

FACTS™

FISHING ACTIVITY & CATCH TRACKING SYSTEM

Response to:

DISCUSSION DRAFT

Electronic Monitoring and Electronic Reporting:

Guidance & Best Practices for

Federally-Managed Fisheries

September 2013

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Background

I am Bryan Stevenson, the CEO of Electric Edge Systems Group Inc. – the maker of FACTS™ (Fishing Activity & Catch Tracking System).

Electric Edge has worked with the Pacific Region of the Department of Fisheries and Oceans Canada (DFO) since 2002. During that time (and ongoing) we have built, upgraded, and supported major fishery IT systems for the region including recreational licensing, scientific and special access licensing, harvest, and quota management. As such we are not only expert systems developers, but fisheries experts as well.

We have handled all the data behind the comprehensive BC Groundfish Integrated Fishery Management Plan (IFMP) which includes 100% dockside and at sea observation. This includes hails, dockside monitored offloads, at sea observer logs, skipper logs, EM logs, and very complex quota tracking and trading. As the reader may know, Archipelago Marine Research provides monitoring services to the groundfish fleets on the west coast of Canada and that includes their EM system. We have managed all of the data created by that program that the government needs.

In 2008 we decided to build a system for the electronic collection of regulatory data in fisheries that included all stakeholders and all data sets (hails, logs, landed catch, and quota or catch shares) typically used in fishery monitoring. This system would validate all data as it was entered and would allow all stakeholders to access fishery monitoring data via a central website. Fishers would only see their data, fishery managers would see data from all vessels in the fishery they manage, dockside monitors or dealers would only see the data they submit, and so on for other stakeholders (science, NGOs, enforcement). This system would include a mix and match set of customizable data collection modules that could be used in isolation or as an integrated set.

The idea was to challenge the notion that these systems have to take a long time to produce and/or be cost prohibitive. By having various modules available and by charging a transaction fee for use of the system, we provided a new way to think about electronic reporting in fisheries. We can implement far faster than traditional software development allows and our initial customization for a fishery is free or at our cost (once the per trip fee starts all other customization is included in that fee).

In April 2010 the first incarnation (EasyHails™) was launched for interested vessels in various BC hook & line groundfish fisheries. That was closely followed by starting service for several sectors in the multispecies groundfish fishery in the Northeast US (approved as an eVTR solution there in May 2013). In 2011 the system was re-branded as FACTS™) and in 2012 it was introduced as a pilot in Maryland's blue crab fishery (the pilot was extended for the entire 2013 season and is ongoing).

Our technical background coupled with our expertise in fisheries monitoring and management put us in a unique position to help a great deal in the transition to electronic reporting in the US.

We are very honored to be asked to review this document and equally pleased at the practical common sense approaches being recommended within.

Response and Recommendations

Overall we are very pleased at the practical and well thought out advice that has been put forward in the guidelines and best practices draft. As stated, this is a large and complex undertaking and there is no single solution – and this is a great start.

As senior systems developers, we often find (and as mentioned in the document) there can be quite a gap in what people think technology can or cannot do. That coupled with many opinions (especially found online or part of organizational culture) and hearsay can make getting to the truth so effective solutions can be implemented is a challenge to say the least.

That being the case, we have added responses and recommendations to subjects that we feel could benefit from a fresh perspective and in some cases to challenge assumptions and provide alternatives or other elements to consider.

Not Being Overly Prescriptive

The recommendation to not be overly prescriptive when setting standards and requirements is probably the single most important issues touched on in the document.

We have seen many projects where a specific hardware or software was a requirement that made meeting the technical requirements more costly, would produce a substantially inferior end result, or simply be impossible. Often when asked why the hardware/software listed was chosen the reply would indicate a lack of understanding of technology (another important suggestion put forward in the draft) or a decision based on mis-information (i.e. hearsay, opinions read online, it worked on another project so it should work in this one, etc).

Sticking with defining requirements only and not stating specific software and/or hardware is key for all the reasons mentioned in the draft – great suggestion.

