



# EMS progress on IOTC

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3rd Workshop of an Electronic Monitoring  
System (EMS) in the EPO

**ISSF**

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## Introduction

- Observer data is key to compile, complement and verify fishery activity information,
- Ideally, scientific observer programs separated from those for compliance,
- Observer coverage in tunaRFMOs:
  - 100 % for PS IATTC-WCPFC-ICCAT
  - 5 % for LL in IATTC-WCPFC and 10 % for LL in ICCAT
  - 5 % of the operations for each gear type in IOTC (Resolution 11-04).
  - 100% for LL at-sea transshipment on the receiving vessels.
- Electronic Monitoring could be a good alternative, and complement or replace human observers

## Introduction

- EM pilot tests in different regions on PS/LL/SSF demonstrated the validity of EMS to improve the collection of fishery information.
- Before EM application, it is necessary
  - to assess the similarity between EM and observers-collected fishery data,
  - to ensure that observer minimum data requirements can be collected,
  - to develop minimum standard for the installation, collection, analysis and storage of data.
- Due to the Covid pandemic, Observer/transshipment ROPs has been suspended in some RFMOs.

# IOTC EM

- Started around 2014
- Trials, lessons learnt.
- In 2017 the Commission preliminarily adopted a set of minimum EM standards for PS but not as a Resolution.
- In 2018 IOTC SC recommended the development of minimum standards for EMS for all IOTC tuna fisheries.
- In 2019, Regional Observer Scheme minimum standard data fields were adopted by the IOTC Commission
- In 2020, ISSF, IOTC and AZTI prepared a paper on EM minimum standards for the installation, collection, analysis and storage of data.
- In 2020, the SC recommended the creation of an ad hoc WG to further advance EM in 2021.
- 2021: Commission endorsed the ad hoc working group
- 2021: the WG will further develop EM standards for SC revision and, ultimately, adoption by the Commission in 2022

# IOTC EM

- The **WGEMS therefore RECOMMENDED** that future WGEMS meetings include participation of scientists as well as compliance experts to advance the discussions on the benefits and use of EMS in the IOTC.
- The SC NOTED the outcomes of the 1st ad-hoc IOTC WGEMS and **RECOMMENDED** the Commission endorse its continuation in the future
- The **SC ENDORSED the Terms of Reference and Plan of Work for the WGEMS.**



IOTC–2021–WGEMS01–R[E]

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Report of the 1<sup>st</sup> Session of the IOTC Ad-hoc Working Group on the Development of Electronic Monitoring Programme Standards (WGEMS)

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Online, 15 - 17 November 2021

# IOTC EM

- Objectives and Scope
- EMS definitions,
- EM Data Standards,
- EM Program Standards
  - Institutional structure and program management,
  - Data collection and review rate,
  - Roles and responsibilities,
  - Specifications and procedures,
  - Timeframe for implementation
  - Confidentiality
  - Cost and financial considerations.
- Expert WS



## APPENDIX IV

### TERMS OF REFERENCES FOR THE AD-HOC WORKING GROUP ON THE DEVELOPMENT OF ELECTRONIC MONITORING PROGRAMME STANDARDS (WGEMS)

To develop EM Program Standards (i.e., how the institutional structure and management of the program is organized) and EM Data Standards (i.e., the minimum data requirements to be collected and technical specifications and requirement of the EM system).

