

# *All Aton are Not Created Equal*

It's time to improve our ATON and Waterways performance metric.

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## **The problem**

Aid availability is defined as the percentage of ATON watching properly over some time period. It is the Coast Guard's most important metric for measuring the output performance of the ATON program – as well as the ATON performance of individual units, sectors, and districts. While this metric has worked well enough for us in the past, it suffers from two significant shortcomings that should be addressed going forward: 1) it treats every aid as equally important, and 2) it does not have a visible enough link to waterway risk reduction.

What's wrong with measuring our performance by treating every navigational aid as equally important? For one thing, we can do better. The Coast Guard has always been a government leader in quality program measurement. We sell ourselves short with a metric that disregards what waterway users and ATON professionals understand well: some ATON are significantly more important than others.

The other problem with treating all aids as equally important is what performance analysts call "perverse incentive". A metric with perverse incentive can inadvertently reward poor decisions or punish good decisions. An example of how our current aid availability metric is thusly plagued is easy to imagine:

Think about a cutter that finds itself with only one day to fix several discrepancies before the start of an 8-week dockside Charlie period. It has discrepancies in two different corners of its AOR, but has time to visit only one. (To make it simple, we'll assume all the discrepancies are the same type: buoys off station.) Should the ship go north where it can bang out six discrepancy corrections, or south where it can fix two? The aid availability metric will reward the unit for going north. Easy enough. But what if the southern AOR is known to be more important? And what if the unit has been under the gun lately for having a low aid availability – would this unit be tempted to go north anyway? The plot thickens.

Of course, we rightfully trust our COs and OICs to make these calls. They have the judgment, experience, and integrity to do the right thing regardless of what a performance metric says; they are willingly accountable. All the more reason they deserve a performance metric that reflects their good decisions - not one that can so easily be at odds with their professional wisdom!

## **An easy fix**

The Coast Guard has long had an excellent tool for informing discrepancy response decisions: the Discrepancy Reponses Factor (DRF) system. Since this tool is based on the notion that all aids are not equally important, it can easily be applied to our aid availability metric to eradicate the problems described above. An aid's DRF1 value is a pre-calculated, historically proven, command reviewed measure of each aid's importance. It is calculated using all the right criteria: waterway sensitivity, channel geometry, traffic characteristics, the aid's purpose, etc.

Buoy A, with a DRF1 of 45 has more potential to reduce risk to the public than buoy B with its DRF1 of 24. All other things equal, the DRF system tells us to fix buoy A first. This aid is more important - the Coast Guard says so.

Yes, our DRF system is risk-based. This is a long-standing achievement upon which we should be proud to shed more light. As far as the Department of Homeland Security is concerned, reducing public risk is the most important aspect of government performance. (Reducing public risk is what Coast Guard ATON does – we know this.) But, to remain competitive as a government program, our ATON program must be able to *advertise* its risk-reducing value to the public by using powerful, risk-based metrics.

It will be a simple task to incorporate this valuable aid-importance information into our ATON metric because the DRF1 data already exists in our I-ATONIS database! (And the math is easier than Tinkertoys for the Coast Guard’s Business Intelligence gurus.) For now, let’s call this improved metric the Risk-Informed Aid Availability, or RIAA.

Here’s the RIAA for a unit that only has 3 aids. Its *least* important aid is discrepant.

Buoy A’s DRF = 48	48 x 1 = 48	
Buoy B’s DRF = 52	52 x 1 = 52	
Beacon C’s DRF1 = 23	23 x 0 = 0	(Beacon C is discrepant - not 100% available.)

$$\text{RIAA} = (48 + 52 + 0) / (48 + 52 + 23) = 100 / 123 = \mathbf{81\%}$$

This ATON unit has 81% of its total potential risk-reducing mojo watching properly.

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If the same unit’s *most* important aid is discrepant:

Buoy A’s DRF = 48	48 x 1 = 48	
Buoy B’s DRF = 52	52 x 0 = 0	
Beacon C’s DRF1 = 23	23 x 1 = 23	

$$\text{RIAA} = (48 + 0 + 23) / (48 + 52 + 23) = 71 / 123 = \mathbf{57\%}$$

Now, only 57% of the ATON unit’s total risk-reducing superpowers are winking and blinking.

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If we only look at traditional Aid Availability we get the same results for both cases...

$$\text{Aid Availability} = (1 + 1 + 0) / 3 = 2 / 3 = \mathbf{66\%}$$

... regardless of whether the most or least important aid(s) are discrepant. We can measure better than this!

### **Ready to kick it up a notch?**

An additional *future* enhancement to the metric could be the replacement of the “0”s and “1”s in the equations above with factors *between* 0 and 1 to reflect the seriousness of an ATON

discrepancy. Here, we bring the DRF2 factor into the game: an aid discrepancy gets a 0 if the aid is completely missing, maybe a .5 if it is extinguished, and perhaps a .9 if the discrepancy is due to something minor such as a missing topmark. You get the idea.

