

# Top 10 Questions Building Equipment Readiness Feedback Indicator Assess Upgrade/Repair Metrics

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Standing up a new modernisation command for the express purpose of efficiently deploying weapons systems capabilities and capacity requires both Site Visit Executive attention and plenty of input from troops to keep it running. The idea is to keep war fighters closer to the process, while bringing the right experience and perspective to fuse the requirements and acquisitions process.

Information from readiness systems is required to determine number of pieces of equipment available for deployment. No Site Visit Executive has created an easy way to link equipment information available from readiness and Services systems.

Under current administrative structures, Troops, requirement writers for what new equipment must do, the programme offices who actually build things, and the logisticians who keep them running are segregated in different bureaucracies. Processes are staff-centric and often stove-piped, which inhibits integration within and across programmes.

Requirements process is slow and overly bureaucratic. To fix this, Site Visit Executive has established unity of command and unity of effort to consolidate the modernisation process under one roof.

Current readiness systems only include commander's best estimate for equipment status. Estimates have traditionally been utilised usually for overall equipment assigned to the unit and not individual pieces of equipment. Military Services use systems to maintain records of equipment under service, but records do not include any information about what units it is assigned to.

Troops coming from operational units will have the best idea of what field-level units need. Site Visit Executive can say 'If you want it bad, here's how much it costs, here's how much schedule you lose.' Today the state of the process is split, it's like the 4 x 100 relay team — the baton just keeps getting handed off.

Readiness Terms are used in different contexts/processes. Operational gaps in systems used by Field Units must be closed so exchange is seamless. Capability to link information as it is processed by Units must be built. Aggregated metrics provided to Commanders must be traced/linked to operational systems used to rollup information.

Site Visit Executive has highlighted how important it is to streamline, rationalise Readiness Plans; currently DoD structure — the institution, the processes, the organisation is not coherent to deliver effective capabilities for the future-- basically a left-right-left, step-by-step process going from an idea, establishing a requirement, writing up big requirements documents, and then vetting it through multiple steps to delivery of a capability, which takes way too long. You just can't operate like that in today's world. You just can't do it. It's got to be faster, it's got to be streamlined, it's got to be more coherent, and Site Visit Executive has got to bring it all together.

Until now, no Site Visit Executive has yet stood up to identify functions spanning across process and write terms required to support processes. You need to get the operator ranks on a System Build Line, on a tarmac, so they can actually get out there and physically work the configurations.

Troops must be involved with identifying and scouting new gear and capabilities, and every day prove their mettle to solve problems constantly. It's made life so much easier, because they can tell you with precision what they need and you can make the trade-offs right there. It's trying to scale that type of behaviour.

For a variety of reasons, aviation depots are struggling to get aircraft through maintenance periods on time. In turn, these delays directly impact the time Troops have to train and sharpen their skills prior to deployment. These challenges are further exacerbated by low stocks of critical parts and fleet-wide shortfalls in ordnance and an aging depot infrastructure.

DoD has testified before Congress about the maintenance and training backlogs that result from high operational tempo, and how addressing those backlogs has been further set back by budget cuts and fiscal uncertainty. Attempts to restore stability and predictability to deployment cycles have been challenged both by constrained funding levels and by operational demands that remain unabated.

The collective pace of operations has increased wear and tear on aircraft and crews and, adding to the downward readiness spiral, has decreased the time available for maintenance and modernisation.

Deferred maintenance has led to equipment failures, and to larger-than- projected work packages for aviation depots. This has forced removal of aircraft from service for extended periods, which in turn increases the tempo for the rest of the fleet, which causes the fleets to utilise available airframes at higher-than-projected rates, which increases the maintenance work, which adds to the backlogs, and so on.

Reversing this vicious cycle and restoring the short-term readiness of the fleet will require sufficient and

predictable funding. This funding would allow pilots to fly the training hours they need to remain proficient and ensure required maintenance on aircraft are conducted. It would also enable DoD to restore stocks of necessary parts, getting more aircraft sorties airborne and better preparing them to stay deployed as required.

The first step is to understand and document user requirements and Constraints for system capability so acquisition process can meet requirements. Availability/ reliability parameters must be explained and guide trade-off studies of mission capability and operational support, defining baseline against which the new system will be measured. So performance factors need to be matched up with user needs into clearly defined system parameters and allocate/ integrate parameters to relevant disciplines needed to realise success.