#### SPECIFIC OBJECTIVES

- To define the objectives and scope of the EM Program in the IOTC.
- Develop and agree on Electronic Monitoring related terms definitions.
- To draft EM Program Standards and EM Data Standards
  - **For EM Program Standards:** objectives of the programme, scope of the fleets, institutional structure and management of the programme, data collection and review coverage, roles and responsibilities of members, specifications and procedures, timeframes for implementation, accreditation of vendors, data confidentiality and access and use, coordination, observer training, cost and financial considerations, etc.
  - **For EM Data Standards:** minimum requirements for EM system and equipment, EM data collection and storage, EM data transfer logistics, EM data analysis and submission, EM maintenance and functioning, EM data validation and quality control, roles of EM users, including the collection of minimum data requirements.
- Identify and assess areas where EM could strengthen current IOTC collection and reporting processes.
- Develop a roadmap and workplan to progressively implemented an EM Program for IOTC fisheries including, but not limited to, fleet specific cost benefit analyses and capacity building.
- Consider how to ensure the compatibility of the data collected by EM programmes with other data currently collected through other programmes (VMS, ROS, etc.).
- Consider and review the best approach (e.g., through a Resolution) to implement the EM programme in IOTC.
- Develop tools, innovative strategies and collaborative projects for collecting, handling, processing and analysing fishery-dependent data from electronic technologies; for example, through machine learning and artificial intelligence and seek the collaboration from academia in joint-initiatives to progress on the matter.
- Consider how to ensure standards are flexible enough to not exclude or limit the use of future technological advances
- Hold an expert workshop(s) to review the draft EM Program Standards and EM Data Standards for IOTC Commission consideration.

# IOTC EM

- **EM implementation roadmap,**
- **Compatibility with other data VMS, etc...**
- **ML & AI for data collection, handling, processing, and analysis.**
- **Expert WS**

## APPENDIX V

### AD HOC WORKING GROUP ON THE DEVELOPMENT OF ELECTRONIC MONITORING PROGRAMME STANDARDS (2022–2026)

The Program of Work consists of the following, noting that a timeline for implementation would be developed by the SC once it has agreed to the priority projects across all of its Working Parties:

**Table 1.** Priority topics for obtaining the information necessary to deliver the necessary advice to the Commission. Resolution 11/04 and 16/04 elements have been incorporated as required by the Commission.

Topic	Sub-topic and project	Priority	Ranking	Lead/ Participation	Timing				
					2022	2023	2024	2025	2026
1. EMS Pilot Projects	Facilitation of EMS pilot projects in IOTC fisheries (LL, PS, PL, GN, and others) to ensure that ROP minimum data requirements are collected by EMS	High	3	Scientist					
	Cross validation of EM information with other data sources								
	Identify needs and encourage pilots for new electronic tools and systems.								
2. EM Minimum data Standards <sup>1</sup>	Agree on definitions	High	2	Scientist, vendors, experts, stakeholders and managers					
	Minimum technical specifications and equipment								
	Data collection (including EM capabilities to collect ROP minimum data requirements) and storage								
	Data transfer and logistical specifications								
	Data analysis specification and data submission								
	EM maintenance and functioning,								
	EM data analysis, validation and quality control specifications								

## **“Possible” Scope/Objectives of IOTC EM PROGRAM**

**The objective of implementing an Electronic Monitoring Programme (EMP) in the IOTC, in line with Res. 11/04 (“On a Regional Observer Scheme”), can be “to collect verified catch data and other scientific information related to the fisheries for tuna and tuna-like species in the IOTC area of competence, and to support the implementation of the conservation and management measures adopted by the Commission.**



# EM capabilities to collect ROS Minimum Data Standards

From 24 IOTC ROS MR:

- 11 are ready to be collected
- 13 possible to be collected/reported with minor work.

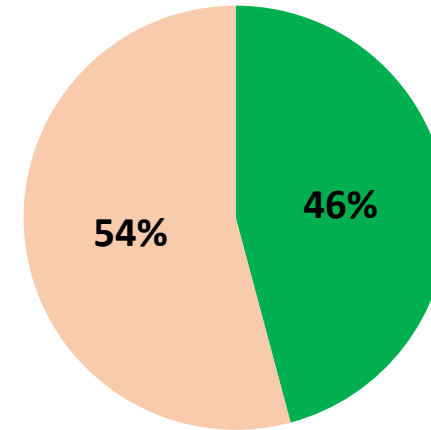
5 “optional for reporting” and 30 “suggested for collection”:

- 17 are ready,
- 7 are not needed (i.e. observer information),
- 8 could be collected with minor work and
- 3 are not possible to collect.

