Development of the Coast Guard Commercial Fishing Vessel Checklist Generator

EPSS development and HPT

Background:
Congress enacted legislation that required all commercial fishing industry vessels that operate beyond 3 miles from shore to be examined by the Coast Guard for compliance with the commercial fishing vessel safety regulations by October 15, 2015. Up to now these vessels were not required to get the exam but could voluntarily request an exam to ensure their vessel was in compliance with the commercial fishing vessel safety regulations.

Billet shortfall and sequestration:
Based on the projected workload due to these new requirements, HQ prepared billet map of commercial fishing vessel dockside examiner increases for fiscal years 2012 and 2013. For FY 2012, 27 billets were proposed and were successfully filled and distributed to field units across the country. In the 2013 billet map an additional 67 billets were proposed with an additional 4 billets for a potential National Center of Expertise. These billets never materialized due to budget sequestration.

Estimated number of vessels affected:
Based on this shortfall I was concerned for our ability to implement mandatory dockside exams for this new requirement. According to Christensen and Kemerer in an article in Proceedings magazine (Winter 2010-11) estimated that approximately 30,000 to 35,000 vessels nationwide would be affected by the mandatory requirement to be examined. In the same article they estimate that 11 – 13% of commercial fishing vessels already comply by taking advantage of the Coast Guard’s voluntary dockside exam program. Taking the lower estimate of 30,000 vessels affected, and assuming a conservative 15% of the fleet currently gets these exams and are already in compliance, that leaves approximately 25,500 commercial fishing vessels that need to be examined.

Workload / number of visits to each vessel:
The majority of these vessels will be new to the program. Experience tells us that the majority of new vessels undergoing their first dockside safety exam required a Coast Guard examiner to visit a vessel at least twice. The first visit is normally an educational visit which results in Coast Guard dockside examiner determining what equipment the vessel is required to have, leaving the vessel owner with a list of items the vessel needs in order to pass the exam and receive a decal. A second visit by a fishing vessel examiner is then required at some time in the future where the remaining items are checked and the vessels is issued a decal (in some instances several more visits may be necessary.) 25,500 vessels X 2 visits = 51,000 visits.

Solution to offset insufficient resources:
I felt if I could develop a job aid that could generate a very specific checklist for any particular vessel, fishermen could use the checklist to prepare their vessel prior to the
Coast Guard visit thus reducing Coast Guard man-hours by one half, by making only one visit to each vessel.

**Calculating potential saving:**
On average assuming two hours travel time to and from the vessel and one hour to conduct the exam that is approximately 3 man-hours per vessel for each visit. By making two visits to each of the 25,500 vessels that is (3 man-hours) X (2 visits) X (25,500 vessels) = 153,000 man hours.

By reducing the visits to one for each vessel that is (3 man-hours) X (1 visit) X (25,500 vessels) = 76,500 man-hours. That would be a potential savings of 76,500 man hours.

In an effort to determine the potential savings in dollars I calculated as follows. A Coast Guard Fishing Vessel Examiner is normally hired as a GS11 or GS12 civilian pay grade. The following cost analysis is based on information obtained using the Standard Personnel Costs tables. A newly hired GS11 costs are approximately $99,000 per year while newly hired GS12 costs are approximately $117,000 per year. Assuming half would be hired at GS11 and the other half at GS12 I calculated an average cost to the Coast Guard of approximately $108,000 per year for each dockside examiner hired. Working a 40 hour work week for 52 weeks (per year), each examiner hired could work a total of a max of 2080 hours each year. If the solution saves 76,500 man hours divided by 2080 possible man hours worked by a new hire. The solution could save the Coast Guard from hiring 36.77 or rounded up to a total 37 new hires needed. Assuming an annual average salary of $108,000 per year multiplied by 37 newly hired GS-11s and GS-12s equals a potential savings of $3,996,000 per year to the Coast Guard.

