Cincinnati Fire Department: Near Miss Web Application

By

Scott Mazan

Submitted to the
Faculty of the Information Technology Program
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___________________________  __________________________
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___________________________  __________________________
Dr. Hazem Said               Date
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Abstract

The Near Miss Web Application is a Web based solution that the Cincinnati Fire Department will use to document situations where an injury nearly occurred, or could have occurred extremely easily. They will then be able to view these incidents, run reports based on the incidents that have been entered, and use that information to improve on training, equipment, or whatever is necessary to help prevent these possible injuries from occurring. Currently the fire department has a process in place for documenting the actions and situations leading up to an event where an injury occurs. This is beneficial, but it is lacking in the fact that no information is recorded until after someone has already been injured. The goal of the Near Miss application is to find these situations where injuries are most likely to occur by looking at the data that has been entered into the application, and analyzing it in different ways. The fire department will then be able to assess how they can reduce the risk of an injury occurring in these situations and hopefully prevent possible injuries from occurring. If used appropriately and often, by those who witness, or are involved in, these near miss incidents, the Near Miss application not only has the potential to prevent injuries from occurring in the first place, but to possibly even save lives.
Cincinnati Fire Department: Near Miss Web Application

1 Project Description and Intended Use

1.1 The Problem

The Cincinnati Fire Department has had a process in place for recording any injuries that are obtained while on the job. There is an official method of documenting these injuries that one must go through if the situation arises (1). This helps the fire department track when injuries occur and also helps them gain an understanding of what caused the injury(s) and how to possibly prevent those situations from occurring in the future. The only problem with this procedure is that no information is gained until after an injury has already occurred. So, in addition to the current process of documenting injuries, the Fire Department would like to add a new process for recording possible injuries before they occur. This new process and system is called the Near Miss System.

The Cincinnati Fire Department has recognized this need to record and track more than just injuries and incidents after they occur and only if someone has been hurt. There are many times when a person is almost injured or has what the fire department calls a “near miss” with an injury or situation, but doesn’t actually get injured. A “near miss” is a situation that thankfully didn’t result in an injury, but there could easily have been an injury, or the conditions or surrounding environment were such that an injury could have easily occurred. These kinds of situations need to be recorded as well, to track different trends and patterns, and to find out what might make these situations more likely to occur in the future. This way the department can work to improve training, equipment, or whatever the need might be to help to prevent these possible injuries from occurring before anyone actually gets hurt.
After comparing several different ideas, and possible solutions that the fire department could implement, they decided that a Web site would be the simplest, most convenient way that they can record this information and analyze the data that is retrieved to improve the safety of those in the Cincinnati Fire Department.

1.2 The Solution

This Web site will be available to the public, but will mainly be used only internally by the fire department. Those in the department must enter their local firehouse number to access the site from wherever they are, whenever it is most convenient for them to enter the situation they might want to enter. They are able to access the Web site from anywhere they have an Internet connection. Each record that is entered is stored in a database that the fire department can view and analyze for patterns and other factors using different views and reporting features of the Near Miss system. The hope, and main goal of the Near Miss Application, is that the fire department will be able to determine ways to prevent the “near miss” incidents, or close calls from happening. The current process for reporting and documenting injuries will stay in place for those times when injuries do occur; however, the Near Miss system will provide information to the department that will enable them to work to prevent those injuries from occurring in the first place.

One of the requirements of the Web site is that the data that is entered be kept anonymous. Different systems that have attempted to collect this type of information in the past haven’t been popular because some members in the department are concerned about getting in trouble for what they might have to enter in the report (1), such as if they had made a mistake or any other type of information they don’t want to reveal. However, that is not the
intention of this system; it is to help prevent injuries from occurring and possibly even save lives. To help assure the data is anonymous, before anyone can read it, there will be 1 or 2 administrators who will review each entry that is submitted and make sure that it is anonymous and no identifying information will be viewable before it is actually published on the site for viewing. There is an optional place to provide your name so that you can be contacted if further details or clarification is needed, but that is the only reason your name will be used and still will not be published anywhere in the incident report, but again this information is optional. This process could become automated in the future, but for the initial stages of the Web site they prefer to manually check the entries to be sure they are anonymous. There will only be 1 or 2 administrators, as stated, and they will not reveal any un-anonymous data that they may find.

1.3 User Profile

There will be several different types of user profiles involved in using and maintaining the Near Miss application. The four main profiles will be: Web Administrator, Incident Reviewer, Users, and Guests.