**It seems that EM is well suited to collect the current ROS data fields.**

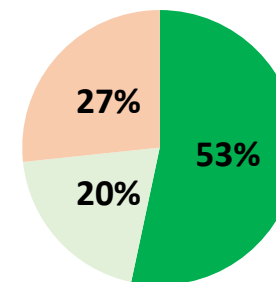
## GENERAL DATA FIELDS

Mandatory Reporting

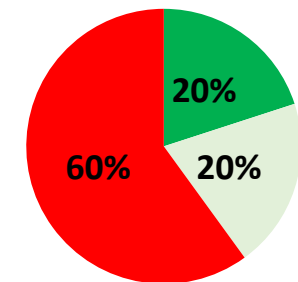


■ R1 ■ R2 ■ NULL ■ P1 & P2 ■ NP

Suggested



Optional



# EM capabilities to collect ROS Minimum Data Standards

From 51 IOTC ROS Mandatory Reporting:

- 28 are ready to be collected (55%)
- 7 ready but require little work,
- 3 ready but require specific work and/or costly,
- 5 possible with minor/major work,
- only 8 not possible.

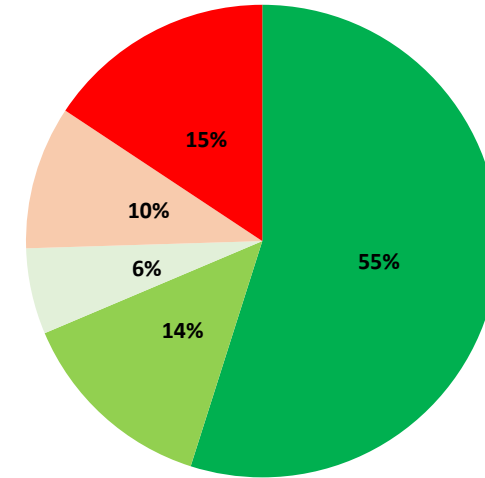
22 “optional for reporting” and 21 “suggested for collection”:

- 20 are ready,
- 6 ready but require specific work and/or costly,
- 2 possible with minor/major work,
- 15 not possible.

**It seems that EM is well suited to collect the current ROS data fields.**

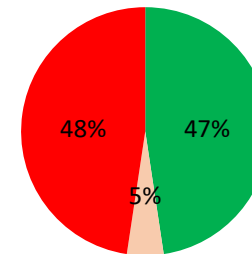
## PURSE SEINE

Mandatory Reporting



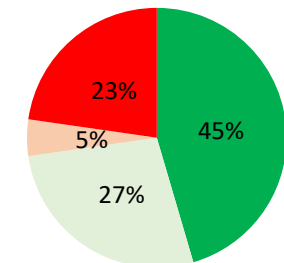
■ R1 ■ R2 ■ R3&R4 ■ P1 & P2 ■ NP

Suggested



■ R1 ■ R2 ■ R3&R4 ■ P1 & P2 ■ NP

Optional



■ R1 ■ R2 ■ R3&R4 ■ P1 & P2 ■ NP

# EM capabilities to collect ROS

## Minimum Data Standards

From 54 IOTC ROS mandatory reporting:

- 24 are ready to be collected (44%),
- 2 ready but require little work,
- 7 ready but require specific work and/or costly,
- 5 possible with major work, and
- 16 not possible to be collected.

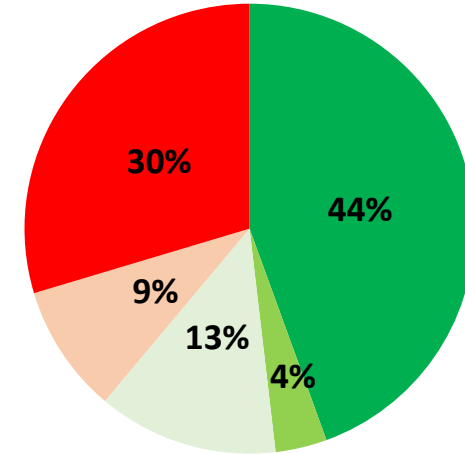
19 “Optional” and 34 “suggested for collection”,

- 22 are currently *ready*,
- 13 ready but require specific work and/or costly,
- 2 are *possible with major work* and
- 16 *not possible* to be collected.

