDIX C: Forsta Language Codes

Important

Custom languages that are added after the initial release of Forsta are assigned a Language code number automatically, based on the order in which the languages are added. Custom languages may therefore have different language IDs for each installation of Forsta (On-Premise, SaaS Euro, SaaS US, SaaS AU). Therefore, be aware that if you intend to export/import surveys between the different environments (On-Premise/Euro/US/AU) and you are using custom languages, you should check the relevant language codes for the sites and edit the XML export files as appropriate.

For each installation; go to the Home > Help > Language Overview menu command to view a list of the languages, with their applicable codes, available on that server.

| Language code | Language | Sub-name | Combident |
|---------------|-----------|--------------|-----------|
| 54 | Afrikaans | | af |
| 28 | Albanian | | sq |
| 1 | Arabic | | ar |
| 5121 | Arabic | Algeria | ar_al |
| 15361 | Arabic | Bahrain | ar_ba |
| 3073 | Arabic | Egypt | ar_eg |
| 2049 | Arabic | Iraq | ar_iq |
| 11265 | Arabic | Jordan | ar_jo |
| 13313 | Arabic | Kuwait | ar_ku |
| 12289 | Arabic | Lebanon | ar_le |
| 4097 | Arabic | Libya | ar_li |
| 6145 | Arabic | Morocco | ar_mo |
| 8193 | Arabic | Oman | ar_om |
| 16385 | Arabic | Qatar | ar_qa |
| 1025 | Arabic | Saudi Arabia | ar_sa |
| 10241 | Arabic | Syria | ar_sy |
| 7169 | Arabic | Tunisia | ar_tu |

| Language code | Language | Sub-name | Combident |
|---------------|------------|--------------------|-----------|
| 14337 | Arabic | U.A.E. | ar_ua |
| 9217 | Arabic | Yemen | ar_je |
| 43 | Armenian | | hy |
| 77 | Assamese | | as |
| 44 | Azeri | | az |
| 2092 | Azeri | Cyrillic | az_cy |
| 1068 | Azeri | Latin | az_la |
| 45 | Basque | | eu |
| 35 | Belarusian | | be |
| 69 | Bengali | | bn |
| 517 | Bosnian | | bo |
| 2 | Bulgarian | | bg |
| 3 | Catalan | | ca |
| 4 | Chinese | | zh |
| 3076 | Chinese | Hong Kong SAR, PRC | zh_hk |
| 5124 | Chinese | Macau SAR | zh_ma |
| 34820 | Chinese | Mandarin | zh_mn |
| 2052 | Chinese | PRC | zh_pr |
| 32772 | Chinese | Simplified | zh_sm |
| 4100 | Chinese | Singapore | zh_si |
| 1028 | Chinese | Taiwan | zh_ta |
| 31748 | Chinese | Traditional | zh_cht |
| 33796 | Chinese | Traditional_old | zh_tdo |
| 518 | Croatian | | hr |

| Language code | Language | Sub-name | Combident |
|---------------|----------|----------------|-----------|
| 5 | Czech | | cs |
| 6 | Danish | | da |
| 19 | Dutch | | nl |
| 2067 | Dutch | Belgium | nl_be |
| 1043 | Dutch | Netherlands | nl_nl |
| 9 | English | | en |
| 3081 | English | Australia | en_au |
| 10249 | English | Belize | en_be |
| 4105 | English | Canada | en_ca |
| 9225 | English | Caribbean | en_ca |
| 6153 | English | Ireland | en_ir |
| 8201 | English | Jamaica | en_ja |
| 5129 | English | New Zealand | en_nz |
| 13321 | English | Philippines | en_ph |
| 33801 | English | Somali | en_so |
| 7177 | English | South Africa | en_sa |
| 32777 | English | Tagalog | en_tg |
| 11273 | English | Trinidad | en_tr |
| 2057 | English | United Kingdom | en_gb |
| 1033 | English | United States | en_us |
| 12297 | English | Zimbabwe | en_zi |
| 37 | Estonian | | et |
| 56 | Faeroese | | fo |
| 41 | Farsi | | fa |