To incorporate the DRF2 factor, however, the Coast Guard's Waterways program would first need to devise and approve the correct degradation factors. Neither I-ATONIS nor the existing DRF2 worksheet is equipped to describe the full range of discrepancies adequately enough for measurement purposes. Both are overdue for overhauls in this respect anyway, especially I-ATONIS which is not even able to create fully accurate descriptions of all aid discrepancies for the District Local Notice to Mariners. Adding the DRF2 to the metric should wait.

**“But we can't / shouldn't / don't want to change the ATON metric!” (Circle one)**

There are no good reasons for not continuously improving our performance metrics. However, here are three reasons that might be offered in this case:

*1. Aid availability is an IALA metric with international standards. We can't change it!*

IALA sets recommended minimum aid availabilities for ATON in three categories: 99.8% for ATON of “vital significance”, 99% for “important significance” and 97% for ATON of “necessary significance”. Indeed, *categorized aid availability* figures can be viewed in I-ATONIS for Coast Guard aids – and the categories are, in fact, determined by DRF1 limits. But the aid availability metric we are most familiar with, the one we hold up to represent our ATON program, kluges together *all* of our aids, regardless of importance. None of these minimum IALA standards apply to the manner in which we report regular Coast Guard aid availability. And no international association seeks to prescribe the manner in which the Coast Guard measures its programs. IALA, in fact, recommends risk-based approaches, and would probably approve of a more visible link to risk reduction. One final note here: The RIAA metric being proposed in this article is similar to categorized aid availability. RIAA roles the math up into one comprehensive metric, whereas the categorized system is three or four separate metrics.

*2. We have all this historic data for regular aid availability. If we change the metric, we'll lose the ability to understand the trends or place our performance in proper context with respect to our past! Nay, we shall be adrift with nary a beacon to guide us!*

In the case of aid availability, nothing prevents us from creating a new-and-improved metric while simultaneously tracking the old one for comparison purposes. In fact, this is a good program measurement practice – and the electrons are free. An even better solution to this concern might be to capitalize on the facts that our DRF1 values are already databased and do not change significantly from year to year, which means we can incorporate the aid-importance data *retroactively*. Yes, we have the ability to hind cast with an improved measure to gain instant performance trend context. The analysts are salivating.

*3) Aid availability is not our main Waterways metric anymore, so we should not bother improving it. We now use the number of collisions, allissions, and groundings (CAG).*

It is true that the Coast Guard has associated the nation's annual number of collisions, allissions and groundings (the CAG metric) with our ATON program in high level government reports of outcome performance. However, aid availability is still advertised in conjunction with CAG in those reports. It has been very difficult for the Coast Guard to effectively prove a link between

ATON performance and ultimate outcomes like annual CAG reduction. (We know the relationship is there, we just haven't been able to prove it.) This is why we still need a lower-level *output* metric like aid availability. In any case, output metrics are the most appropriate kind for reckoning our performance at the management level anyway.

## **In Conclusion**

We recommend the Office of Waterways Management (CG-541) work with Coast Guard Business Intelligence to create this ready-made RIAA metric and add it to I-ATONIS and our CGBI suites. We can immediately give our ATON units, Sectors, and District Waterways staffs a much improved metric for their management toolbox – at little to no cost. The Office of Performance Management and Assessment (CG-512) might also consider adopting such a metric for enterprise tracking and public performance reporting.

In the mean time, OAK's ENS Jim Ellsworth has developed an MS Query-tool to assist units in extracting and calculating their RIAA directly from I-ATONIS. The tool can be downloaded at [www.uscg.mil/d7/cgcOak/RIAA.asp](http://www.uscg.mil/d7/cgcOak/RIAA.asp)

Let us, therefore, no longer mumble *passively*, in a Napoleon Dynamite-type voice:

“ \_\_\_ % of our ATON is available... just in case anyone wants to use them.”

Instead, let us shout, in an *active* voice:

**“Our ATON system is operating at \_\_\_% of its total waterway risk-reducing potential!”**

Final Note:

Upon providing a courtesy professional review of this article prior to publication, ATON expert CDR Kevin Hanson, observed, “If we adopt this new metric, all of our wildest dreams will come true.”

## References

“On Categorisation and Availability Objectives for Short Range Aids to Navigation – IALA Recommendation 0-130”, Edition 1. International Association of Marine Aids to Navigation and Lighthouse Authorities, December 2004

“DHS Annual Performance Report: Fiscal Years 2008-2010”, Department of Homeland Security, Office of the Chief Financial Officer, Program Analysis and Evaluation. January 15, 2009.