**In general, EM is well suited to collect longline ROS mandatory data fields,** however, for the collection of more detailed information on line material/hook type e-reporting mechanisms from a pre/post-trip, interviews are needed.

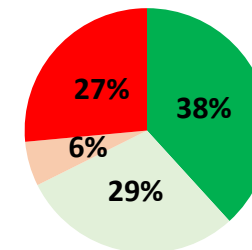
## LONGLINE

Mandatory Reporting

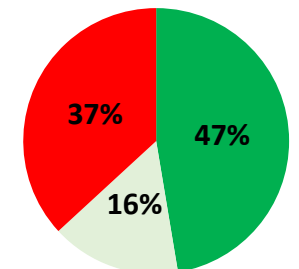


■ R1 ■ R2 ■ R3&R4 ■ P1 & P2 ■ NP

Suggested



Optional



# EM capabilities to collect ROS

## Minimum Data Standards

54 IOTC ROS mandatory reporting data fields,

- 39 are *ready with EM* (72%),
- 2 *ready but require little work*,
- 1 *ready but require specific work and/or costly*,
- 12 *not possible* to be collected.

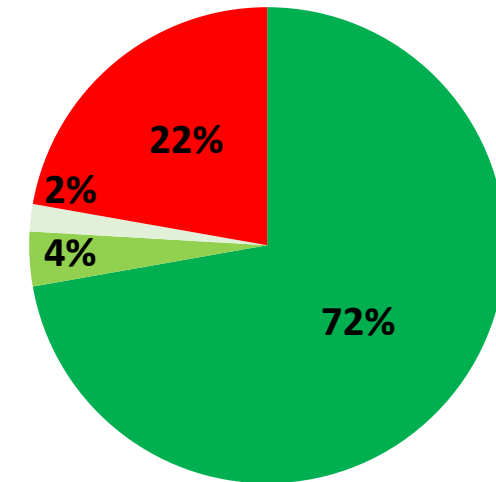
33 IOTC ROS “optional for reporting” and 12 “suggested for collection”,

- 18 (40%) are *ready to be collected*,
- 4 *ready but require specific work and/or costly*,
- 23 *not possible* to be collected.

**In general, EM is well suited to collect pole and line ROS mandatory data fields,** however, for the collection of more detailed information on line material/hook type e-reporting mechanisms from a pre/post-trip, interviews are needed.