**Web Administrator**: The Web Administrator will start out as myself, and possibly be passed on to someone within the department sometime after the application has been implemented and in use. The Web Administrator will develop and maintain the Web Site and Database, as well as setup and create the initial reports being used to analyze the data that is entered into the Near Miss application.

**Incident Reviewer**: This user will only be one or possibly two people. This will likely be Captain Michael Cayse, and maybe another person such as the Safety Committee Chair. These users will receive notification when an incident has been entered into the system. They will then need to
access the incident and review it for completion and detail. Then, one of the most important
tasks of this role is that they will remove any names or identifying information from the
incident before it is published to the Web. The is important to for the users to be aware of; that
the information they entered into the application will remain anonymous and only be used for
training, safety, and learning processes and not to get anyone in any kind of trouble.

**Users:** The users of the Near Miss application will be anyone who uses it to enter information
about an incident. These people will be those within the department who will either be on the
scene of any dispatched incident, on route to or from any incident, present during any training
exercises, or on site during any type of daily tasks such as fire inspections or hydrants. Users will
need to enter some type of identifying information to confirm they are part of the department,
such as their squad number before they can access the enter an incident section of the Near
Miss application. Users will also be able to view the other incidents and reports that have been
posted to the site.

**Guests:** Not everyone will be able to log onto the Near Miss application and enter an incident;
that is only for the users group. However, anyone will be able to view the incidents and reports
that have been entered once they are reviewed and posted to the site.

2 Design Protocols

The specifications for the Near Miss system can be state in one word: simple. It just
needed to be developed in a way that was easy to use and intuitive to follow throughout. So
that was the main goal in developing this application, and it seems to have turned out pretty
well. As shown below (See Figure 2-1), the main page that comes up isn’t too overwhelming.
After some of the initial testing, it was mentioned by the testers that they thought the color scheme should be updated to represent more of a fire department look and feel. That is when the colors were changed to go with the overall red, white, and black color scheme.

To make the use of the Near Miss application as easy as possible for the users when performing their main function “entering incidents” many of the fields are dropdown lists, checkboxes, date pickers, anything to make the entry of the incident easier and faster for the user. You can see one page with many of these items in place below (See Figure 2-2).
3 Deliverables

There was a list of deliverables that was decided upon during the initial stages of developing the Near Miss system in coordination with the Cincinnati Fire Department. These items needed to be implemented to assure the application’s success, and that it would meet the needs of the department and their goals for the Near Miss system. This list consisted of the following items:
To create a Web Site where those within the Cincinnati Fire Department can easily document “near miss” situations.

To make sure users feel confident in knowing that their information is for the improvement of training and safety purposes only and will not be used to get them or anyone else in any kind of trouble.

To create a database that will house and store all of this information in a secure way that is also able to be backed up in case something happens to the original.

Provide a method of reporting that the Cincinnati Fire Department can use to analyze and learn from the incidents that are reported using the Near Miss application.

4 Project Planning

There are many different challenges in planning a large project such as the Near Miss system. The biggest hindrance that was faced in this project was allocating enough time to implement everything the way it needed to be implemented. This was achieved, however, by following some project planning guidelines and staying as close to a set schedule as possible.

Taking the time to create a timeline or schedule is a crucial part of planning any large project, and the results of doing so can pay off as they have in this project. Below is the timeline that was implemented in the final phase of developing the Near Miss system (See Figure 4-1). By sticking with this timeline as closely as possible it aided in keeping on track and on pace to finish the project within the desired timeline.
Another aspect of planning a project is the budget. This can be a difficult task for any project, but taking the time to plan the budget ahead of time allows you to plan for those resources that will be necessary to successfully complete the project. As shown in the Near Miss budget below (See Figure 4-2) a projected and actual cost can be used to track where you stand on your expenses compared to what was planned for.

<table>
<thead>
<tr>
<th>Product</th>
<th>Actual Cost</th>
<th>Projected Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Visual Studio Professional 2010</td>
<td>$0 (MSDNAA)</td>
<td>$549</td>
</tr>
<tr>
<td>Web site Domain Name</td>
<td>20</td>
<td>20</td>
</tr>
<tr>
<td>Custom DNS – DynDNS.com</td>
<td>25</td>
<td>25</td>
</tr>
<tr>
<td>Microsoft SQL Express 2008 R2</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>$45</strong></td>
<td><strong>$594</strong></td>
</tr>
</tbody>
</table>

Now that the Near Miss system is complete it is important to make sure that all of the deliverables that were decided upon have been met. The following will be a tour through the
Near Miss system, and will demonstrate how it meets the four main deliverables agreed upon with the Cincinnati Fire Department.