| Language code | Language | Sub-name | Combident |
|---------------|-------------|---------------|-----------|
| 11 | Finnish | | fi |
| 12 | French | | fr |
| 2060 | French | Belgium | fr_be |
| 3084 | French | Canada | fr_ca |
| 5132 | French | Luxembourg | fr_lu |
| 6156 | French | Monaco | fr_mo |
| 1036 | French | Standard | fr_fr |
| 4108 | French | Switzerland | fr_sw |
| 514 | Gaelic | | gd |
| 55 | Georgian | | ka |
| 7 | German | | de |
| 3079 | German | Austria | de_au |
| 5127 | German | Liechtenstein | de_li |
| 4103 | German | Luxembourg | de_lu |
| 1031 | German | Standard | de_de |
| 2055 | German | Switzerland | de_sw |
| 8 | Greek | | el |
| 513 | Greenlandic | | gl |
| 71 | Gujarati | | gu |
| 13 | Hebrew | | he |
| 57 | Hindi | | hi |
| 14 | Hungarian | | hu |
| 15 | Icelandic | | is |
| 33 | Indonesian | | id |

| Language code | Language | Sub-name | Combident |
|---------------|------------|-------------------|-----------|
| 32801 | Indonesian | Bahasa | id_ba |
| 1057 | Indonesian | Indonesia | id_id |
| 16 | Italian | | it |
| 1040 | Italian | Standard | it_it |
| 2064 | Italian | Switzerland | it_sw |
| 17 | Japanese | | ja |
| 75 | Kannada | | kn |
| 96 | Kashmiri | | ks |
| 2144 | Kashmiri | India | ks_in |
| 63 | Kazak | | kk |
| 520 | Khmer | | kh |
| 33288 | Khmer | Cambodian | kh_kc |
| 87 | Konkani | | ki |
| 18 | Korean | | ko |
| 2066 | Korean | Johab | ko_jo |
| 1042 | Korean | Korea | ko_ko |
| 38 | Latvian | | lv |
| 39 | Lithuanian | | lt |
| 2087 | Lithuanian | Classic | lt_cl |
| 1063 | Lithuanian | Lithuania | lt_lt |
| 47 | Macedonian | | mk |
| 62 | Malay | | ms |
| 2110 | Malay | Brunei Darussalam | ms_br |
| 1086 | Malay | Malaysian | ms_ms |

| Language code | Language | Sub-name | Combident |
|---------------|--------------------|----------|-----------|
| 76 | Malayalam | | ml |
| 515 | Maltese | | mlt |
| 88 | Manipuri | | ma |
| 78 | Marathi | | mr |
| 97 | Nepali | | ne |
| 2145 | Nepali | India | ne_in |
| 20 | Norwegian | | no |
| 1044 | Norwegian | Bokmål | no_bo |
| 2068 | Norwegian | Nynorsk | no_ny |
| 72 | Oriya | | or |
| 516 | Pashto | | ps |
| 33284 | Pashto | Afgan | ps_af |
| 34308 | Pashto | Deewa | ps_dw |
| 21 | Polish | | pl |
| 22 | Portuguese | | pt |
| 1046 | Portuguese | Brazil | pt_br |
| 2070 | Portuguese | Standard | pt_st |
| 70 | Punjabi | | pa |
| 24 | Romanian | | ro |
| 25 | Russian | | ru |
| 79 | Sanskrit | | sa |
| 26 | Serbian / Croatian | | sr |
| 1050 | Serbian / Croatian | Croatian | sr_yu |
| 3098 | Serbian / Croatian | Cyrillic | sr_cy |