Willingness to Modify Regulations

The end of section 3 (page 19) states “This includes a willingness to modify regulations to meet the tool if necessary, not just the willingness to only choose a tool if it can meet a current regulation”.

This is an excellent line of thinking and ties into not being overly prescriptive with technology requirements for hardware/software. It also speaks to a phrase many of us in fisheries have heard – “it’s always been that way”. That is a mentality that does need to be re-considered as it can hold back progress when progress is required.

One system we have worked on needs to have accurate license details for a trip to do its job. Amazingly enough license holders are not required to give their license number as part of their hail that starts their trip (even though they must have their most recent license amendment onboard that states their license number). The system then needs to try and lookup the license based on the vessel, fishery, and date of hail. That lookup often produces erroneous details because the licensing system has long standing issues that have not been resolved for years that often result on a license’s status or the vessel

it is on to be reported incorrectly. If regulations were changed to state that license numbers were to be given at the time of hailing, almost all issues fall away. This has not occurred and continues to cost the government each time license details are incorrect on a trip (which effects remaining quota for the license and is costly due to the need to unwind inappropriate data processing). So far the cost to alter the system to take a provided license number at hail has been far outstripped by the cost of correcting data when errors with license derivation occur.

Open Source and Common Programming Languages

Open source code and licensing is an area where there is a great deal of hearsay and assumptions. One of the biggest assumptions is that it is free and is somehow a “silver bullet” of sorts – it is not. The other is that it can somehow do things better than commercial software. All software and languages either meet requirements or they do not and they all have costs (some less obvious). There may be instances where one option is more suited than another, but that follows all the other advice in the best practices document – choose the best fit for your requirements.

Cost and “Locking In”

The EM whitepaper listed on page 1 states “The Agency should look for open source code or standards rather than locking into a particular suite of software (e.g., Oracle, SAS, etc.)”. What I would like to point out is that software licensed under an open source license is still simply software – just like the examples given of Oracle or SAS. If open source software is used, it is still locking you into that software. It is no different than being locked into the usage of commercial software.

The real difference comes in when you consider long term usage. Commercial software is backed by companies that should still exist tomorrow. Open source software is generally not supported by an organization with any kind of longevity and often never makes it out of beta testing. Commercial software comes with support and generally has a regular upgrade cycle while open source software comes with no support and often never evolves. This all speaks to that fact that in the longer term, open source software is not free and can be discontinued at any time because there isn't anyone liable for it (which would introduce a huge cost of transitioning to a new software solution).

It seems quite contradictory to be recommending a non-prescriptive approach in terms of what hardware/software/language should be used in ER/EM systems and then to state that open source and common programming languages should be used to avoid dependency on proprietary software and to facilitate better data integration.

It is mentioned many times that attracting the private sector can help drive competition, hopefully keep costs lower, and foster innovation. It is highly unlikely that any private service provider is going to release their software using an open source license that would then allow their competitors to see all of their intellectual property and use it as their own.

Open Source and Common Language Capabilities Assumed “Better”

The mention that open source code and the use of a common programming language would aid in better data integration is false (although there are always some exceptions).

Firstly, open source is about licensing and not functionality – there is no impact on data integration. Open source software can either meet technical requirements or not – same for commercial software.

Secondly, the use of a common programming language also does not have any real effect on data integration. Programming languages can either meet the technical requirements or not. If two systems use different languages and both of them can provide data in the required format, then they will integrate well.

Following the plethora of recommendations for not being overly prescriptive, I don't see any reason to be so prescriptive in terms of open source code and a common programming language.

If I had to say that there is one deal breaker in the entire document, prescribing open source code and a common language would be it. It would force tools to be used that may very well not be the best tools for the job and could stifle innovation.

Chain of Custody

Chain of custody of electronically reported data is mentioned a fair amount, but there does not appear to be a clear indication of what steps should be in the chain. This should perhaps be made clearer because many may still think it means data must pass from the data collection interface directly to government servers. A precedent has been set in terms of VMS and again with our eVTR approval in the Northeast.