5.1 New Incident

A user will be able to directly type in the Web address (which has not been determined as of yet by the fire department, but will likely be CincyNearMiss.org or similar, but link will be on their Web site at iaff48.org) or link to it from the main Web site at iaff48.org. This will bring them to the home page (See Figure 5-1).

![Near Miss Reporting System | Cincinnati Fire Department](Image)

**Welcome to the Cincinnati Fire Department's Near Miss Reporting System.**

Here you can safely, easily, and anonymously enter incidents that happened to you, or that you witnessed happen to someone else.

You can enter incidents in which an injury(s) occurred; however, the official injury documentation process must be followed as well. The primary purpose of this Web Site is to capture events in which an injury almost occurred, was narrowly avoided, or the environment was such that an injury was likely to occur. It has been recognized that these incidents are not being captured by any documentation or reporting means.

The hope of the Cincinnati Fire Department is that with the information provided by you they will be able to better recognize the factors that can contribute to injuries affecting the health and safety of the firefighters during daily emergency response situations. These factors will then be addressed by changes in training, re-training, safety equipment, etc...

At the end of the day, with your help, the Near Miss system is here to improve the health and safety of firefighters, reduce injuries, and even save lives.

![Figure 5-1. Home Page](Image)

This page provides some basic information about the site and what it is all about. The fire department can use this page to relay any other information that they might find necessary.
From here the user has four choices, the “Home” link, which is the current page, “New Incident”, “View Incidents”, and “Reporting”. Let’s look at the main function that a user will be accessing when using the Near Miss system, a “New Incident”.

The first page the user sees is where they need to enter their local firehouse number (See Figure 5-2). This will be an easy way for the users to gain access while helping to minimize on automated or unwanted entries from being completed.

![Near Miss Reporting System | Login](image)

**Figure 5-2. Login Page**

Once the user enters their firehouse number and clicks the Submit button they will be brought to the first entry screen (See Figure 5-3) which is considered the “Personal Information” screen.

These are important details to be obtained; however, the name is optional as stated with the deliverable to maintain anonymity for the users. Also there are many dropdowns for the choices on this screen as with many others to help make the entry as quick and easy for the users while also helping to reduce entry or typing errors.
Next the users will be presented with the “Incident Factors” screen (See Figure 5-4).
This page will gather more important details about the incident and environmental conditions. Also, when choosing the “Event Type Status”, which is either Fire or Non-Fire events, the “Event Type” dropdown list will only provide the corresponding Event Types, either Fire or Non-Fire event types. This is just another way of making the entry as easy as possible for the users and greatly minimizing the possibility of errors.

The next screen is the “Event Type Details” screen (See Figure 5-5). This screen will be different depending on the “Event Type” choices that were selected in the previous “Incidents
Factors” screen (See Figure 5-4). In this incident we are seeing the Event Type Details for an Explosive Ordnance Response Event.

Figure 5-5. Event Type Details Screen

The next screen is the “Type of Near Miss Details” screen (See Figure 5-6). More information is gathered from the user here in grouped, easy to follow sections using dropdowns as much as possible with options coming from our highly normalize, rational database.
Lastly, the user will reach one more, extremely important screen. On this final screen which is titled “Event Description” (See Figure 5-7) the user will be able to give a written and detailed recollection of the incident that occurred. Also on this page the user can provide any lessons that they may have learned from the incident that had occurred (See Figure 5-8). These two areas are shown below.
Figure 5-7. Event Description Entry Screen

Figure 5-8. Lessons Learned Entry Screen

Also on this final page, the user can enter any “optional” contact information (See Figure 5-9).

Again, this is optional and will only be used to contact someone if more information or
clarification about the incident is needed. This also goes back to the deliverable of maintaining anonymity within the Near Miss System.

![Optional Contact Information Screen](image)

**Figure 5-9. Optional Contact Information Screen**

Once the user clicks Finish and Submit Entry, their work using the Near Miss system is complete. That will send an E-mail to the two site administrators to review the incident for accuracy and completeness, and perform one final check that no identifying information will be revealed in the incident before then approving the incident to be posted on the site for viewing.

**5.2 View Incidents**

The “View Incidents” sections is where users, which will mostly be those analyzing the entries within the fire department, can get a quick view of the incidents that have been entered. Here they can sort by any column, go back and forth through the pages, as well as minimize the results by using some search criteria as specified by the fire department. An example of the screen in use showing only the fire emergency events is shown below (See Figure 5-10).
Figure 5-10. View Incidents Screen (showing fire events only)

This can be a very useful screen for those in the department analyzing the results of the incidents that are entered, especially when they just want to get a quick look at something. The real power of analyzing the data they receive though exists in the final section of the Near Miss system, the “Reporting” section.

