International Journal of Communication and Information Technology

E-ISSN: 2707-6628
P-ISSN: 2707-661X
www.computersciencejournals.com/ijcit
IJCIT 2023; 4(1): 12-17
Received: 05-10-2022
Accepted: 11-11-2022

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Readiness data collection, evaluation and reporting system for combat tenders: A conceptual framework

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DOI: https://doi.org/10.33545/2707661X.2023.v4.i1a.54

Abstract
This paper presents a conceptual framework for readiness data collection, evaluation and reporting system for combat tenders. Modules on data gathering areas and the elements of the gathering areas are built; from which a matrix is established.
Type of data to be collected namely; state data and data are identified. Readiness Data Collection (RDC) and reporting system are proposed. A dynamic Fleet Readiness Analysis Centre (FRAC) is also proposed. The framework is based on the; method of c-ranting technique for Combat Readiness Assessment.

Keywords: Data gathering area, data gathering elements, state data and factor data

Introduction
The assessment of the capability (readiness of combat tender (naval fleet) to carry out a specified challenge (task) is a matter of considerable importance if forces are expected to minimize waste and risk. In other that combat readiness (CR) be meaningfully assessed, it is imperative that the assessment is tailor made towards a particular task. The relevant readiness data, how it is collected, evaluated and reported upon is imperative to this objective. Hence, in this work, a conceptual framework system for the collection of readiness data evaluation and reporting is in the front burner.

Readiness data gathering matrix: Now, Module I (MOD I) and Module II (MOD II) are to be used concomitantly. The treatment gives in what we call the Readiness Data Gathering Matrix (REDGAM) shown in table I.

Table 1: Readiness Data Gathering Matrix

Mod I andMod II	(A-II)	(B-II)	(C-II)	(D-II)
(A-I)	O_o	O_e	O_t	O_c
(B-I)	L_o	L_e	L_t	L_c
(C-I)	E_o	E_e	E_t	E_c
(D-I)	M_o	M_e	M_t	M_c

Nomenclature
O = Operations
L = Logistics
E = Engineering Systems
M = Manpower
O = Own forces (Fleet)
E = Enemy force (Fleet)
T = Terrain (Theatre of Conflict)
C = Nature of Conflict

The REDGAM is read (.,.) = MOD I, MOD II)

The gathering area is the first entrant (in Capital Letter), then the element upon which information/data are being gathered (in lower case). For examples, (.,.) = [(A-I), (A-II)] = O_o will mean, data on own force (Fleet) as it concerns the RA operations with respect to the identified Task.

(.,.) = [(B-I), (B-II)] = L_t. This will mean data on terrain (theatre of war) as it concerns the RA logistics. That is, the required logistics backup to meet the challenges of the terrain. And so on.

Elements of an area could assume one of the three possibilities:

i) Owns Territory
ii) Enemy's Territory
iii) A neutral Ground

When possibility I is case, then data on terrain for example will be easy to compile but if the conflict is in enemy's territory-possibility II), then it will pose some difficulties and may require a lot of intelligence gathering. A neutral ground terrain (possibility III) could equally offer some serious challenge when it comes to data gathering.

Engagement with an adversary, the 'e' factor will generally need to cover amongst others

- Enemy Weapons Systems.
- Enemy Allies.
- Enemy Manpower Capacity and Forces Structure.
- Enemy's ability to sustain hostilities and survivability.
- Etc.

Types of data to be collected

The type of data to be collected should be geared towards the war effort or each subresource for the accomplishment of the task. This will largely depend on the nature of the Specific Operational Requirement we are assessing relevant data.

Basically, there are two types of data to be collected; namely:

a) ϕState data (Prevailing (Static) Condition of sunresource).
b) λFactor data (Task, Terrian and Nature of Conflict Components).

ϕState Data

This is the input data. It is the Prevailing Condition (PSC) of subresources. It concerns the PSC of own forces at the time of assessment. It could be graded as excellent, good, fair or poor. ϕ State data, entries are:

[(A-I), (A-II)] = O_o; [(B-I), (A-III) = L_o; [(C-I), (A-II)] = E_o; [(D-I), (A-II)] = M_o.

For each of the entries there may be a number of subresources ($\geq$ I) which will be required for accomplish task. The question arises, when do we say a subresources is in an excellent, good, fair or poor condition? Table 2 provides a typical basis.