In the Northeast, OLE accepted that fisheries data is sent via VMS in some instances and that data travels through the VMS service providers servers before being delivered to NMFS. That set a precedent that allows data to be sent from a vessel to a service provider's servers and then sent on to NMFS.

Initially the eVTR requirements in the Northeast specified that data should go directly from the vessel to NMFS. During the approval process that FACTS™ went through earlier this year, chain of custody was a hot topic. It was explained that we needed to receive the data first in order to drive other parts of our system and give the best service possible to our clients (industry), that the data would arrive at NMFS a few seconds later, and that we could prove if the data was manipulated in transit if a court case required it. After hearing that, chain of custody was no longer an issue.

A good way to think about service providers and chain of custody is to consider how Turbo-tax conducts business. It accepts data from tax payers (just like fishers), stores that data on their servers, and sends that data along to the government on behalf of each tax payer when the tax payer is ready to file their taxes. Turbo-tax can prove what was sent and has no vested interest in tampering with the data or they would be out of business very quickly. The same can be said of service providers collecting data to support fisheries management.

Durability of Hardware

While it is understood why rugged hardware may be needed in certain instances, it seems the “Durability Threshold” section on pages 27 & 28 assumes that new hardware may always be needed when implementing a new ER/EM system. If that is not the assumption, then perhaps a clarification in that section would be useful.

I’d like to challenge that assumption in terms of ER systems and put forward that there are ways (and at least one system in use) to make software work on existing hardware (such as onboard PCs for charts etc.). This is so that fishers especially are not burdened with yet another cost when being asked to move to electronic reporting. In these situations, to prescribe the use of rugged hardware when the user is happy to use their own (and replace it should it fail) would not be cost effective.

Mixing Paper and Electronic Reporting

While it may be true that mixing and matching the use of paper and electronic reporting may aid in keeping costs lower, in other cases it can make the electronic side of the work more costly due to additional effort to integrate with paper based data.

An example would be where all data related to a trip is to be stored against a unique trip identifier (trip ID). Depending on which data is collected first for a trip, either the electronic or paper side will set the trip ID and a manual process will need to exist to get that number to the other side. Perhaps an e-hail is sent and starts the trip and sets the trip ID, and then the catch is offloaded and verified at the dock on a paper form to be data entered later. That paper form needs to end up with the trip ID created by the initial hail on it – a simple transposition error breaks the connection with the electronic portions of the trip and then human effort is required to resolve the discrepancy later.

It may be prudent to add such a warning to that recommendation.

Engaging All Stakeholders

As mentioned (page 6), it is critical to involve all stakeholders (or all core stakeholders) as early as possible. The sophisticated monitoring regime that BC groundfish fisheries enjoy is due to a long engagement of government and industry to ensure both parties were in agreement BEFORE changes occurred in the fishery. Everyone could have their say and ask all the questions they needed to make sure all parties had all the information to base their decisions on. Without this level of co-operative involvement, a huge risk exists of setting any progress back when a group “finds out” some detail or another that they are dead set against.

Suggestion: NMFS as rule setter and auditor

The infrastructure section starting on page 32 states that NMFS sees a large volume of new data that will be coming in that will need a great deal of oversight to deal with. While it is indeed true that the amount of data coming in will increase, it does not need to mean that places a large new burden on NMFS. It appears (on page 34) that an alternative concept should also be considered. That alternative is essentially for NMFS to set the rules and requirements surrounding ER and EM and then audit external

systems to ensure they are compliant (as opposed to undertaking all the development and support work to implement such systems).

In Canada there is discussion about how involved the government should be in various situations – a big one being quota transfers (mid-season leasing and permanent transfers). Electric Edge built a sophisticated system for the DFO that not only tracks the impact of harvest on remaining quota, but also the transfers of quota between licenses. During that project and still to this day they have wondered if they should have tracked the impact of harvest of remaining quota internally, and then set the rules for quota transfers and let external groups build systems to handle those details (which are far more complex than tracking the impact of harvest on remaining quota). Then the DFO's role in quota transfers would simply be to audit that any systems performing those transfers are in fact following the rules.