**Justification for creating the proposed solution:**
This gap analysis was a sufficient savings to justify developing a solution. Using the principles of Human Performance Technology as outlines in the Coast Guard Training Manual (pages 1-1 and 1-2). I determined that if I could provided sufficient data (guidance) in the environment (for use by commercial fishermen) to prepare their vessels for examination I could reduce the number of trips the Coast Guard would need to make to each vessel new to the program in half.

**Why is it so difficult for fishermen to determine what is required?**
So why does it take two trips? Why can’t fishermen figure out what their vessel is required to have on their own? The Commercial Fishing Vessel Safety Program has provided brochures and static job aids of the various safety equipment requirements over the years with little effect on fishermen being able to determine the equipment their vessels needed. This was the reason for the courtesy dockside exam program in the beginning of the Coast Guard fishing vessel safety program when it was developed back in 1991. The problem of determining what equipment is required for their particular vessel is the difficult. There are myriad requirements that are dependent on various operating parameters of a particular vessel. These various vessel operating parameters can include the vessels length, the number of crew on board, whether the vessel is state registered or Coast Guard documented, whether the vessel operates inside or beyond the
boundary line, how far off shore the vessel operates, what type of technique the fishing vessel employs to catch fish, the type of propulsion and fuel the vessel uses, gross tonnage, where in the country the vessel operates, the temperature of the water the vessel operates in, the type of material the vessel is made of, the location of the vessels operating station in relation to the crews normal work stations, etc. There are potentially a total of 28 various operating parameters that must be taken into consideration.

**Complexity of determining a vessels equipment requirements:**
In addition to the number of vessel operating parameters, these parameters are different for each safety item. For example to determine what survival craft is required we must first be aware that there are seven different types of survival craft a vessel might be required to have, ranging from a life boat, a SOLAS A equipped inflatable life raft, a SOLAS B equipped inflatable life raft, an inflatable life raft with a coastal equipment pack, a inflatable buoyant apparatus, a ridged life float, a ridged buoyant apparatus or nothing at all. In order to determine which survival craft the vessel is required, you need to determine the maximum distance the vessel operates off shore from greater than 100 nm (nautical miles) off shore, between 100 and 50nm, between 50 and 20 nm, between 20 and 12nm, between 12 and 3nm or inside 3nm from shore. Also whether the vessel operates in cold or warm water and what time of year, whether the vessel is documented or state registered, whether the vessel is greater or less than 36 feet in length, and whether there are three or fewer individuals are on board.

**Development of the Checklist Generator**
In order to reduce the number of visits required to get a commercial fishing vessel to complete a mandatory exam in one visit I developed a web based electronic performance support tool I called the Checklist Generator.

The first version of the Checklist Generator was release to the public in August 2012. It was designed using Adobe Flash. This web application worked by asking users to input information into various fields, thus capturing the various operating parameters necessary to generate a custom checklist for the vessel being entered. Data validation was used to ensure all of the fields were being filled in as any blank field would result in a incorrect checklist. The web app then took the various operating parameters ran them through over 600 filters with the results being “pushed” to a table that was then displayed to the user. This version of the Checklist Generator worked well. The major negative to this version was that in order to run it the user needed the Adobe Flash Player to run the web app. This meant it did not work on smart phones or iPad type devices. Many users requested a Checklist Generator that worked on all devices.

Based on this feedback, I then set out to create a second version. This employed the use of HTML and JavaScript so that the web application would work on any device that uses any browser. This latest version of the checklist generator can now be used on any device that can access the internet to include desktops, laptops, tablets and smart phones. Additionally the design included adopting a responsive web design. Responsive web design allows the web app to resize and reconfigure the web apps screen layout to display on any size device.
Both versions provided the user with the ability to access a checklist for each item in the checklist. Both versions of the checklist generator provide the user with the ability to view applicable code of federal regulations and other guidance documents such as Navigation and Vessel Inspection Circulars (NVICs), Coast Guard policy letters, etc for each item on the checklist.

It is with a high degree of certainty that if a commercial fisherman uses the on line checklist generator to prepare their vessel for a dockside examination, they will pass the dockside exam on the first Coast Guard visit thus reducing the number of visits to each vessel by at least half.