Table 2: A typical PSC criteria grading system

ϕState	Prevailing Static Condition	(% of STD met)
ϕ_0 (Excellent Condition)	The sub resource meets fully the MOD standards in terms of the appropriate phenomena e.g. operating state, quality, quantity, performance, etc.	80% and above
ϕ_1 (Good Condition)	The sub resource can be used or deployed with some deferrable limitation (defects). It cannot withstand a resource	Between 50% and 80%
ϕ_2 (Fair Condition)	Sub resource has conspicuous deficiencies, which can affect badly the capacity of the system.	Between 30% and 50%
ϕ_3 (Poor Condition	The characteristics sub resource under consideration is in bad state. It cannot be engaged and cannot withstand the minimum enemy engagement.	Below 30%

Typical relevant ϕ-State sources that need to be addressed in designing the test are shown in figure below.

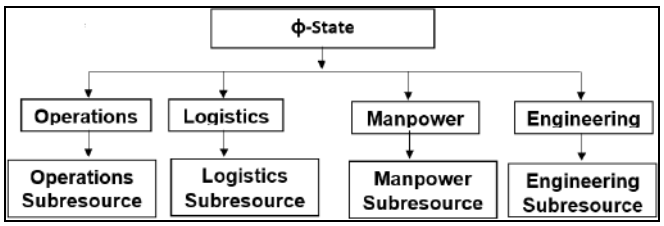

Fig 1: Typical ϕ-State Sources

It is significant that the design takes into account all the relevant variables not only the ones of primary interest.

The λ-factor data

Data for determining the various Lambda values for each subresource will largely be predicated on the task or the challenge. The enemy's capability, terrain of operation and the nature of the conflict constitute the task. Enemy's capability will include aspects such as degree of armament sophistication, manpower level of training, political will, defense pacts, etc. It will also include the enemy's capacity in terms of operation sophistication, logistics backup and engineering systems support. But, by far one major factor that will influence the critically variable is own and enemy objective.

The terrain is also a major component in determining the criticality of subresources in the execution of the task. Information from the terrain is not control data as it is independent of owner's command. It is of note that in carrying out its mission, a ship subjects its subresources to a number of environmental stresses. Some of the stresses are dependent upon the mission theatre; others are independent to sheer activity of cruising and maneuver (Pitching and rolling). Heat and vibration may take a tool on some subresources especially electronic gadgets. The 'on', 'off' and cyclic stresses can occur. Some terrain factors are illustrated in figure below.

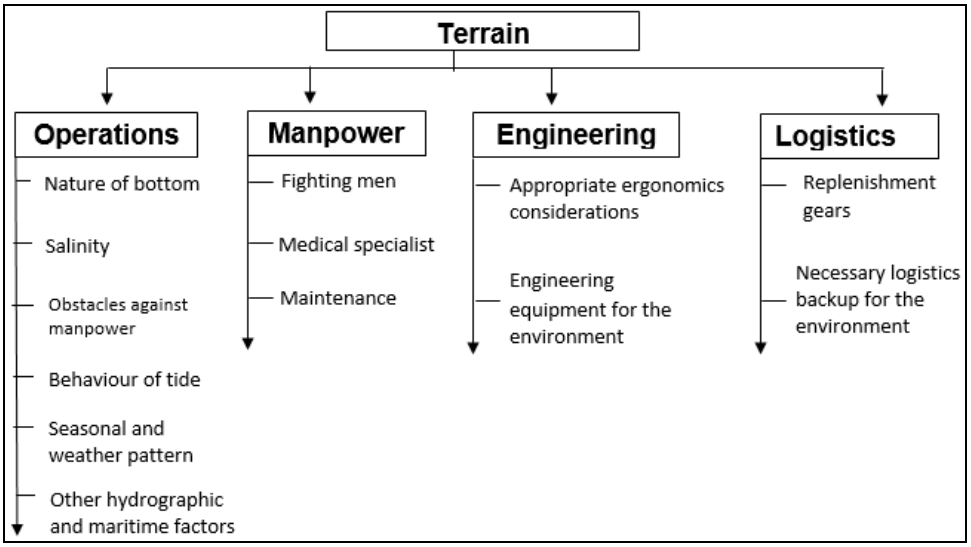

Fig 2: Terrain Factors

The nature of the conflict-biological, chemical, nuclear or conventional warfare will greatly influence the various factors for the subresources in the fleet. The λ-value for each of the subresources required for the accomplishment of the task will be determined by:

O_e, O_t, O_e, L_e, L_t, L_e, E_e, E_t, E_e, M_e, M_t, M_e.