Systems engineering attempts to optimise effectiveness and affordability as the capability is created. The systems approach makes sure the question What are the user needs and constraints? is answered before designing the answer. The top-level programme plan for achieving required available/reliable is executed in manner to ensure requirements are achievable. Through understanding user needs and constraints, new capabilities begin to be defined.

Site Visit Executive has called for a new model-based systems engineering space to facilitate aircraft and weapons system development through a paperless process of generating specifications, digital drawings, and testing the design in virtual training space. Operators want mission capability when a new product is delivered, and DoD has not readily delivered on providing this service to field-level units.

Troops want to know that that capability has been fully characterised, so not only do they know what it does, but they know what it doesn't do – equally important to them when they take it into combat. DoD is pretty good at providing this service to operators. When capability is delivered to Troops on Day 1 it's fully integrated with the work/training space they're expecting to utilise it in. Troops are told what it can do, but typically also get the impression, 'don't worry, your training system, your simulator tech is a step or two behind, but it'll catch up.' Well, it usually doesn't catch up.

Weapons systems programme offices need to sit down with operators and understand the requirement on a tactical level: what mission needs to be accomplished, what capability is needed, what threat is being countered, how will the system be used, who will use it, and more. If that information is all included in simulation model, notional placeholder aircraft or weapon can be inserted into the model so smart engineering practises are enabled.

Readiness simulation models can be put back into tactical scenarios where operator is back in step 1 and just see how it goes. What better evaluation or assessment of how the programme is maturing than to actually run

the current level of maturity of performance that we see in our models through the tactical situations we've built with the operators?

Because in the end that's what matters, in the end capabilities-based test and evaluation is about testing the capabilities –not about ensuring design/build teams met every huge volume of specs. That's where DoD spends all valuable time today during Test/Evaluation, validating that design/build teams met the specs. Troops in field-level units couldn't care less, they want to know that the attributes and the capabilities that they're counting on will be met.

Site Visit Executive must establish the case for a materiel approach to resolve gaps in weapons system readiness/capability. The primary focus is to acquire quality products balancing process of satisfying user needs while improving mission capability and operational support, also adhering to scheduling constraints and justifiable acquisition costs.

During capability assessments, time and resources need to be set aside to measure and characterise current operational experience, organise metrics and supply line performance to reach conclusions about the causes of shortfalls. It is also imperative to understand subsystem design complexity and influence on availability/reliability. Capabilities-based approach leverages the expertise of all service directorate activities defining new capabilities.

Site Executive has promoted trying to make a move away from a traditional acquisition serial approach to more of an agile sprint-based type of approach to include establishing multi-disciplinary teams. You've got the operators and the designers and the testers and everybody working together to get through the most important milestone goals, whatever sprint you agree to, push something out to the field and then go in to the next one.

Primary focus is to ensure that joint force is properly equipped and supported to perform across disciplines to identify improvements to existing capabilities and create new warfighting capabilities. Process defines needed capabilities through characterisation of doctrine, organisation, training, materiel, leadership, and Labour at Job Sites. Availability/reliability levels are defined within this framework, principally in the category of materiel.

So Goal is to inform and share metrics among decision makers tasked with design, buy, use, and system support. Information to be shared includes user requirements, and how system will be used or potentially miss targets. Key to any Readiness assessments is description of use/support location, constraints on what support is available for system, what metrics will be available to decision makers, and how that information will be verified.

Aircraft maintenance metrics are important. Don't let anyone tell you differently. Metrics are critical tools to be used by Site Visit Executive to gauge organisation effectiveness and efficiency. In fact, they are roadmaps that let you determine where you've been, where you're going, and how you're going to get there.

Use of metrics allows you to flick off your organisational autopilot and actually guide your unit. But they must be used correctly to be effective. Chasing metrics for metrics' sake is not good thing and really proves nothing. Metrics are nothing more than a barometer for pain. Site Visit Executive responsibility is to know where the pain is in order to make it stop. Understanding the unit's maintenance metrics is only the first part of learning to manage the pain.

Site Visit Executive goals include making maintenance availabilities more efficient, particularly as DoD tries to embrace condition-based maintenance, only fixing or replacing components as needed instead of on a fixed schedule. Supply officers today focus on reactively replacing parts that are consumed from their inventory, instead of using metrics to proactively predicting what parts will be needed and when, which would be more useful in condition-based maintenance regimes.