| Language code | Language | Sub-name | Combident |
|---------------|--------------------|--------------------|-----------|
| 2074 | Serbian / Croatian | Latin | sr_la |
| 89 | Sindhi | | sd |
| 519 | Sinhalese | | si |
| 27 | Slovak | | sk |
| 36 | Slovenian | | sl |
| 526 | Sotho | Sesotho | st |
| 60942 | Sotho | Northern Sotho | st-nso |
| 10 | Spanish | | es |
| 11274 | Spanish | Argentina | es_ar |
| 16394 | Spanish | Bolivia | es_bo |
| 13322 | Spanish | Chile | es_ch |
| 9226 | Spanish | Colombia | es_co |
| 5130 | Spanish | Costa Rica | es_cr |
| 7178 | Spanish | Dominican Republic | es_dr |
| 12298 | Spanish | Ecuador | es_eq |
| 17418 | Spanish | El Salvador | es_el |
| 4106 | Spanish | Guatemala | es_gu |
| 18442 | Spanish | Honduras | es_ho |
| 2058 | Spanish | Mexican | es_me |
| 3082 | Spanish | Modern Sort | es_ms |
| 19466 | Spanish | Nicaragua | es_ni |
| 6154 | Spanish | Panama | es_pa |
| 15370 | Spanish | Paraguay | es_pa |
| 10250 | Spanish | Peru | es_pe |
| 20490 | Spanish | Puerto Rico | es_pr |

| Language code | Language | Sub-name | Combident |
|---------------|------------|------------------|-----------|
| 1034 | Spanish | Traditional Sort | es_es |
| 14346 | Spanish | Uruguay | es_ur |
| 8202 | Spanish | Venezuela | es_ve |
| 65 | Swahili | | sw |
| 29 | Swedish | | sv |
| 2077 | Swedish | Finland | sv_fi |
| 1053 | Swedish | Sweden | sv_sv |
| 73 | Tamil | | ta |
| 68 | Tatar | | tt |
| 74 | Telugu | | te |
| 30 | Thai | | th |
| 31 | Turkish | | tr |
| 34 | Ukrainian | | uk |
| 32 | Urdu | | ur |
| 2080 | Urdu | India | ur_in |
| 1056 | Urdu | Pakistan | ur_pa |
| 67 | Uzbek | | uz |
| 2115 | Uzbek | Cyrillic | uz_cy |
| 1091 | Uzbek | Latin | uz_la |
| 42 | Vietnamese | | vi |
| 512 | Welsh | | cy |
| 521 | Zulu | | zu |

APPENDIX D: Codepage

| | |
|--|-------|
| Arabic ASMO-708 | 708 |
| Arabic (DOS) | 720 |
| Arabic (ISO) | 28596 |
| Arabic (Windows) | 1256 |
| Baltic (ISO) | 28594 |
| Baltic (Windows) | 1257 |
| Central European (DOS) | 852 |
| Central European (ISO) | 28592 |
| Central European (Windows) | 1250 |
| Chinese Simplified (GB2312) | 936 |
| Chinese Simplified (HZ) | 52936 |
| Chinese Traditional | 950 |
| Cyrillic (DOS) | 866 |
| Cyrillic (ISO) | 28595 |
| Cyrillic (KOI8-R) | 20866 |
| Cyrillic (Windows) | 1251 |
| Greek (ISO) | 28597 |
| Greek (Windows) | 1253 |
| Hebrew (DOS) | 862 |
| Hebrew (ISO) | 28598 |
| Hebrew (Windows) | 1255 |
| Japanese (JIS) | 50220 |
| Japanese (JIS-Allow 1-byte Kana) | 50221 |
| Japanese (JIS-Allow 1-byte Kana - SO/SI) | 50222 |
| Japanese (EUC) | 51932 |

| | |
|----------------------------|-------|
| Japanese (Shift-JIS) | 932 |
| Korean | 949 |
| Korean (ISO) | 50225 |
| Latin 3 (ISO) | 28593 |
| Thai (Windows) | 874 |
| Turkish (Windows) | 1254 |
| Turkish (ISO) | 28599 |
| Ukrainian (KOI8-U) | 21866 |
| Unicode (UTF-7) | 65000 |
| Unicode (UTF-8) | 65001 |
| Vietnamese (Windows) | 1258 |
| Western European (Windows) | 1252 |
| Western European (ISO) | 1252 |