We ask the big question: When do we assign a particular value to a particular subresources? Table 3 shows a typical grading system for determining factor.

Table 3: Typical λ-factor criteria for grading system

Grading Bases Lambda Factor	The consequence of the unavailability of the sub-resource on the identified task	War effort description
λ_0	Exceptional grave damage to the capability of the fleet and by extension, the entire nation.	Highly critical.
λ_1	Serious damage to the capability of the and consequently injury to the interests of the nation.	Critical.
λ_2	It may limit significantly the readiness status to engage a task.	Non-critical but may be vital.
λ_3	Has no bearing (no fleet) on the capability of the fleet for this task at this time of assessment.	Inconsequential, i.e. not a readiness indicator.

The Readiness Data Collection Instruments (RDCI)

In this section, we purpose a number of readiness data collection instruments. The comprise a number of forms, namely, the subresource status from (SSF-01), the Lambda (criticality) factor record form (CFRC-02), constant criticality subresource form (CCSF-03) and ship subresource precarious form (SSPF-04).

Table 4: Subresources Status form (SSF-10)

State Record SS-01	Assessment Period		Type of Assessment		Precedence
	Date	Time	Routine	Special	
Ship	Resource Area		Resource Type		
Description or Status			Name of Assessor:_____ Specialty:_____ Rank:_____ Signature:_____		
For DPIU use Only					
			Name of Assessor:_____ Specialty:_____ Rank:_____ Signature:_____ Date:_____ Time:_____		

Table 5: Lambda (Criticality) Factor Record form (CFRF-02)

State Record CFRF-02	Assessment Period		Type of Assessment		Precedence	
	Date	Time	Routine	Special		
Ship	Resource Area		Resource Type		Task	
					Actual	Perceived
Elements for Criticality Assessment 1.			Complier:_____ Specialty:_____			

2. 3.	Rank:_____ Signature:_____
For DPIU Use Only	
Time Arrived:_____ Current State:_____ Last State:_____ Validity period for current assessment: _____	Name of Assessor:_____ Specialty:_____ Rank:_____ Signature:_____ Date:_____ Time:_____

Table 6: Constant Critical Subresource Form (CCSF-03)

Subresource:_____
Constant Status:_____
Factor:_____
C-Ranting
Task 1: _____
Task 2: _____
.
.
.
.
Task x:_____
Validity period for current assessment:_____
Assessed by:_____
Rank:_____
Signature:_____
Date:_____
Time:_____

Table 7: Ship Subresource Precarious form (SSPF-04)

Subresource:_____
Resource Area:_____
Precarious Degree in Ship's:_____
S1: _____
S2: _____
.
.
.
.
Si: _____
Period of validity:_____
Assessed by:_____
Recorded by:_____
Name:_____
Rank:_____ Date: _____ Time: _____

Combat readiness reporting system

Reading of the readiness posture actually starts right from the time data and information are being collected on relevant sub-resources to reporting on result and findings of analysis. Note that before a final report is made, there would have been various sub-reports from one unit to another while yet in the analysis stage.

The act of reporting is as crucial to mission success, as is the art of data collection and evaluation. Priel (1974) [5] noted that, developing a good report format is difficult and ensuring a regular flow of data, day, week after week, requires a dogged perseverance.

Now, reports can be internal or external. Internal reports for readiness assessment should include reports between units of the Analysis Centre. While external reports will encompass reports to be sent to the Military High Command (MHCOM).

Basically, reports should satisfy some provisions, namely:

- Summary of entire findings.
- Agree with data analysed.
- Should be reliable at least within the validity period.
- Unambiguous and quick to understand of decode to ensure prompt response.

Reports should be classified and stored in the appropriate places. However, they should be stored such that the retrieval will not be difficult or cause unnecessary delays.

Reporting of analysed data can be done on some of the established known statistical models. Models such as bar charts, histograms, pie charts, graphs, percentages, etc. can be aptly employed. However, it must be noted that, the models used must be considered vis-à-vis the complexity of the situation under discussion i.e. the task being assessed.

