Criteria for consistently assessing levels of maturity (CALM) of REDD+ concepts

INTRODUCTION

GFOI has drawn on the concept of Application Readiness Levels (ARL) (Box 1) to develop criteria to **consistently assess levels of maturity (CALM)** (Table 1) of concepts under assessment (CUA) related to REDD+ MRV.

The CALM criteria are used by GFOI stakeholders in internal communications relating to the development of guidance and capacity building materials and research priorities for REDD+ and other similar mechanisms MRV.

The NASA ARL protocol was chosen as the basis of CALM for its standard known by several practitioners and nine levels enabling a fine and gradual assessment of a concepts progression from research to operational status.

BOX 1: Application Readiness Levels

Application Readiness Levels (ARL[1]) were developed by NASA[2] to track and guide project application efforts. The ARL assessment system has been widely used and adapted in a number of applications as an indicator of the development status of concepts such as technologies, methods, tools and data.

Other major stakeholders in research and development have proposed similar assessment systems including the Technology Readiness Levels of the European Commission[3] and who proposed an Application Readiness Level[4] to assess processing requirements needed for the integration of multiple sources of data from virtual constellations.

ACRONYMNS

ARL – Application Readiness Level

CALM – Consistent Assessment of Levels of Maturity

CUA – Concept Under Assessment

GFOI – Global Forest Observations Initiative

MRV – Measurement, Reporting and Verification

NASA - National Aeronautics and Space Administration

R&D – Research and Development

DEFINITIONS

CUA – a concept under assessment can include processes, technologies, methods, tools and/or data

CALM – a set of quantitative criteria used by GFOI components for internal communication of concepts under assessment relating to co-ordination activities

GFOI APPLICATION OF THE CALM PROTOCOL

CALM is used to consistently communicate maturity levels within and between GFOI components in the following way:

The **Research and Development (R&D) Coordination component** encourages their community to report the status of their research using CALM in order to communicate progress toward operational status. Using CALM, the R&D Coordination component would encourage the formulation of targeted research calls to meet specific R&D gaps and fund promising (early and mature stage) research.

The **Methods and Guidance Document component** utilises CALM in assessing and prioritising the development of new guidance on pre-operational/operational concepts.

The **Data component** uses CALM to communicate the maturity levels of data platforms and tools that help bridge the gap between scientific and technological developments and country MRV needs.

The **Capacity Building component** communicates maturity level through the development of training materials of the concept that forms part of its country outreach/engagement and would encourage countries to seek to build their capacity in technologies that are considered operational.

THE CALM PROTOCOL IN PRACTICE

Applying the CALM criteria (Table 1) to a CUA will lead to the assignment of a rating: 1 being lowest; 9 being highest. Levels 1-3 are considered Research[1] 4-6[2] Pre-operational and 7-9 Operational[3].

Advantages and strengths in applying CALM include:

- establishing internal GFOI consistency in the assessment of technology or method status;
- prioritising R&D activities;
- prioritising the development of guidance for pre-operational/operational CUAs;
- prioritising the development of tools for pre-operational/operational CUAs;
- contributing to enhancing communication in the context of capacity building
- assess individual components of the MRV systems which may have different levels of maturity.

Limitations in applying CALM include:

- The CALM criteria has its basis in the qualitative assessment of common practice, therefore CALM levels do not cater for unique national circumstances nor does it quantitatively assess best practice; therefore maturity does not necessarily fit with appropriateness, effectiveness, performance, relevance, transparency, reproducibility or other quantitative elements of CUAs for national implementation.
- assessed CUAs may not consider the entire operational context of an complete MRV system; rather only components that may form a part of the system.

[1] ARL's Discovery and Feasibility phase
[2] ARL's Development Testing & Validation phase
[3] ARL's Integration into Partner's System phase

Considerations in the utility of the CALM criteria are that:

- CALM is applied on an individual basis and is not used to rate or compare CUAs.
- Results of the outcomes of the CALM assessment are only relevant at the time of the assessment, and for the region / case study for which the assessment has been done, and are used in internal decisions between GFOI groups.
- There is no CALM register or centralised management of results. GFOI does not publicise a definitive list of assessed CUAs.
- A CUA can be assessed at any CALM level and does not have to have passed previous levels.
- It is up to the users of the CALM criteria to define what evidence is acceptable for milestones. Therefore the results can be subjective.
- A CALM assessment of a CUA does not endorse or revoke the use of the CUA. It is up to the user of the CUA to decide the level that is acceptable for their context.
- GFOI is neither the auditor nor authority for results of the usage of this CALM protocol.
- Countries may use CALM to assess if a certain CUA is a candidate for use in their MRV, however it does not assess applicability to country specific circumstances and as such does not assess risk of adoption.

Table 1: Criteria for consistently assessing levels of maturity (CALM) of REDD+ concepts

Phase	Level	Milestones	REDD+ Supporting Information
Research	1 Basic Research (Conception)	• CUA has stated goals for application in REDD+ MRV systems. • Prerequisites of CUA detailed	• Literature review • Concept notes available
	2 Application Concept (Invention)	• High level outline of CUA formulated and created • Intended priority key aims and scope of CUA identified	• Research proposals submitted or approved
	3 Proof of Concept (Viability Established)	• CUA design is independently reviewed • Detailed documented design of the CUA • Convincing case for the viability of the CUA made	• Publications exist outlining the application being considered and provide analysis to support the concept. • Appropriate calibration and validation data are available.
Pre-operational	4 General Planning in external context (Prototype/Plan)	• Components of CUA brought together and external interaction issues worked out • Impacts of CUA understood and mitigated	• Experimental data / publications for small-scale scenarios are available.
	5 Specific Planning in Relevant Environment (Potential Determined)	• Impacts and required changes have been reviewed and pros and cons understood • Accepted to proceed to beta testing	• Experimental data / publications available at national / jurisdictional level. • Methods assessed for applicability in REDD+ MRV context.
	6 Demonstration in Relevant Environment (Potential Demonstrated)	• Prototype CUA beta-tested in a simulated operational environment • Results reviewed and assessed	• Data/estimates are acquired/made in consistent and sustainable manner for routine national monitoring • Publications outlining the processing workflow and application in REDD+ MRV context available.

Phase	Level	Milestones	REDD+ Supporting Information
Operational	7 Adopted in an Operational context (Functionality Demonstrated)	• CUA adopted in operational environment • The CUA has demonstrated pre-operational phase level 6	• Active implementation and capacity in country organizations mandated to conduct REDD+ MRV.
	8 Application Completed and Qualified (Functionality Proven)	• CUA used in operational environment and results reviewed and shown to operate as expected • Results from CUA qualified and approved • Documentation and training completed	• CUA has been used in the development of estimates submitted in reports to the UNFCCC or other bilateral arrangement/programme. • Core data are available for routine monitoring.
	9 Operational Deployment and Use (Sustained Use)	• Sustained use of CUA in operational environment	• CUA has been subjected to technical assessment / technical analysis process of UNFCCC (or equivalent third party validation/verification) process at least once.

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