# Implementing Continuous Improvement in

# maritime Familiarization Training

## By

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# ABSTRACT

"Continuous Improvement" (or "CI" for short) is a term we hear a lot lately. Sadly, despite knowing the term and possibly even applying CI principles to some aspects of operations, CI principles are infrequently applied to in-house job and familiarization training (or for that matter to certification training at many maritime academies). The improvement in training outcomes, trainee satisfaction, safety and performance can provide a tremendous return on investment given the low cost and effort of implementing such a program for your operational training.

This paper is a "how to" primer for implementing continuous improvement in maritime familiarization training and will give an introduction to continuous improvement, talk about measurement and key performance indicators, and then discuss some simple metrics and techniques that apply specifically to maritime training.

# Implementing Continuous Improvement in maritime Familiarization Training

## 1- Introduction:

"Continuous Improvement" (or "CI" for short) is a term we hear a lot lately. Sadly, despite knowing the term and possibly even applying CI principles to some aspects of operations, CI principles are infrequently applied to in-house job and familiarization training (or for that matter to certification training at many maritime academies). This is a mistake. First - it is neither difficult nor expensive to establish and maintain a program of CI for in-house training. Secondly, there is a good chance that if you do ignore CI, not only will your training outcomes fail to improve, but they will likely deteriorates - with a concomitant deterioration in safety and operational performance. After all - if you are not applying improvement principles, you are also not likely measuring outcomes, which is a recipe for deteriorating performance.

The good news is that it is easy to begin. Even a modest program can yield significant results. Once you have begun, you can then gradually expand your CI program making it more effective and more sophisticated. The improvement in training outcomes, trainee satisfaction, safety and performance can provide a tremendous return on investment given the low cost and effort of implementing such a program for your operational training.

This series of articles is a "how to" primer for implementing continuous improvement in maritime familiarization training. This paper will give an introduction to continuous improvement, talk about measurement and key performance indicators, and then discuss some simple metrics and techniques that apply specifically to maritime training.

## 2- The Importance of continues improvement:

Before defining continuous improvement, it is very important to highlight that this topic is especially timely now. You need to start thinking about this. Vessels, equipment and job routines in the maritime industry continue to become more and more complicated and sophisticated. As a result, deeper knowledge and more specialized skills are required to operate safely. Much of this knowledge and many of these skills are not or cannot be taught in the required certification courses. Instead, they must be taught as part of job and vessel familiarization training by vessel owners and operators. However, familiarization training in most organizations has not changed much over the years and as a result there is an increasingly large gap between the sophistication of operational training and the knowledge needs of modern seafarers. A program of continuous improvement for operational training is a necessary (and possibly sufficient) tool to apply to the task of closing this gap.

## 2-1 What Is Continuous Improvement?

In fact, the term "continuous improvement" defines itself pretty well. A short definition is mentioned here (which, by the way, is an important training technique - that of making sure your students all have a common foundation of understanding before teaching something that relies on that understanding ...).

Paraphrased from Wikipedia:

"A continuous improvement process (CIP or CI) is an ongoing effort to improve products, services, or processes. .... processes are constantly evaluated and improved in the light of their efficiency, effectiveness and flexibility ..."

This definition can be summarized in the following points:

- The core principle of CIP is the (self) reflection of processes. (Feedback)
- The purpose of CIP is the identification, reduction, and elimination of suboptimal processes. (Efficiency)
- The emphasis of CIP is on incremental, continuous steps rather than giant leaps. (Evolution)

So essentially the Wikipedia definition says that a CIP is a continuous process of reflecting on the task at hand and identifying and eliminating suboptimal practices in a series of incremental, rather than drastic steps.

Wikipedia definition emphasizes efficiency, but not effectiveness. This distinction I must be elaborated when teaching the safety-critical systems. Maritime operations are an excellent example of a safety-critical system - one which can cause significant damage or loss of life if not done well. While it is important to make training in any system as efficient as possible, the primary goal in safety-critical systems is to make training as effective as possible. Effectiveness in our context means ensuring that required knowledge and skills are learned well by every trainee. This applies equally to assessment. Our assessment techniques must also effectively identify those trainees who did not learn the required knowledge and skills to the level required. Efficiency is important, but secondary.

## 3- Measuring and Managing Continuous Improvement:

One of the cornerstones of any CI process is measurement of efficiency or (in our case) effectiveness. A mentor of mine and incredible businessman, David Coe2 (is very fond of the saying "If you can't measure it, you can't manage it". His point is that for any business process, including training, unless you implement a system of measurement to keep track of how well that process is functioning, there is no way to improve the process. After all, how would it be possible to determine whether changes you have implemented to improve effectiveness have had any success unless you have a system of measuring effectiveness in the first place? So let's discuss measurement.