The activities that will be required for collecting, evaluation and reporting the readiness data will be quite numerous. As such, there will be need to install a facility that can execute this task. In Section D, we propose, an organizational structure that can effectively man the various concepts

evolved in previous Sections. We call this the Fleet Readiness Assessment Centre.

Fleet Readiness Analysis Centre (FRAC)

Organizational configuration

We propose here, an organizational structure for the facility to handle readiness matters. The hierarchical setting is such that management is the apex body in the structure. Next to this are the technical offices, then four units designed to carry out various functions in the day today running of FRAC.

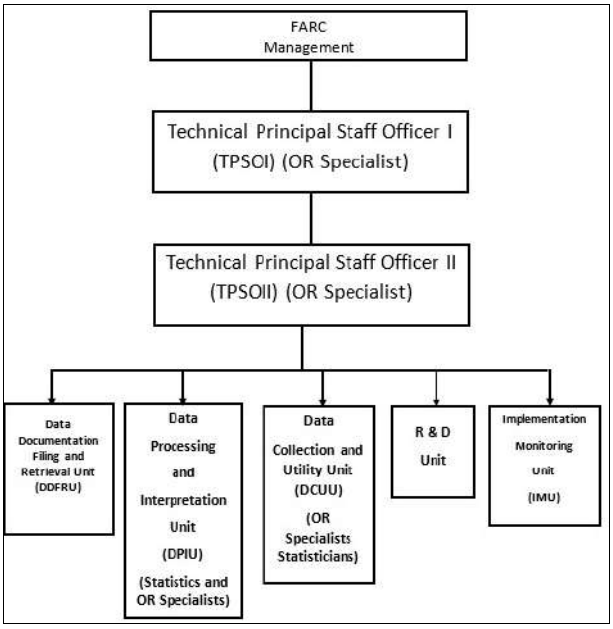

Fig 3: Fleet Readiness Analysis Centre (FRAC)

Figure 3 show the organizational chart for our proposed model.

Five departments are proposed namely:

a) Data Collection and Utility Unit (DCUU).
b) Data Documentation, Filing and Retrieval Unit (DDFRU).
c) Data Processing and Interpretation Unit (DPIU).
d) Research and Development Unit (RDU).
e) Implementation Monitoring Unit (IMU).

The interfacing of the various units is as shown in figure 5 below.

Basically, the DCUU collects data from the field. It is the liaison body with the various units in the field and other inorganic unit and system e.g. Air force and Army. The DDFRC handles the documentation and effectuates the filing and retrieval of reports and data information required by the DPIU or any other unit or authority that so requires. This unit ensures that each document is given the required security protection as classified. Clear security instructions should be marked out. For the fact that the security of document depends, not only on proper handling, but also, on appropriate and correct grading, it is imperative that security grading for security material should be handled according to the rule framed.

A material, which requires security protection is termed 'classified' and is assigned a security grade. For example, in the Nigeria Armed Forces, classification such as Top Secret, Secret, Confidential or Restricted, are in use. All other official document is marked 'unclassified'. Classification of document may alter from time to time depending on prevailing situation. This compares well the behaviour (dynamic nature) of the A-factor. The DPIU is the main nerve of the system. The unit shall be charged with the responsibility of analysing the data as received from DDFRU. It also interprets the data and when necessary, raises observation on inadequate data. The analysed data is sent back to the DDFRU for storage ready for use by the DCUU.

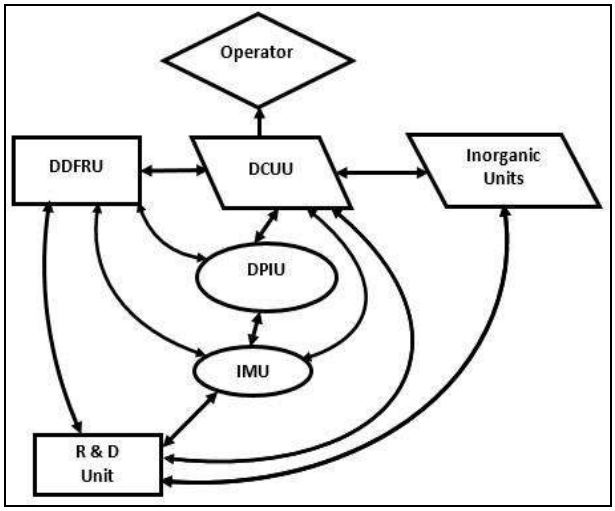

Fig 4: Interfacing of FRAC Units

The Arrows indicate the direction of flow of information.