We see that direction being a valid one for a few reasons.

Firstly, it allows systems to be built that can meet industry and other stakeholder needs even if NMFS has no need for the functionality (systems NMFS would likely not build). That scenario can help with adoption of such systems if there is more value in them for end users.

Secondly, it allows NMFS to focus more closely on its core business of managing and protecting fisheries.

Lastly, it allows NMFS to benefit from a higher volume of much more accurate data without having to collect and process it all. Service providers can add standard reports to their systems to serve other stakeholder and may well be able to provide such reports to NMFS as well. That would mean NMFS would not necessarily have to do as much processing of incoming data as may be assumed.

Phased Approach and Timing of Ongoing Enhancements

The concept of enhancing ER systems over time is an excellent approach. Rarely does anyone have the vision to get it right the first time. The timing of these enhancements was not touched upon and as such I wanted to make sure guidance is given as to when to start planning for such enhancements and when to implement them.

The following may go without saying, but after over a decade of work with the DFO I can say that planning needs to start sooner than most think – no later than about halfway through a season (or calendar year) is when planning should commence for the following season. Ideally there should be a gap between seasons when implementation can occur. It may seem quite early to start planning so soon, but I've seen time and time again that government staff have their priorities changed or a political issue flares up that needs attending to, or fishers involved in the process have to get back to the busy part of their season and can no longer be involved. That all means that suddenly time has run out and then mistakes get made or desired changes have to be triaged.

Attempting to implement mid-season with an electronic system can be a logistics issue. Software may need to be re-installed and additional training may be required. This is all

made more straightforward at a time when vessels should be at port and most stakeholders are not so busy with the regular operations of the fishery.

Data for Fisheries & Business Purposes

This section on page 33 offers a great suggestion and one we support - where it is appropriate.

Traceability is given as one possible example, but perhaps some others are needed to make sure readers realize that trying to meet business and fishery needs is not a catch-all sort of recommendation.

Fisheries data and business data can be very far apart and potentially have no reason to be in the same system. An example is recording the state of crew hygiene, the food inventory on a vessel, and other similar data elements that do not aid in fisheries governance in any way. Recording such data is important to the business of fishing, but does not have a place in fisheries governance. Another more obvious example would be that accounting packages meet a need when running a vessel, but that functionality should never be coupled with a regulatory data collection system.

So the suggestions put forward should perhaps include that there can be a degree of fit between fisheries and business use (which is great when it can occur) and in the absence of such a fit that it should not be a negative deciding factor in ER/EM program assessment.

Confidentiality

Page 34 speaks to confidentiality – something we take very seriously.

In the spirit of not being overly prescriptive with technical requirements, this is one area that we think needs to also embrace that way of thinking.

There can be subtle nuances on the vendor side of the coin that require some novel use of data.

One example would include that ER service providers need to follow rules from NMFS (as they should), but also meet the requests of their customers (could be an industry group, individual fishers, or the government). Situations could arise where the paying customer wants to share their data (perhaps a fisher wants to share their harvest with other fishers) and authorizes the service provider to do so. Often fisheries have regulations about only sharing aggregated and not personally identifiable data that could conflict with that request if not enough leeway is given in terms of confidentiality regulations.

We'd like to suggest that NMFS survey existing vendors to see what their confidentiality characteristics may include (and why) before making final confidentiality decisions.

ER Gaps

Section 5.1.3 states “Improvements in data transmission capabilities at-sea would allow more effective validation of compliance with reporting requirements and validation of self-reported catch data.”

We do agree that better data transmission capabilities will help the entire concept of ER to take greater strides, but we disagree that this would aid in data validation at the source (or that this is somehow not possible given current communications).

It is true that some things cannot be checked at the time of data entry without a 2-way connection (like we have when we connect to the Internet), but our experience is those checks are few and do not impact the validity of the regulatory data being collected.

In British Columbia the only check we cannot perform is whether or not the license on a trip is currently valid – a check we must do against a DFO system when the data comes to our central server. If the license was not valid, the data would not be accepted and an e-mail sent to the vessel to correct the situation. In the Northeast US all data can be validated onboard the vessel.

