



# Automated Question Generation for Delphi Studies

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## CASE STUDY

We are developing a cyber security game that will be used to explore how hackers or hacking groups attack systems. In order to understand different tools, techniques and procedures (TTPs) a list of potential attack possibilities needs to be created. To generate this list and to gather different opinions about the characteristics of the TTPs we chose to undertake a Delphi study. However, there is a lack of flexible, free and computerized solutions available, which meant that a need for new tool-support has arisen.

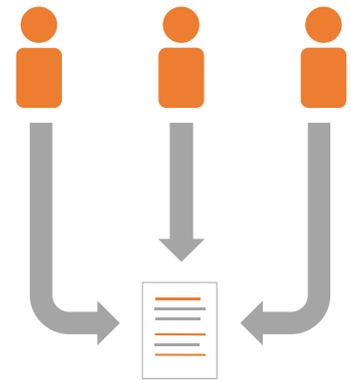
## WHAT & WHY

### Problem

The Delphi approach works by sourcing and refining expert opinion of the characteristics of various techniques, until a consensus is reached. In our application, the list of items that was considered was very large (314 items), which is beyond the scope of current solutions.

### Solution

Qualtrics Delphi Toolkit (QDT) was designed to automate the generation of questions used in the study. It also allowed the use of random subsets of questions to ensure even distribution of questions across experts.



Qualtrics is a well-established and flexible platform for making surveys, however it lacks the capabilities for carrying out a Delphi study – there is currently no functionality to automatically generate questions or randomly select a subset of questions from a larger pool. Therefore an augmentation to the existing platform has been developed.

## HOW

Qualtrics supports importing and exporting the surveys. It is these exported files that are processed in QDT.

ID: QID%ID%

QDT generates output files in the Qualtrics format, these can then be imported back into Qualtrics to create the final survey.

Keys Values

Key 1	Value 1
Key 2	Value 2
Key 3	Value 3
Key 4	Value 4
Key 5	Value 5
Key 6	Value 6

The principle behind the application is as follows:

1. A Qualtrics survey with question templates is exported. This template will later become complete questions. Additional settings, such as the order questions come in are also saved at this step.
2. The template file is loaded into the QDT application.
3. A separate list of question topics is also entered.
4. A set of automatically generated questions is then added to the template survey file.
5. A output file is generated and imported back into Qualtrics.

### QDT is...

- Designed to help researchers to create automated Delphi studies
- Currently more functionally advanced than the existing solutions
- An intuitive template format that allows greater flexibility

## WHERE

The code will be available on Github at <http://github.com/tasidonya>

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