APPENDIX E: List of Examples

Example

1. Screening Based on a Single Question
2. Filtering a Single Question Based on Answers to a Multi
3. Excluding a Column (Question) in a 3D Grid
4. Piping in the Response to a Single Question
5. Password Check
6. Setting complete status before the end of the survey
7. Displaying a Dynamic Follow-Up Question in the same Page
8. Removing an Answer in a Single or Grid Question
9. Screening on a Numeric Question
10. Response Piping from a Single Question with Other Specify
11. Conditional Code Masking
12. Replacing "NO RESPONSE" in Response Piping
13. Using switch to set Values for each of the Answer Alternatives on a Single
14. Validating Sums in a 3D Grid Using a for Loop
15. Validating Sums in a 3D Grid Using a while Loop
16. Validating Sums in a 3D Grid Using a do while Loop
17. Copying a Multi to do Response Piping with "Other, specify"
18. Validating Sums in a 3D Grid Using a for Loop and break
19. Calculating Averages in a Grid
20. Calculating Averages on a Single Question in a Loop
21. Validating Sum on a Numeric List Question
22. Validating Sums in a 3D Grid with the Sum Function
23. Finding the Number of Answers on Three Multi Questions
24. Calculating Averages on 3 Numeric List Questions in a 3D Grid
25. Finding Maximum and Minimum Values on Numeric Multi Questions
26. Building a Condition on a Range of Codes
27. Displaying different instruction if Advanced WI feature is being used
28. Building a Cryptic URL to be Displayed in an Info Node
29. Calculating the number of days elapsed since a record was uploaded
30. Setting Interview Status Before End of Survey
31. Recording the Respondent's Browser Type and Version
32. Quota Check
33. Presetting a Quota Question to Check Several Quotas
34. Allocate a Respondent to the Lowest Current Quota Cell
35. Displaying Current Credit Balance in a Survey
36. Calculating Credit Balance for the Last 30 Days

37. Retrieving and Listing the last 10 Panelist Credits Transactions inside a Survey
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84. Recording respondent's browser version and operating system
85. Using Cookies to Limit Access to an Open Survey

APPENDIX F: QSL-to-Forsta Script Conversions

This table provides examples of conversions from the QSL-script used in Pulse Train projects to the script used in Forsta projects.

| Section | QSL | Forsta | Forsta more info. | Description |
|----------------|---|---|---|---|
| Routing | | | | |
| If | IF var_single(1); ENDIF; | f('var_single')==1' | Use in Condition Node | Check if answer category 1 of single var is switched on |
| | IF var_single(1 2); ENDIF; | f('var_single')==1' f('var_single')==2' or set('1','2').inc(f('var_single')) | Consider nset() and nset() when using numeric codes | Check if answers 1 OR 2 are switched on |
| | IF ^var_single(1); ENDIF; | !(f('var_single')==1') or f('var_single')!=1' | " | Check if single var does NOT have code 1 switched on |
| | IF var_multiple(1); ENDIF; | f('var_multiple').inc('1') | " | Check if answer 1 switched on in multiple var |
| | IF var_multiple(1 & 2); ENDIF; | f('var_multiple').inc('1') && f('var_multiple').inc('2') or set('1','2').isect(set('1','2')).size() == 2 | Consider nset() and nset() when using numeric codes | Check if answers 1 AND 2 are switched on in multiple variable |
| | IF var_single(1) var_multiple(1); ENDIF; | f('var_single')==1' f('var_multiple').inc('1') | " | Check if answer 1 is switched on in EITHER single var OR multiple var |
| | IF var_single(1) & var_multiple(1); ENDIF; | f('var_single')==1' && f('var_multiple').inc('1') | " | Check if answer 1 is switched on in BOTH single var and multiple var |
| | If var_multiple(1 5); ENDIF; | InRange('var_multiple'1,5) or set('1','2','3','4','5').isect(f('var_multiple')).size() > 0 | Consider nset() and nset() when using numeric codes | Checks if ANY answers between 1 and 5 are selected (ie 1 or 2 or 3 or 4 or 5) |
| | If var_multiple(1 && 5); | | | |

