# Statement of Completeness

The primary requirements of the project were set out as follows:

1. Allow us to draw mazes, either from scratch or using a randomly generated maze as a base. Our designers spend a lot of time manually verifying that mazes are solvable (and occasionally creating solutions for clients that require them), so part of the task should be to automatically verify that mazes can be solved and to produce a solution to the maze on request. Often, we have logos or other images that need to be incorporated into the mazes, and we want the software to help us accomplish this.
2. Store these mazes in a database and allow the retrieval of existing mazes from the database.
3. Support exporting mazes from the database to image files so that they can be published, sent to clients etc. We also want to be able to export mazes with solutions (e.g. a different coloured line showing a path from the entrance of the maze to the exit.)

These requirements are clearly met. The product can automatically randomly generate a maze, as well as set out a base for a blank maze. These automatically generated mazes are solvable, and with the “Solve” button the solution can be digitally drawn onto the maze with red dots. Logos are also implemented, with them being generated into the maze.

Mazes are also stored in the database, and with the “Search for Maze” method can be retrieved and edited.

Mazes can also be exported as images, using the “Export Maze” button. By toggling the solution dots on these can also be exported using the “Export Maze” button.

The requirements set out in the user stories and their implementations are listed in the table below.

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| User Requirement | Solution | Screenshot |
| “sometimes I want to start creating a maze from scratch, while other times I want a maze to be generated automatically for me so that I can edit it and make changes” | By specifying the maze size you are able to automatically generate a maze using the “Generate Maze” button, and blank mazes can be generated using the “Create Blank” button |  |
| “Naturally, the generated maze needs to be solvable.” | All mazes are generated with connection between the opening cells |  |
| “The most standard design is a maze where two of the outermost lines are missing, such as the following:” | The opening cell (top left) and leaving cell (bottom right) are both left open. |  |
| “Things to note are the arrows pointing out where the maze starts and where it finishes, showing that you come in through the top left and leave through the bottom right” |  |  |
| “In this case the logo takes up a 2x2 block in the maze grid, however we sometimes use logos that are smaller, larger, or not square-shaped” | By specifying the larger dimension of the logo in the logo cell size box, a logo space generates closed in the maze.  The maze also generates and is solvable around the logo space, which in this case is 3x3 cells. |  |
| “As a maze designer, I’ve observed that we create mazes of many different sizes. The most I’ve ever seen us create is 100x100 cell, so that is probably a suitable maximum for this software.” | The maze software will automatically scale the maze images which will be visible on screen at appropriate ratios |  |
| “so in this case we usually have the start and end of the maze being inside the maze, and being indicated by images” | The users can specify the starting and ending images for child mazes. These will be scaled to fit in a 2x2 cell spacing. |  |
| “Once again, this should be something we can handle in the editor, as well as support during automatic maze generation” | By selecting “Child Maze” the maze will automatically generate spaces for them in the maze, and by importing the images they can fill the 2x2 space regardless of whether the maze is automatically generated or manually generated |  |
| “As a maze designer, when I create a new maze I want to be able to give the maze a name (so that I can easily find it later, mostly) and the name of the author (so that I’m recognised for my work).” | When generating a maze you are able to specify the Authors name as well as the maze title. |  |
| “I want to be able to go through the mazes in the database, showing the author, maze name, the date and time the maze was first created and the date and time the maze was last edited for each maze.” | With a database viewer you will be able to see these elements are visible as columns in the database. In addition through the “Search for a Maze” button you will be able to search using these criteria |  |
| “As a maze designer, I want to know at any given point that the maze is currently solvable.” | While working on a maze, the “Maze Metrics” window will update with statistics, and while the maze is not solvable, the percentage of cells visited in solution will be -1 |  |
| “The percentage of the cells in the maze that are reached by an optimal solution of the maze.” | This can be seen in the “Maze Metrics” window. |  |
| “The percentage of cells in the maze that are dead ends (that is, the cell has walls in 3 directions and is therefore not part of the solution.)” | This can be seen in the “Maze Metrics” window |  |
| “As a maze designer, I want to be able to see the optimal solution to the maze as I am working on it. This should be toggleable, because I know some designers will not want to see it, but I should be able to turn it on at any point.” | This is possible through the “Solve Maze” button for an existing maze, or through ticking the “View Solution” button |  |
| “I want to be able to open up the software, browse through the list of mazes (seeing who authored each one, when they were made etc.) and easily select any number of mazes for image export.” |  |  |
| “Many of these mazes are destined for print and they need to be high resolution enough so that the lines of the maze are clear and that the logos look fine. From experience, we usually want the smaller mazes to occupy a larger size per cell than the larger mazes.” | The mazes will apply a scaling factor to be visible in many different sizes |  |
| “As a systems administrator, I require the mazes to be stored in a MariaDB or PostgreSQL or SQLite3 database on the server, so they are all kept in one place and they can be backed up easily. There needs to be an editable properties file called db.props with a format similar to this: jdbc.url=jdbc:mariadb://localhost:3306 jdbc.schema=mazeco jdbc.username=user jdbc.password=hdsajkhd” | The mazes are stored in a SQLite3 database.  The d.props file is editable and in the desired format |  |