## 3-1 Key Performance Indicators

In order to measure something, you will need to establish a set of "Key Performance Indicators" or KPIs. These are the things you will measure and track. They are indicators of effectiveness and efficiency which provide a measurement of "key" or important aspects of training – those aspects you feel are worth optimizing. For example, if one of your goals is to create a positive educational culture in your maritime organization, you might feel that trainee satisfaction with the training process is an important aspect to optimize. You would then choose a KPI which attempts to measure that aspect as closely as possible. One way to do this might be to require all trainees to fill out a course satisfaction evaluation at the end of each course, and monitor the results of those evaluations as a KPI. That is just an example; we will get to some suggested KPIs and methods for gathering those KPIs later.

Whatever KPIs you choose, make sure that they are closely aligned with the high-level goals of your training organization. And although it may go without saying, also ensure that they measure aspects of performance that:

- Can be directly measured. Some important parts of any process are difficult or impossible to measure because data is either not easily available, or because there are too many confounding factors which make it difficult to isolate a particular indicator.
- You actually have some control over. Even if you can measure it, there may be little point, at least for the purposes of CI, if there is no easy way to influence the metric.

Also, it is wise to choose KPIs which will react reasonably quickly to changes made to training practices. For example, although "days without safety incident" is a critical KPI for any maritime organization, the value is not likely to change quickly with small changes in training (but may change substantially in the long term). Therefore as a training KPI it may not be useful because it will be hard to relate changes in this KPI to specific changes in training. Instead, have faith that if you take care of the "little" things (like lifeboat drill frequency and effectiveness) the "big" things (like overall company safety) will take care of themselves in this regard[3].

## 3-2 The Continuous Improvement Cycle

Although all CI processes agree that measurement is a key requirement, the next steps in a CI process vary subtly from process to process. There are a large number of CI "systems"[4] including Deming, Six Sigma, Kaizen and many others. However, all of

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[3] For a little more information on general KPI categories, check out this interesting article: http://goo.gl/OPNGZ

[4] The Deming cycle http://en.wikipedia.org/wiki/PDCA, Kaizen: http://en.wikipedia.org/wiki/Kaizen, Six Sigma (more aimed at customer-facing processes, but interesting): http://en.wikipedia.org/wiki/Six_Sigma

the systems are variations of a very basic CI philosophy which is implemented as a continuously repeating periodic cycle and looks like this:

Run your system for some period of time (in our case, perform your maritime familiarization and job training)

- Collect and analyze your KPIs
- Propose and implement changes which you believe will improve your KPIs
- Go to step 1

## 3-2-1 The Period of the Cycle

The period of your CI cycle (the length of time that each cycle lasts) is determined by your ability to collect meaningful metrics and implement proposed changes. Depending on the size of your organization and the number of people you train, this might be anywhere from 6 months to a year or more. Remember, however, that CI is generally a process of making small changes, and that it is generally unwise to make too many changes during any one cycle since it may be difficult to determine which change affected the KPIs. Therefore, it is not necessary to establish a long period in anticipation of making a large number of significant changes. Shorter periods, as long as they allow for meaningful measurement, will create a training organization which is more responsive to trainee and organizational needs, and which can make quick course corrections when a change is found to be detrimental rather than beneficial.

## 3-2-2 Meta Reviews

In addition to the steps above, it is also important to periodically do a kind of "meta" CI review - a review to review your CI process itself. Here you would:

- Review your KPIs to make sure they optimally capture the aspects of performance most important to your training organization. In other words - do you have the right KPIs? Should any new ones be added? Any existing ones deleted or altered?
- Review the period of your CI cycle to ensure it is neither too long nor too short.
- Review performance in terms of your success in being able implement changes you felt were necessary.
- Review your performance in terms of how well the changes you made in the past improved the training KPIs.

By doing this you are applying the philosophy of continuous improvement not only to training, but also to the system which ensures the continuous improvement of training.

# 4-Continuous Improvement in Maritime Training and Familiarization

Attention must be made to a specific technique which can be applied to maritime training. To do so, we will look at KPIs that are useful in this environment, and how to gather those KPIs. This will necessarily be an incomplete list, and not all suggestions will apply to your organization. However, it should be enough to give you a place to start, and a seed to grow your own ideas from.