5.3 Reporting

This section of the Near Miss system will again mainly be used only by those who are analyzing the data for trends and how they can improve the safety with the fire department. The first screen that they will see when they access the reporting section of the Near Miss system is a list of reports that have been created as shown below (See Figure 5-11).
From here all a user needs to do is click on a report to view it. This is an extremely valuable and very powerful tool called Microsoft SQL Server Reporting Services, and is included with Microsoft SQL Server 2008 Express R2. A quick, simple report can just list all of the events that have been entered (See Figure 5-12).

There are endless amounts of reports that can be created. Some other example that have been created so far are reports with parameters, so the results can be limited by criteria, and drill down reports where the user can drill down into the different details of an incident as shown below (See Figure 5-13).
Lastly, another benefit and useful tool of the reporting section is the visual tools that are available. Endless charts and graphs can be used to provide visual feedback of the incidents that have been entered, for example all of the fire incidents that have been entered as shown below (See Figure 5-14).
With all of these different functions, the Cincinnati Fire Department is very pleased with the outcome of the Near Miss system. Once it is implemented, they hope to gain some great insight into what is causing these near miss incidents to occur and will hopefully be able to minimize or prevent them from occurring at all.

6 Testing

Testing was an important aspect of the development and implementation of the Near Miss system. The input from individual testers as well as those within the department really adds value to the final product that was produced. The testing that was completed helped eliminate as many issues as possible before implementing the system. It also allowed the fire department to decide on specific elements of the system and how they wanted to see them implemented by getting to use the actual system as it was being developed for them.
Testing was provided by individual users outside the department initially to get some ideas before present the product to the department. Then there were two testing sessions with the fire department. The issues and resolutions of those testing sessions can be seen in the table below (See Figure 6-1).

<table>
<thead>
<tr>
<th>Issues Reported</th>
<th>Actions / Resolutions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blue color scheme doesn’t represent system/fire department very well.</td>
<td>Updated color scheme to red and black based on user input.</td>
</tr>
<tr>
<td>No way to prevent unwanted entries from being entered into the site.</td>
<td>After the fire department determined they did not want to use user names and passwords to access the site, we implemented a feature where the user just needs to enter their local firehouse number to be able to enter an incident which will help prevent unwanted entries. This method was approved by the fire department.</td>
</tr>
<tr>
<td>Too many columns showing in the “View Incidents” section of the Web site.</td>
<td>Got a list of columns from the fire department captain of what information they would want to see on this “View Incidents” page.</td>
</tr>
<tr>
<td>No way to search on the “View Incidents” page.</td>
<td>Added search functionality to the “View Incidents” page based on the criteria provided by the captain of the fire department on which criteria they would like to search on.</td>
</tr>
</tbody>
</table>

Figure 6-1. Testing Table

7 Conclusion and Recommendations

7.1 Conclusion

The Near Miss System will be an excellent resource to the Cincinnati Fire Department. It will work alongside the current system they have in place for recording injuries after they have occurred. The hope with implementing the Near Miss Web Application is that the fire department will be able to gain insightful information from the entries as to where injuries were likely to occur. With this information they will be able to improve on training, equipment,
or whatever it may be that needs attention to prevent injuries from happening before they actually do. The main goal of the Near Miss System will be to help people from getting hurt, and possibly even save lives.

7.2 Recommendations

This was an extremely rewarding and fulfilling project to work on. Starting out a large project like this can seem overwhelming, but once the end is reached and that final product is finally something tangible it is a great feeling.

There were some challenges with this project, however, as there will be with any large project. One of the most beneficial tasks that were implemented at the inception of this project was the focus on the database design. This is recommended to anyone who might be taking on a similar project. The way that the database was designed in a strict, relational way, was extremely helpful later on down the line of the project development. It certainly took some time, but once that strong database foundation was established, the programming against it from the Web site was made quite simple.

Finally, one last recommendation is that when working on a project like this for someone, or some company, the more that you can meet with and talk to the customer, the better. When they can see something actually implemented it may be better, worse, or just different than what they were imagining. This can affect the project in different ways.

Communication played a crucial role in the development of the Near Miss system. Every time after an act of communication had taken place, such as a meeting or a testing session, the project became clearer of what it needed to look like and what the customer actually wanted to see. That is what helped get the Near Miss system to where it is today.
8 References

References