| Section | QSL | Forsta | Forsta more info. | Description |
|--------------------|---|--|---|--|
| | ENDIF | f('var_multiple').inc('1')&& f('var_multiple').inc('2') && f('var_multiple').inc('3') && f('var_multiple').inc('4') && f('var_multiple or set('1','2','3','4','5').isect(f('var_multiple')).s ize() == 5 | Consider nset() and nset() when using numeric codes | Checks if ALL answers between 1 and 5 are selected (ie 1 and 2 and 3 and 4 and 5) |
| | IF var_quantity==1; ENDIF; | f('var_quantity').toNumber()==1 | " | Check if quantity variable is equal to 1 |
| | IF var_quantity>>1; ENDIF; | f('var_quantity').toNumber() > '1' | Remember .toNumber(), to ensure numeric evaluation | Check if quantity var is greater than 1 |
| | IF var_quantity>=1; ENDIF; | f('var_quantity').toNumber() >= '1' | " | Check if quantity var is greater than or equal to 1 |
| | IF var_quantity<<1; ENDIF; | f('var_quantity').toNumber() < '1' | " | Check if quantity var is less than 1 |
| | IF var_char=='abcde'; ENDIF; | f('var_char')== 'abcde' | See also String.match / String.replace / String.search in Scripting manual | Check if character variable is equal to 'abcde' |
| Run Mode (Web) | IF RUN_MODE()==R\$4(WEB); ENDIF; | GetSurveyChannel == 'Cawi' | Use in Condition node | Checks if Run Mode is Web |
| Run Mode (Cati) | IF RUN_MODE()==R\$4(CATI); ENDIF; | GetSurveyChannel == 'Cati' | " | Checks if Run Mode is Cati |
| Run Mode (Capi) | IF RUN_MODE()==R\$4(CAPI); ENDIF; | GetSurveyChannel == 'Capi' | " | Checks if Run Mode is Capi |
| Case | CASE VAR_SINGLE | Switch(f('var_single').get()) | See Switch statement in Scripting manual | |
| | WHEN (1); | { Case '1' : <code 1 actions> | | |
| | COMMENT Actions for when var_single is code 1; | break | | |
| | WHEN (2); | Case '2' : <code 2 actions> | | |

| Section | QSL | Forsta | Forsta more info. | Description |
|------------------|---|---|---|---|
| | COMMENT Actions for when var_single is code 2; | break | | Routing using Case statement; (an alternative to "if single_var(1) then.....else if single(var(2) then.....else if single_var(3) thenelse if single_var(4) then.....else.....") |
| | WHEN (3); | Case '3' : <code 3 actions> | | |
| | WHEN (4); | Break | | |
| | WHEN OTHERS; | Case '4' : <code 4 actions> | | |
| | COMMENT Actions for if not caught by above cases; | break | | |
| | ENDCASE; | default: <actions for any other case> | | |
| | | } | | |
| While | WHILE (<condition>); | While (<condition>) | See While in Scripting manual – also see 'Do While' and 'For' in Scripting manual | While loop – stay in while loop while condition evaluates to True |
| | ENDWHILE; | { <statements> } | | |
| Redo | REDO <var_name>; | Redirect(GetRespondentUrl()+ '&__qid=x x',true) | Where xx is the qid you want to start re-doing. One should also use script to 'end' the redo. Or, consider using Call Blocks. | Ask a question again |
| Operators | | | | |
| Arithmetic | + | + | Scripting – Operators | Addition |
| | - | - | Scripting – Operators | Minus |
| | / | / | Scripting – Operators | Division |
| | * | * | Scripting – Operators | Multiplication |
| Relational | == | == or === (depending on with/without type conversion) | Scripting – Operators | Equals |
| | >> | > | Scripting – Operators | Greater than |
| | >= | >= | Scripting – Operators | Greater than or equals |
| | =< | <= | Scripting – Operators | Less than or equals |