It is important to look at one of our top readiness metrics source and say, can we be more predictive of the supply side there, reduce the supply line time and get better accuracy around how we provide parts for those types of repairs? You might have to replace a blade on an engine, but you don't necessarily order the bolts with that part. So can we create metrics relationships so whenever for example the blade is replaced there is usually this other task to do as well.

So predictive supply systems can be created that would say you just requested to replace the blade on the engine, you might also need these other parts because we find that there's a high rate of these types of repairs with that as well. And then it's over to the user. The machine and metrics have presented some courses of action; the user can say, no, we don't need that—We already checked, or maybe that wasn't checked, maybe I should do that, let's go see. Site Visit Executive expects predictive sensor tech can be used to compress maintenance cycles and speed up the time.

Metrics are not just charts and numbers to be looked at. They are tools for fixing problems. If the tool does not generate questions, it is a waste of time. If a lot of time is spent looking at metrics that do not address daily problems affecting the unit, their value is questionable.

When there is no applicable metric for driving unit performance, build one. Watch for filtering of the metrics that show the pain—they are the ones with the greatest value. If a metric rarely meets its prescribed standard, the standard is probably not realistic for one of two reasons—it was arbitrarily set too high, or significant

issues need resolution. Either way, investigation into the circumstances is warranted.

Maintenance and supply experts have been surveyed to find out what metrics they collect, through what processes, and to what end. Metrics shouldn't be collected for metrics sake, but must be considered how metrics collection is actually contributing to their mission. So metrics experts then talk Troops through what metrics could be shared and how, to assist each unit in doing their jobs better, and to ultimately reduce the time it takes for an airplane to come into the depot, maintenance to begin, required parts to be identified, the right parts to arrive at the depot, and the airplane to be sent back out for operations.

Maintenance personnel were given new metrics set to work with and new processes to implement on a trial basis, and preliminary results indicate mean time to repair aircraft is already down. Maintainers have also identified new policies, training areas and additions to metrics that would benefit their operations going forward. It will ultimately be up to Site Visit Executive take those recommendations and create long-term solutions from them, but it looks like DoD could realise significant readiness impact just making a couple key changes.

However, caution is in order at this point. Overemphasis of a particular metric while ignoring the root cause of a problem may well lead to an improvement in the metric but worsening of the problem. Metrics are indicators and, as such, should be viewed in aggregate. The relationship between two metrics may be so intertwined as to make it impossible to separate the cause from the effect.

Generally, metrics should be used to identify trends and not as pass or fail indicators. Individually, they are snapshots in time, and even the best organisations will occasionally dip below standards. Good metrics assessments will focus Site Visit Executive attention on those areas where improvements can be realised and not strive to improve a metric but utilise the information to improve performance of the organisation.

Here we provide handbook is to introduce maintainers at all levels to these necessary tools of trade. We encourage each of you to read this handbook and keep it close at hand for future reference. Discuss the importance of metrics with others responsible for advancing quality skill sets of the maintenance workforce. Service Maintenance Units have best people, parts, and equipment in the world. We submit that this handbook will help you capitalise on these strengths.

Site Visit Executive task is to provide good iron to the operators when needed. Understanding metrics and their use in effectively and efficiently executing aircraft maintenance is key to your ability to uphold important responsibilities placed on your shoulders. Good Luck.

1. What are the common/multiple readiness write-ups for major contributing systems or different systems trends?
2. Is Mission Capable Supply/Mission Impaired Capability Awaiting Parts condition information available on aircraft with high supply times?
3. Are there technical metrics limitations or lack of proper tools or could parts reuse/transfer been a factor?
4. Do pilot reported readiness discrepancies appearance indicate recent corrective trend in system write-ups for major system contributors?
5. How are equipment upgrade/repair shops contacts initiated for repeat/recurs checks made in effort to identify component failures?
6. Have maintenance procedural, training, or skill-level problems impacting overall readiness been identified?
7. How are quality assurance summaries and deferred discrepancy lists reviewed for positive and negative trends identify problem aircraft or systems readiness issues?
8. Do Aircraft scheduling deviations for negative maintenance practices and trends impact work force and stability of workload availabilities?
9. How is maintenance portion of the base/intermediate repair enhancement programme monitored/evaluated?
10. How to determine performance of selected systems, subsystems, and line-replaceable units to isolate source of problems affecting mission readiness capacity?