

SE 3XA3: Software Requirements  
Specification  
Title of Project

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October 11, 2016

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Table 1: **Revision History**

Date	Version	Notes
2016/10/11	1.0	Revision 0

This document describes the requirements for artistic QR Code generating software. The template for the Software Requirements Specification (SRS) is a subset of the Volere template (?).

# **1 Project Drivers**

## **1.1 The Purpose of the Project**

QR Code stamps are not popular, even though they were a source of much excitement when it was conceived that they could be used to more conveniently and attractively direct smartphone holders to internet addresses. QR codes are very practical but do take up much more space than a written domain and may ruin the balance of a graphic advertisement or notice. QR Codes may be more attractive to graphic designers if they could easily and attractively incorporate logos and colours, or additional information like the domain text itself to add multiple functions to one graphical article, through a simple tool that those without technical expertise could use. This open source project is an exciting chance to explore and contribute to new tools that could make this great technology more enticing and practical.

## **1.2 The Stakeholders**

### **1.2.1 The Client**

Professor Spencer Smith is the client for this project. the development for the project will proceed as per the requirements and constraints specified in the 3XA3 course.

### **1.2.2 The Customers**

Graphic designers are the preliminary target users of this product. They should be able to apply the elements output by this program to condense functions in their graphics and creatively present articles of the work with a practical twist if this project is successful.

### **1.2.3 Other Stakeholders**

Those who view these graphics should be more likely to engage in the intention of the graphics.

Those who commission the graphic (whether they themselves be the designer) should see a higher rate of views engaging their intentions for the graphics.

### **1.3 Mandated Constraints**

The system should be an executable desktop program. It should run on a (at least one) Windows 10 computer. Other systems are not required but are expected to be applicable. The system must be completed by December 2016.

### **1.4 Naming Conventions and Terminology**

QR Code: Similar to a barcode, a machine readable array of black and white squares typically used to store URLs.

URL: Uniform Resource Locator. An address to a resource on the internet.

Version: The size of a QR code, version 1 being 21 by 21 pixels, up to version 40 which has 177 by 177 pixels.

Error Correction Level: A process that encodes bytes into the QR code that allow the reader to determine if the data was read correctly, and can be used to correct any errors that prevented it from being read correctly.

### **1.5 Relevant Facts and Assumptions**

It is assumed that the user will have basic skills in the use of computers especially in regards to file browsers.

## **2 Functional Requirements**

### **2.1 The Scope of the Work and the Product**

#### **2.1.1 The Context of the Work**

The majority of any population that is regarded a target market of any particular advertising campaign has a smartphone with the capability to

decode QR codes. This allows for those interested in an advertisement to immediately learn more about the advertised product or service, increasing the potential effectiveness of the advertisement.

### **2.1.2 Work Partitioning**

The partitioning of the work on the project is illustrated in the group's Gantt chart.

### **2.1.3 Individual Product Use Cases**

A graphic designer has a logo on a poster, and wants to make it the only focus, but he is also tasked to put a link on the poster. Instead he takes the logo and puts it into a qr code, and makes that the centre of the poster.

A business owner is making a sign and wants to link to their website, but doesn't want to have more text on the sign to keep it minimalistic and doesn't want to disrupt the colour, so he uses the system to make a qr code of the stock colour so it blends with the sign and maintains style.

## **2.2 Functional Requirements**

System must accept image files of the format JPEG, PNG, or GIF.

System must output either a Portable Network Graphic (.png) or Graphics Interchange Format (.gif) file. This will depend on whether the input is a JPEG or PNG file (output PNG) or a GIF file (output GIF). No other file formats will be accepted.

System must have a GUI allowing the user to input an alphanumeric string to encode into a QR code, and allowing the input an image if desired to create an artistic QR Code.

System must generate an appropriate version QR code based on the number of characters in the user input text string (versions 1 to 40) and error correction level (L,M,Q, or H).