## 4-1 suggested Key Performance Indicators in maritime training

Key Performance Indicators (KPIs) are the foundation of any CI process. KPIs are measurements used to evaluate effectiveness and efficiency. This is critical - unless you have a way of measuring whether changes made in the name of CI have created an improvement in outcomes (effectiveness and efficiency), then you'll have no way of telling whether you are moving closer to, or further away from, your goal. KPIs provide that information by measuring the success of every change you make.

As a reminder, KPIs should minimally satisfy the following requirements:

1. They must be aligned with corporate goals - otherwise, what is the point of measuring them?
2. They should react reasonably quickly to changes in training so that when we do make changes, our KPIs will tell us whether they were effective or not.
3. They must track something that is actually "measurable". This may seem obvious, but some important things can be difficult or impossible to measure.
4. They must track something you have some control over. Otherwise, although they may be interesting to track, they are not helpful in the process of tuning training outcomes.

As with many data-driven systems (and KPIs are just that - data), technology is your friend here. If many or most aspects of your training activities are delivered and managed with a computer-based learning management system (or LMS), you can use that system to report on metrics about the learning process which cannot otherwise be practically obtained. In fact, metrics are one of the greatest strengths and benefits of an LMS and that is one of the reasons that most large training organizations use an LMS. However, LMSs are only now starting to emerge in maritime familiarization training. Therefore, most organizations will not yet have access to the rich KPIs an LMS can provide. Therefore, the paper will first focus on KPIs which can be obtained without the aid of LMS (let's call them "Manual" KPIs).

There are many good resources which provide information on KPIs and frameworks for evaluating training. One that found to be useful is a paper written by Deniz Eseryel[5] at Syracuse University called Approaches to Evaluation of Training. This is short and a bit academic, but it is sure to give some good ideas and additional background and references.

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[5] http://www.ifets.info/journals/5_2/eseryel.html.

# 4-1-1 Manual KPIs for Maritime Familiarization Training

Even without the help of a learning management system, there are many KPIs which we can track to evaluate changes we make to familiarization training as part of our CI process. These fall generally into four categories:

- Ask the trainee
- Ask the trainer
- Evaluate the trainee
- Record performance

Let's look at some KPIs in each of these categories and discuss how they can help us improve training performance.

## • Ask the Trainee

Despite how it may often seem, our students can be an excellent source of information. The signal to noise ratio can sometimes be quite low, but there will be good data there.

Probably the most common and obvious technique is to have the trainees fill out an evaluation of the trainer and the familiarization process. This is typically done at the end of training. This evaluation can be both formative and summative.

* Formative: used to inform the trainer for the purpose of helping the trainer improve his or her technique.

* Summative: used by training administrators as one means of trainer and program evaluation. This data will be useful in terms of hiring and advancement, as well as in providing suggestions or further training the trainer could use to improve performance. They also help on a company-wide basis to help optimize your train-the-trainer program and the familiarization process itself.

Student evaluations are easy to implement and give you excellent insight into some aspects of training and trainer performance6. This resource is a little light on the evaluation of the trainer, but does provide some great tips on evaluating the training as a whole.

Another very useful, though rarely applied, technique is to revisit the training evaluation 6 or 12 months after the completion of the training event. Once a seafarer or any employee in shipping industry has gained some on-the-job experience and had some time to put the knowledge and skills into practice, they may be able to provide a more informed and therefore more useful evaluation of the training. For example, they will be more likely to be able to answer questions such as "What was missing from

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6 An excellent, short resource with tips and examples for creating trainee evaluations can be found here:
http://www.servicegrowth.net/documents/10%20Tips%20on%20Creating%20Training%20Evaluation%20Forms.net.pdf

your familiarization training that you now believe should have been covered". Or "What was covered during familiarization which you feel was not relevant to your position as a deckhand". This can be very useful information.

## • Ask the Trainer

While many training organizations do collect some form of trainee feedback, it is much less common to gather trainer feedback. This is a shame as it can be very insightful to ask the trainer to reflect on the process either during each training event, or immediately after. There will be ideas which are fresh in his or her head which will be useful, but diminish in immediacy over time. Like trainee evaluations, this can be collected by way of a form which is submitted to training operations.

Trainers can be asked to comment on a variety of useful metrics including the preparedness of the trainees, the appropriateness of the duration of training, the quality of the materials used to support the trainees during familiarization, the quality and appropriateness of the assessment techniques and materials, is the right trainee attend the course and so on. This last question regarding assessments is a very important one. This feedback is critical in the process of continually refining the assessments to ensure that trainees know what they need to know, at the level required.