**Evaluation: Determining the accuracy of the checklist generator.**
A feedback loop was integrated into the evaluation phase. The first phase was accomplished by providing subject matter experts the checklist generator before its release to identify potential operational bugs and errors in the output of the checklist to ensure it was providing the correct items for each district around the country. Feedback was requested of all District Fishing Vessel Safety Coordinators and further each of the various districts dockside examiners prior to its release to the public. All deficiencies were reported via e-mail to me. Errors in programming were corrected as they came in.

A second level of feedback was placed on the web page where the checklist generator exists ([http://www.fishsafewest.info/docksideexams.asp](http://www.fishsafewest.info/docksideexams.asp)). Users are asked to provide feedback via an e-mail link. This feedback loop remains in place today and is available to provide feedback directly to me. Corrections are usually made the same day, the checklist generator is updated and the next time the checklist generator is accessed via the web, the fishermen are using the latest version.
**Evaluation: Did the solution solve the problem?**

The Adobe Flash version of the checklist generator was placed online August 2012. In order to track user use of the checklist generator, Google Analytics code was placed on the dockside exam web page on August 17, 2014. The screen shot below is from Google Analytics for the period from that date to September 14th 2015 which is when the old Adobe Flash version was replaced with the newest browser based version. Google Analytics below shows that 11,699 people accessed the checklist generator during this period as indicated by the red arrow below. The time period is 393 days with an approximated average of 30 users per day. The field labeled “Users” (see red arrow) shows the number of users hitting the website and is the numbers used above.
On September 14th 2015 the new browser based checklist generator was placed online. As of the date of this paper October 29th 2015 Google Analytics places the number of users of the new checklist generator at 1833 as indicated by the red arrow below. In those 45 days an average of 41 users accessed the checklist generator per day.

![Google Analytics Chart]

By combining the number of users from both, the total is 13,532 users that visited the website and accessed the Checklist Generator. If each user used the checklist generator and prepared their vessel prior to requesting a visit by a Coast Guard dockside examiner that is an estimated savings of 3 man hours saved by the Coast Guard by only making one trip to the vessel as opposed to two. That is a potential savings in man hours of 3 hours as posited above multiplied by 13,532 users for a maximum estimate of 40,596 man hours saved which equates to $2,160,000 savings to date.

I expect that some will question the disparity of the “Bounce Rate” as indicated by the brown arrows in the above two charts. Google Analytics defines the Bounce Rate as the percentage of visits where only one page was viewed then the user leaves the site. This is done by measuring the time of first arrival of a visitor on the web site, if the user doesn’t access any other pages on the website within 30 minutes - it counts as "a Bounce".

The bounce rate for the first Google Analytics page is a high 65.02%. The reason the bounce rate appears high is because the original version of the checklist generator was an Adobe Flash application so when the user was on the dockside exam web page then selected the checklist generator the user is interacting with Flash not any web pages, so Google Analytics registers a bounce. In some other situations after using the Flash
Checklist Generator users did interact with other pages on the website within 30 minutes of landing on the page and so did not register as a bounce (34.98%).

The bounce rate for the second Google Analytics page above is for the web based version of the checklist generator and so it shows a low bounce rate as the user is interacting with many of the checklist generator web pages.

**Conclusion:**
The checklist generator has reduced the number of Coast Guard man hours and has / will result in the savings of millions of dollars in man-hour savings. Although October 15th 2015 has passed many fishing vessels have yet to get the mandatory dockside exam, we expect as each fishery across the country opens, fishermen will begin to prepare their vessels and will begin to request to get mandatory exams before operating after the deadline. Since these vessels are not currently in operation they have yet to get their mandatory examinations. So as the year progresses and into the future if Coast Guard fishing vessel safety program and field personnel actively influence fishermen to use the checklist generator to prepare for their upcoming exam, the checklist generator will continue to result in the reduction of Coast Guard visits and continue to save the Coast Guard money. If indeed the estimate of Christensen and Kemerer are correct the checklist generator could potentially save the Coast Guard nearly $4,000,000.00 in saved man-hours.

*Dan Hardin*
*Jan. 20, 2016*