The R & D unit will engage in hard core research work for further development of the fleet readiness: Periodic special studies can be conducted on existing data base so as to capture the trend of the readiness posture of subresources and hence the fleet. The IMU will act as the inspectorate arm of FRAC. It will regularly monitor the implementation policies as appropriate.

Operations of the facility

The operation of the facility is similar to that of facility for reliability analysis in the sense that both can be classified as feedback systems. The interfaces between the units are shown in figure 5. The operation commences with collection of data from the various data gathering areas (operations, logistics, engineering and manpower). Of course, the required type of data is the one that is relevant. Collected data are then subjected to evaluation and analysis. The scheme developed in section II of this work will be used. This involves reducing the data to a manageable form, coding, etc. then the publication and reporting of findings follows.

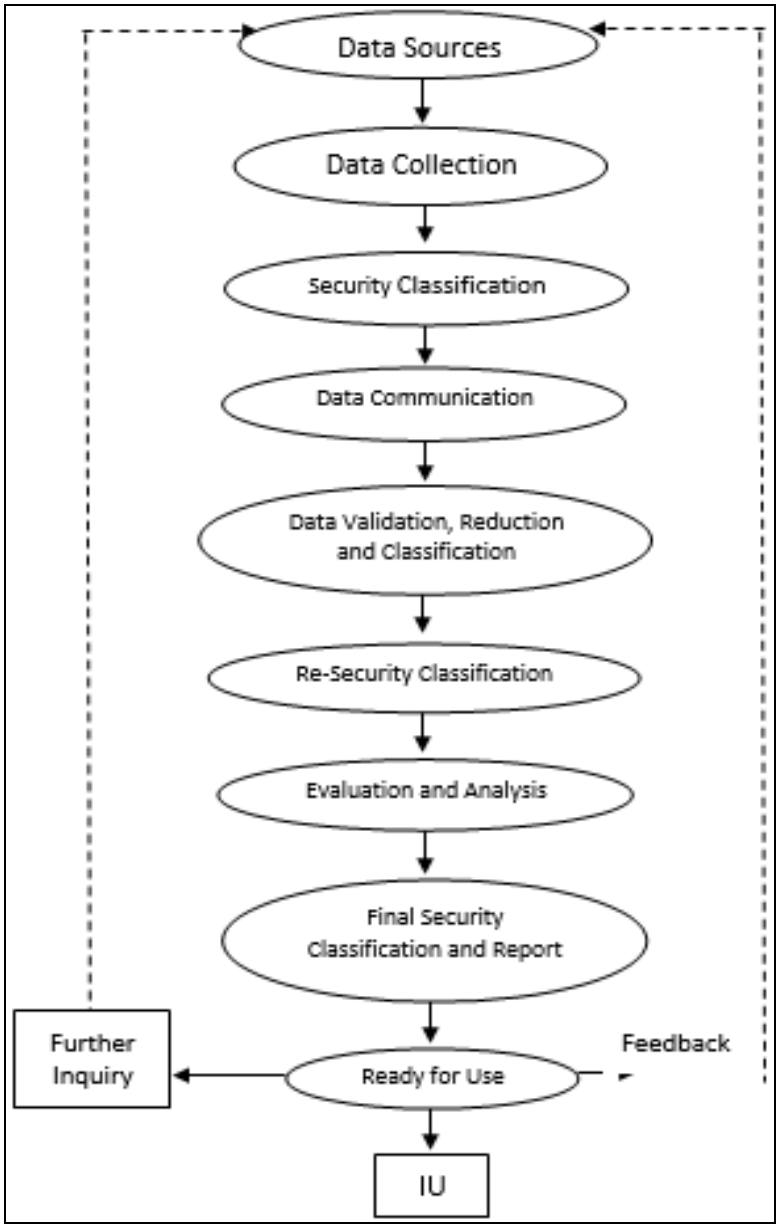

Fig 5: Shows a schematic diagram of the system operations

Conclusion

The concept of readiness elicits the existence of a challenge. It demands the marshalling together of a number of relevant resources to an acceptable status if the challenge is to be adequately and decisively engaged. At the heart of the problem is the question; can the resources do the job? To answer this question it implies that, an assessment of the unit capability (her logistics, manpower, engineering and operations) needs to be done.

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