Another useful technique here is to ask the trainers to perform self-evaluations. Ask them if they feel they performed well during that training experience, ask what they could have done better, what new techniques they tried and found to be particularly successful, and what support they require to deliver a better experience next time. In order to get honest (and therefore useful) answers, it should be clear that this information will never be used to evaluate their performance - only to support them in their job and improve training as a whole throughout the organization. The additional subtle, but extremely important, benefit of this self-evaluation is that it causes the trainer to reflect on the process of training and to make him or her a partner in its improvement. Otherwise, you are wasting a valuable thought resource because the trainer simply "works IN training", and is not as likely to "work ON training" - a key distinction.

## • Evaluate the Trainee

Hopefully you already have a process in place to evaluate candidates at the end of familiarization. If not, implementing one may be a more immediate need than continuous improvement. But assuming you do conduct some form of candidate evaluation to determine whether newly familiarized employees are fit for duty, you can use these evaluations as a KPI, for example English language courses need to determine the candidate level to enter that course level.

A couple points on this. First - it is a good idea (and a common technique) to perform assessments not only at the end of training to evaluate the candidate, but also at the beginning of training in order to evaluate and improve the effectiveness of the training itself e.g. (simulator training on gantry cranes). There are many reasons for this pre-

assessment. First, if you do provide an evaluation at the start of training, you then are aware of what the candidate "does not know" in addition to what they do know. By comparing that to the results of evaluation conducted at the end of training, you can determine how successful training was even in the presence of candidates with varying degrees of knowledge and aptitude on entrance. Secondly, a pre-assessment also helps you improve hiring practices and pre-familiarization self-study materials, if you have them. Finally, pre-assessment results can be used by the trainer during familiarization in order to tune his or her program to the candidates in hand, and to ensure that critical gaps in knowledge are covered.

Another good technique is to re-evaluate the candidate after some passage of time since the training event. This provides information on how well knowledge is retained over time. If critical knowledge is lost, then the training program can be altered to reinforce the maintenance of this knowledge and to recommend further training to individual candidates.

Finally, although all of these metrics are very useful, use caution in applying them without analysis and thought. Assessment outcomes can vary significantly with the method of assessment, with differences in the person administering the assessment, with differences in the candidates, and with the age of the assessment itself, just to name a few. So always think carefully about whether (or how much) a KPI is being influenced by actual effectiveness, or affected by the method of gathering the KPI itself. But do not let this consideration stop you form using assessment as a meaningful KPI.

- **Record Performance**

The final category speaks to the need to record performance - both in terms of safety and efficiency. No doubt you already have a system in place for measuring key aspects of operation performance. You can mine these other (non-training) KPIs for information you feel is directly related to your training performance. Any KPI that can be tied to a training event can be used, e.g. (number of TEU, s moved per hour for each gantry crane operator).

One simple example is a KPI which measures the duration of familiarization training. Some organizations do not have fixed training agendas and vary the number of days of familiarization according to the candidate. Keeping good records on this metric (or mining existing records that you might already have in your human resources or crewing departments) can provide very useful data. For example - has the number of days crept up over the years? If so - why? Has it shortened? Does it vary according to the trainer? According to the number of trainees? According tot he vessel? These are all important questions whose answers can provide insightful clues on how to improve outcomes.

Another example is the mining of loss or safety-related incidents. Statistics on these should be visited regularly in order to uncover common and recurring issues which

can be addressed through a modification in training. Likewise for other operational metrics such as vessel loading and turnaround times, customer service complaints, and so on. There is a wealth of information you either are already collecting, or may begin collecting that will help you improve training, and therefore safety and operational efficiency.

All of the KPIs spoken of above can be collected and analyzed manually. Whether or not you employ an LMS in your in-house training, those KPIs will still be very useful (as will many others) and should be tracked. However, if you do use a learning management system to deliver familiarization and job training, you'll likely also have access to a variety of other deep KPIs which can provide insight that is simply not otherwise possible.

## 5- Conclusion

This topic is especially timely right now. Vessels, equipment and job routines in the maritime industry (ships operation – port operations – cargo operation) continue to become more and more complex and sophisticated. As a result, deeper knowledge and more specialized skills are required to operate safely - knowledge and skills which can only be taught by vessel operators or equipment manufacturers. However, familiarization training in most organizations has not changed much over the years and as a result there is an increasingly large gap between the sophistication of operational training and the knowledge needs of modern maritime industry personnel. A program of continuous improvement for operational training is necessary (and possibly sufficient) to close this gap.

Concerning maritime training, most training organizations do not yet employ an LMS in training. Until such time as they do, there are still some excellent KPIs which can be tracked and analyzed as indicated in this paper.

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