It does require great care to ensure that business rules of the fishery are built into the interfaces used in the field, but it is entirely possible.

What would indeed help all ER/EM system progress is to get cheaper and better communications available for vessels to use in the US – especially “always on” 2-way capabilities.

Need for Standard Core Data Lists

Although not discussed in the draft and perhaps heading down the technical details path a bit too far, standardized national core data lists should be created and used by all regions. Without these core sets of data, all regions will suffer inefficiencies and national data integration efforts will be far more complex than they need to be. We have put forward these suggestions as we have seen lack of this core data cause many data issues in our fisheries work (and other systems we’ve developed).

Standardized national data lists of species, gear, areas, landing locations (ports), dealers, catch form, catch grade, and units of measure should be created. These lists should only describe the list subject matter and not overload the meaning of that subject matter. For example, in the one fishery we server there are species lists with entries like “skate wings” which clearly do not describe a species, but rather the form (wings) a species (skate) can end up in. The proper way to handle such data (from a systems standpoint) is to have a list of species, a list of forms, and a third list that relates each species with forms applicable to that species. This makes data validation far more straightforward and allows user interfaces to filter out the noise (options that do not apply to the user and the fishery they are in) to make the interfaces less cluttered, easier to navigate, and easier to understand. If all data being collected uses the unique identifiers (i.e. species ID, gear ID, etc.) in those lists, national data integration and comparison is considerably easier.

Need for Standard Units of Measure

As with data lists, units of measure were not discussed in the draft – we feel they are critical to moving forward.

Standard units should be implemented wherever possible and conversion factors between those units made available. For example, our work in Maryland's blue crab fishery introduced us to the "bushel". This unit of measure is not easily converted to any other more discreet unit (i.e. pounds, kilos, etc.) because it is the equivalent of seeing how many people (crabs) you can stuff in a phone booth (the bushel). It is well known that some crabbers remove retaining bands on the bushel baskets allowing them to stuff more crabs in. The seafood dealers recognize this and record their purchases in pounds so they pay for what they actually receive and not somewhere close to it.

Using nebulous units like bushels makes accurate data set comparisons with differing units inaccurate. For example, looking for mis-matches between dealer reports and logbooks where each data set uses a different unit of measure. If a bushel is used in such a comparison with pounds being the other unit of measure, all mis-matches are suspect as the conversion between units is not perfect. This can lead to using thresholds of difference to indicate mis-matches which lead to the need for additional human analysis instead of faster fully automated approaches.

It is suggested that all regions try and adopt a single unit if possible, and if not then a short list of units that can be easily converted between one another with accuracy. This is an area where the well known "it's always been that way" argument does need to be challenged.

FACTS™ is not listed

It's a little difficult to know what date this text was written (Phase III: Program Design page 39) "At present, only the FLDRS software application is approved for use as an eVTR. At this time (June 2013), FLDRS software.....", but if I may be so bold as to point out that FACTS™ was approved for use as an eVTR in the region on May 17, 2013 and has been in use for hails and dockside monitor data entry (when it was still part of the program) since May 1, 2010. I understand why listing us in the section mentioned above may not be appropriate (as we are a service provider), but being listed in the appendices does seem appropriate.

I'm not asking to be listed as a sales technique and instead see it as being a resource that can be called upon (much like my neighbors here in Victoria, BC – Archipelago Marine Research) to aid on in this broad ER/EM discussion.

Conclusion

If any of my interpretations (based on my replies above) of issues discussed in the draft were wrong, my apologies. Without face-to-face communication, many misunderstandings can occur – I take no offence to a rebuttal and in fact would welcome it.

Since I got involved in the eFIS workshops in 2011 at AFS in Seattle, I've been looking for signs of further progress on the subject of electronic reporting and monitoring. So thank you for reaching out.

I would like to stay current with national ER and EM efforts and to be involved in any way I can.

Please do not hesitate to contact me in future for any reason – in an official capacity or for a phone chat and brainstorming session.

Best Regards,
Bryan Stevenson