| Section | QSL | Forsta | Forsta more info. | Description |
|---------------------|---------------------------------------|---|---|--|
| | << | < | Scripting – Operators | Less than |
| | <> | != or !== (depending on with/without type conversion) | Scripting – Operators | Not equals |
| Logical | & | && | Scripting – Operators | And operator |
| | | | Scripting – Operators | Or operator |
| | ^ | ! | Scripting – Operators | Not operator |
| Calculations | | | | |
| Temp | TEMPORARY <temp_var>; | vartemp_var : int; OR vartemp_var : int = value (if assigning as well) | Defined in script nodes, and validation code. | Creates a temporary quantity variable |
| Increment | INCREMENT <var_name>; | ++ <var_name> | See Arithmetic Operators in Scripting manual (also useful is -- to decrement) | Increments a variable (either quantity or temp variable) |
| Zero | ZERO <temp_var_name>; | variablename = 0; | Assuming variable has been previously defined in the script. If not, use vartemp_var_name : int = 0 | Sets to zero a temporary variable |
| Compute | COMPUTE <target_var> (<var1>+<var2>); | f('target_var').set(f('var1').toNumber() + f('var2').toNumber()) or f('target_var').set(Sum(f('var1').toNumber(),f('var2').toNumber())) | Using Sum() is a better option, when dealing with several previously defined variables, or the values from a multi question: varmySum = Sum(f('var_multiple').values()) will sum up any number of answers, given in var_multiple. | Set value in target_var to be sum of var1 + var2 |
| Off | OFF var_multiple 1; | f('var_multiple')[1].set(null) | | Switches OFF answer category 1 in var_multiple |
| On | ON var_single 2; | f('var_single').set('2') | | Switches ON answer category 2 in var_single |
| Clear (single) | CLEAR var_single; | f('var_single').set(null) | Set | Clears any value in single variable |

| Section | QSL | Forsta | Forsta more info. | Description |
|------------------|-----------------------|---|-------------------|---|
| Clear (multiple) | CLEAR var_multiple; | f('var_multiple')[<code>].set(null) This will need to be iterated for each code. Or, to clear all codes: function ClearMulti(MVar) { var codes = f(MVar).domainValues(); for(var i : int = 0; i<codes.length ; i++) { var code = codes[i]; f(MVar)[code].set(null); } } ClearMulti('var_multiple') | Set | Clears any value in multiple variable |
| Clear (quantity) | CLEAR var_quantity; | f('var_quantity').set(null) | Set | Clears any value in quantity variable |
| Clear (char) | CLEAR var_char; | f('var_char').set(null) | Set | Clears any value in character variable |
| Masking | | | | |
| | <var1> <var2> | f('var1').union(f('var2')) | Union | Include answers that are switched on in EITHER var1 or var2 |
| | <var1> & <var2> | f('var1').isect(f('var2')) | Isect | Includes answers that are switched on in BOTH var1 and var2 |
| | var1 var2 + TRUE(1) | f('var1').union(f('var2')).union(set('99')) | Union | Include answers that are switched on in EITHER var1 or var2, also always include last answer (eg Don't Know or Refused) |
| | var1 & ^(var2) | f('var1').diff(f('var2')) | Diff | Include answers switched on in var1 but exclude answers switched on in var2 |
| Quotas | | | | |

