Software Requirements Specification

for

Building Maintenance Manager

Version 1.0

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Revision History

Date	Description	Author	Comments
10/27/2014	V1.0	Brett Fielding, Bryan Anders, and Cord Rehn	Initial Version

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1. Introduction

1.1 Purpose

To convert AutoCAD documents into a usable format capable of providing an interactive interface between building schematics, schematic layers, and current problems/work assignments (As well as implementing such an interface).

1.2 Scope

This project will seek to render buildings only in 2D way. Its inputs are limited to files derived from AutoCAD binaries. It is not being built with mobile interactivity, but instead as an interactive digital version of the book of architectural, structural, electrical and mechanical schematics which correspond to a building. It will allow the user to designate and monitor issues, but will not be capable of receiving those notifications from other programs or devices. The scope of this project will be focused on the AutoCAD files for Hargeraves Hall, and while it will be technically capable of using like-formatted files, we will not likely get to testing and implementation of additional building schematics.

1.2.1 Wishlist (Outside the Scope of this Project)

- Porting of this Project to an android mobile application to use with work crews on site.
- Capability to be linked to the mobile android application which can update work assignments, add new problem areas, and add photos to new and existing work assignments.
- Eventual linking of a vast network of devices with varying access dependant on the occupation of the user, from top level management off site abroad to individual workers on site.

1.3 Definitions

- AutoCAD: A commercial software application for 2D and 3D computer-aided design (CAD) and drafting.
- .dwg file: The file format (saved as a collection of draw commands) for use in AutoCAD.
- VBA: Visual Basic for AutoDesk. The scripting language used within AutoCAD (and stored in a .vba file).
- .bmp file: A common binary file format that supports image transparency.
- Problem area/work assignment: A layer on the schematic that denotes an area with a problem that is either in need of or has been assigned to a work crew to fix. The area is visually identified by a red area if identified but not yet assigned, yellow if it has been assigned and work is in progress, or green if it has been completed but not yet closed.
- Schematic layers: Layers applied to overlay the base schematic floor plan to show the running of electronics, mechanics, work assignments, etc. through the entire building.

2. General Description

Building Maintenance Manager will allow its users to use buildings' AutoCAD binaries to create an interactive building administration interface. This program is broken up into two modules. The first module extracts information from AutoCAD binaries to build the files required to generate the user display, while the second uses those files to present the user with a manipulable touch interface which displays selected features of a building's structure.

3. Specific Requirements

3.1 Building Maintenance Manager

3.1.1 User Interface

The user's display is broken down into 3 subviews under a main menu bar at the top. The top left and top right subviews will each cover roughly one sixth of the window and will display the options listed below for viewing within the main subview. The main subview will cover the remaining two thirds of the window and display all the selected base schematic and sub-layers selected in the other to subviews. The main menu bar at the top will display icons for primary operations of the interface, such as the open file, zoom, and select region options. The open file option will open an existing building file (as created by the AutoCAD File Converter) for use within the current Building Maintenance Manager instance. The zoom selector will allow a mouse drag-to-zoom selection within the main view. The select region toggle will allow a similar drag-to-select feature with the main view which will define an area with which to create a new problem area region upon the schematic.

3.1.1.1 Top Left Subview

The upper left subview contains two tabbed views. The first tab is the building floor selector, which will allow the user to select which floor of a multi-floored building they wish to view. The issue view inhabits the second tab and will display issues under the following categories:

1. New issues, displayed in red.
2. Acknowledged but unresolved issues, displayed in yellow.
3. Recently resolved issues, displayed in green.
4. Less recently resolved issues, displayed in gray.

When an individual issue is selected it will expand to display the following information about the issue:

1. Location.
2. Description.
3. Status, including the ability to move an issue to the next phase if it is not already completed.
4. The date the issue was created.
5. The date the issue was solved, if it has been solved.
6. The number of days it took to solve an issue if it has been resolved, or the number of days an issue has been open if it has not been resolved.

3.1.1.2 Bottom Left Subview

The lower left subview contains 3 tabbed views. The first view contains the information on the building being viewed as follows:

1. Name.
2. Date.
3. Street Address.
4. Owner.
5. Architect.
6. Structural Engineers.
7. Mechanical Engineers.
8. Electrical Engineers.
9. Civil Engineers.
10. Fire Protections.
11. Landscape Architect.
12. Occupancy Group.
13. Construction Type.
14. Use.
15. Estimated Cost.
16. Construction Start Date.
17. Building Height.
18. Building Sq. Ft.
19. Completion Date.

The second tab allow the user to toggle on or off schematics layers of infrastructure in the building so that they only view what they want to on a building at any given time. The layers are organized into these categories:

1. Landscape.
2. Architecture.
3. Civil.
4. Electrical.
5. Mechanical.
6. Structural.
7. Fire Prevention

The final tab will display Abbreviations for labels on the layers. It will contain 3 dropdown menus:

1. Landscaping.
2. Architecture.
3. Electrical.

3.1.1.3 Main Display Subview

The main display subview will comprise the roughly two thirds of the screen not filled by the preceding two views. The main display subview will contain a 2-dimensional image of a building as well as the layers the user has selected to display in the lower left view. The image will be rotatable 360° as well as zoomable. New issues, issues in progress and recently completed issued will be displayed on the current level and will be selectable. Creation of new issues will occur on the main display as well. If there are any diagrams for specific rooms, the user will be able to view them by selecting the room.

3.1.2 Functional Requirements

This is where the information about the functional requirements for the main display will go.

3.2 AutoCAD File Converter

3.2.1 User Interface

Interface will likely be a basic command-line command or a very basic stand-alone application with very few options since it is not likely to be used more that one way to perform the basic file conversion. It may also be launchable from the Building Maintenance Manager as a top menu option, but it's complexity and compatibility with the Building Maintenance Manager are not known at this time as it is still in the proof-of-concept phase of development.

3.2.2 Functional Requirements

We will convert AutoCAD binaries (.dwg) to a format that is easily visually displayed in layers. We are currently progressing down two paths, and do not yet know which will be more viable.

1. Use a C library to convert AutoCAD binaries to text files and parse those files into a quickly loadable format as vector art. This will make use of XML files to organize the data.
2. Use VBA to extract images directly from AutoCAD binaries using Visual Basic macros.

Each of these approaches has limitations. The C library path requires that .dwg files be converted to the 2004 version or earlier, while the images produced by the Visual Basic Macro will be limited by resolution, which will in turn limit the zooming that the application will be able to perform before running into resolution issues. The VBA option also has the dependency of requiring the AutoCAD software suit in order to operate. The process of converting files from .dwg files to images or XML only needs to be completed once for each set of files.