System must not allow the user to enter a string that contains unsupported characters for the alphanumeric mode of QR encoding, and must prevent the user from entering a string of more than MAXIMUM characters.

When a non compatible file is chosen, there must be a visible warning. The warning explains the allowed formats and only allows acceptance. The acceptance brings the GUI back to the original browse for a file state.

## **3 Non-functional Requirements**

### **3.1 Look and Feel Requirements**

The system must have a simple, intuitive interface.

### **3.2 Usability and Humanity Requirements**

The system must notify the user when an invalid input is entered for either the text or image.

the system must prompt the user for an appropriate input in the GUI, to remove confusion about the requested input for the field.

### **3.3 Performance Requirements**

The system will output the specified QR code within 5 seconds.

The output of the system must be recognizable as the original images. A viewer must be able to distinguish the QR code image that represents one input image from another QR code image which represents an input that is different. Here different refers to a significant difference in colour palate, distribution of high activity areas in the input image, and text which differs by more than two letters and significantly in format. Here high activity refers to a distinct logo, or a clearly visible object or subject in that area.

### **3.4 Operational and Environmental Requirements**

The system will be used on a desktop or laptop computer.

The system will be used with a Python interpreter.

### **3.5 Maintainability and Support Requirements**

The system will be small enough to allow for easy replacement of the system with updated versions.

The system will produce meaningful messages when the user inputs incorrect input to allow the user to resolve issues.

### **3.6 Security Requirements**

None.

### **3.7 Cultural Requirements**

None. Any images used to generate QR codes are the responsibility of the user.

### **3.8 Legal Requirements**

The development of the system will follow the guidelines of GNU General Public License Version 3.

### **3.9 Health and Safety Requirements**

The system must not cause any critical failure of the computer it is run on that may pose a risk to the health and safety of the user.

## **4 Project Issues**

### **4.1 Open Issues**

The process of encoding a QR code from an alphanumeric string has not been fully researched by the group. This may slow down the implementation of the software. The software also requires the use of a few Python libraries which the group is not entirely familiar with at this point.



## **4.2 Off-the-Shelf Solutions**

Documentation on the encoding process is readily available, as are numerous open source examples of QR encoders. These will make it possible to attain the required knowledge to complete the implementation. The libraries will also be useful for the implementation of the software as they allow components such as image IO not to be redeveloped as they are basic and not part of the main purpose of the software.

## **4.3 New Problems**

None.

## **4.4 Tasks**

At this stage, a proof of concept demo is in development that will create one size of QR code from an alphanumeric string without the artistic component. In parallel to this, a testing plan, and a Gantt chart are being constructed and modified. All these and this requirements document will continue to be refined throughout the development process.

## **4.5 Migration to the New Product**

This project is a redevelopment of a current existing product, and is a portable solution. As such, there are no issues in migration to the new product.

## **4.6 Risks**

As the project is mostly centered around one algorithm for the generation of QR codes, and image quality is an important requirement for the output of the system, there are risks involving difficulty in testing the product.

## **4.7 Costs**

The product may not meet requirements adequately if components of the software are unable to be tested well. This will result in an incomplete solution for the project, as there may be many untested cases where the software fails.

## **4.8 User Documentation and Training**

The software as intended will not require extensive training if any, as the only knowledge required to use the software is basic knowledge of the file explorer to select input images, as well as to retrieve generated QR codes, and basic knowledge on URLs. Documentation is an important part of the redevelopment of this project and as such there will be an ample amount of documentation that will be available to the user if required.

## **4.9 Waiting Room**

N/A

## **4.10 Ideas for Solutions**

The algorithm must be understood well and modularized to allow for unit testing, and the requirements for acceptable image quality must be well-defined before testing.

## **References**

## 5 Appendix

### 5.1 Symbolic Parameters

MAXIMUM - 4296 (the maximum capacity of the largest QR code, version 40-L)