| Section | QSL | Forsta | Forsta more info. | Description |
|---------------------------|--|---|--|---|
| Define quota | <quota_name>: LOOKUP_B <var_single> (150 150); | These are defined in the Questionnaire Tree. Refer to the separate Survey Designer user guide for further information. | | Defines quota <quota_name> where target quotas are 150 in answer1 and 150 in answer2 from <var_single> |
| Check quotas | IF ^<quota_name>; | qf('quotaname') | Use in Condition Node | Checks if target in quota cell has been reached; if it has then interview is abandoned and status set to quotafail |
| | ABANDONED QUOTAFAIL ; | | | |
| | ENDIF; | | | |
| Assign quotas to variable | Compute <quantity_var> Quota_Value(<quota_name>,1) | f('quantity_var').set(qc('quota_name')) | sets current count into question 'quantity_var'. | Computes to <quantity_var> the current number of Achieved interviews in cell 1 of <quota_name> |
| | Compute <quantity_var> Lookup_Value(<quota_name>,1) | f('quantity_var').set(qt('quota_name')) | sets quota target into question 'quantity_var'. However, we could just use: var x = qt('quota_name'), if working in a script node. | Computes to <quantity_var> the current number of Target interviews in cell 1 of <quota_name> |
| Functions | | | | |
| Count | count(var_multiple)>>1 | f('var_multiple').size() | Size | Count function returns number of answers set to True in variable |
| Random | Random(5) | Math.ceil(Math.random()*5) | | Returns a random number between 1 and 5 |
| Range | Range(var_quantity,0,18,66) | var no = f('var_quantity').toNumber(); var single = f('single_var'); if(lnRange(no,0,17)) single.set('1'); else if(lnRange(no,18,65)) single.set('2'); else if(lnRange(no,66,99)) single.set('3'); | | Computes quantity variable into single; in this example var_quantity is a quantity var with range of 0-99 (eg age question), target var is a single with answer categories: |

| Section | QSL | Forsta | Forsta more info. | Description |
|-----------------------|-----------------------------|---|-------------------|--|
| | | | | Under 18 18 to 65 inc 66 or more Appropriate answer category will be switched on in target depending on value of age_quantity |
| Remainder | Remainder(dividend,divisor) | Dividend%divisor | Modulus | Returns remainder from dividend divided by divisor; eg if value of var_name is 11 then Remainder(var_name,3) would return 2 |
| Unrecorded | Unrecorded(<var_name>) | (!f('var_name').toBoolean()) | Boolean | Returns True if <var_name> is unrecorded |
| Not Unrecorded | ^Unrecorded(<var_name>) | f('var_name').toBoolean() | Boolean | Returns True if <var_name> has a value |
| Date functions | | | | |
| Day | Day_of_Month() | vardate_var = new Date().getDate() | | Function that returns day of current date (eg 15 th Jan would return 15) |
| Month | Month() | varmonth_var = new Date().getMonth()+1; | | Returns month of current date (eg if June, would return 6) |
| Year | Year() | varyear_var = new Date().getFullYear(); | | Returns year of current date |
| Misc. | | | | |
| Comments | COMMENT this is a comment; | // this is a comment /* this is a multiline comment */ | | Adding a comment to a script |

| Section | QSL | Forsta | Forsta more info. | Description |
|--|---|-----------------------------------|---|---|
| DTS (answer to variable) | <%var_name> | ^f('var_name')^ | Piping | Substitutes answer to var_name (if var_name is a categorical variable then it substitutes answer category text) |
| DTS (conditional text) | <(conditional_expression)/TrueText/FalseText> | ^condition ? TrueText :FalseText^ | Conditional Expression Ternary Operator | If condition evaluates to True then interview engine inserts TrueText, otherwise it inserts FalseText |
| DTS (conditional answer to a question) | <(conditional_expression)%var_name> | ^condition ? f('var_name') : ""^ | Conditional Expression Ternary Operator | If condition evaluates to True then insert answer to var_name |
| DTS (date) | %D | ^new Date()^ | Inserts full datetime value | Inserts date |
| DTS (tel number) | %T | GetTelephoneNumber() | | Inserts telephone number (only appropriate for CATI) |
| Call Count | CALL_COUNT() | GetCallAttemptCount() | | Returns the number of telephone calls that have been placed to this record on previous occasions |

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