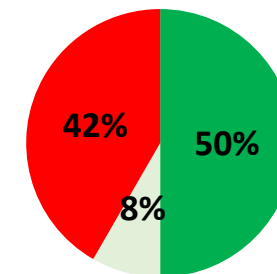
## POLE & LINE

### Mandatory Reporting

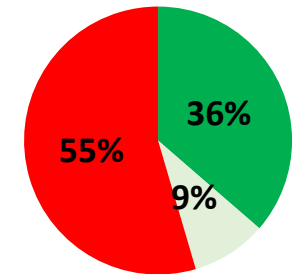


■ R1 ■ R2 ■ R3&R4 ■ P1 & P2 ■ NP

### Suggested

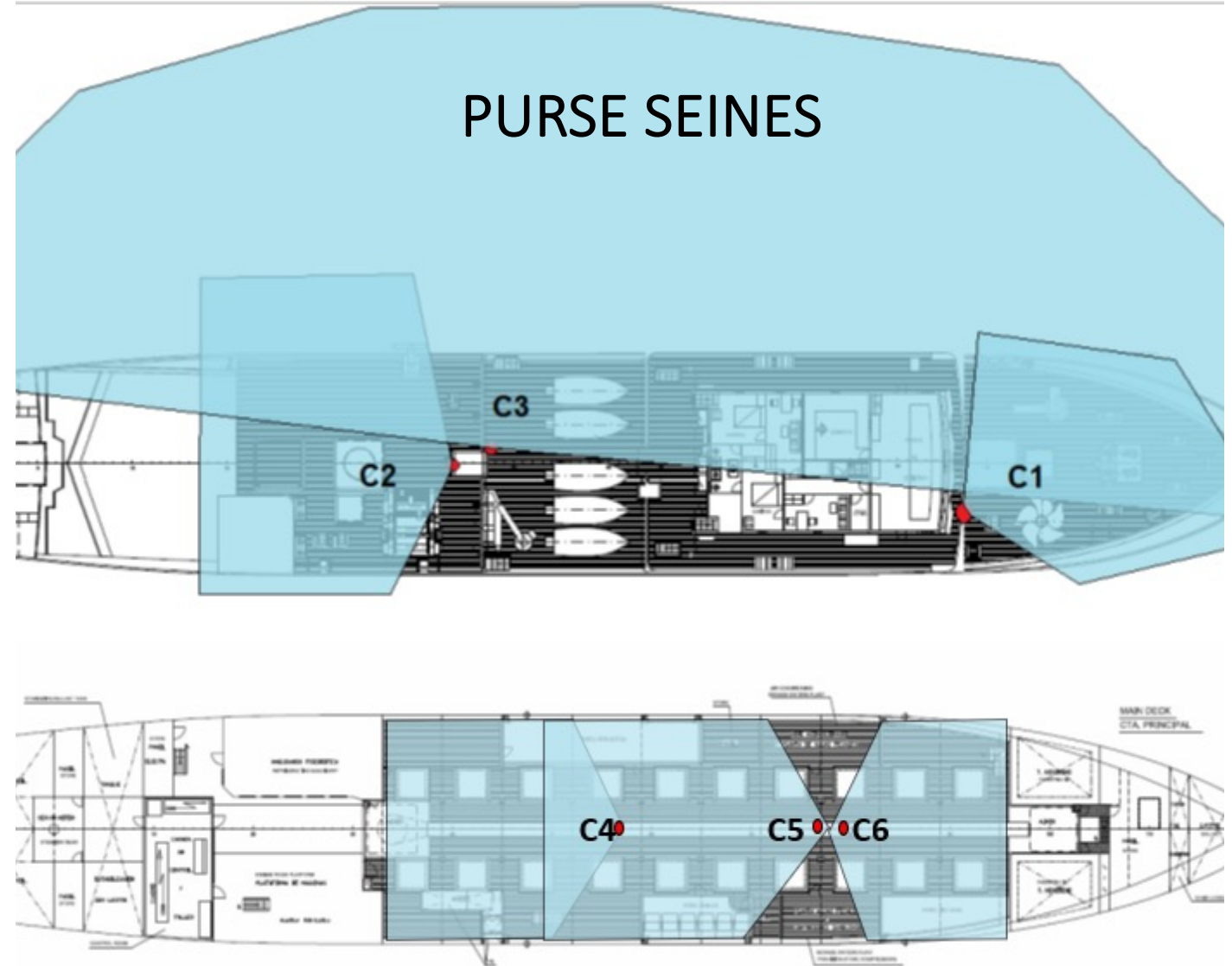


### Optional



## EM SYSTEM AND EQUIPMENT

The minimum areas that cameras should cover are the working deck (both port and starboard sides), the net sack and the brailer, the foredeck or amidships, and the well deck and conveyor belt (Restrepo et al., 2018).

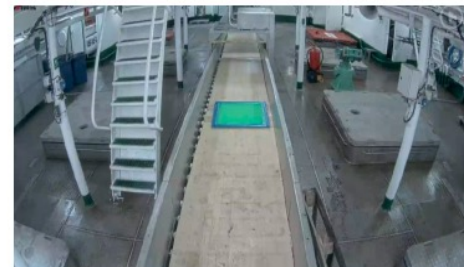


source: Digital Observer Systems (DOS)

# PURSE SEINES

## EM SYSTEM AND EQUIPMENT

Cameras must cover the following actions: brailing, net hauling, FAD activities, bycatch handling and release, tuna discards, catch well sorting (process of putting the catch in the hold or wells). In large purse seines, **at least 6 cameras** are needed to cover fishing and fish handling operations.

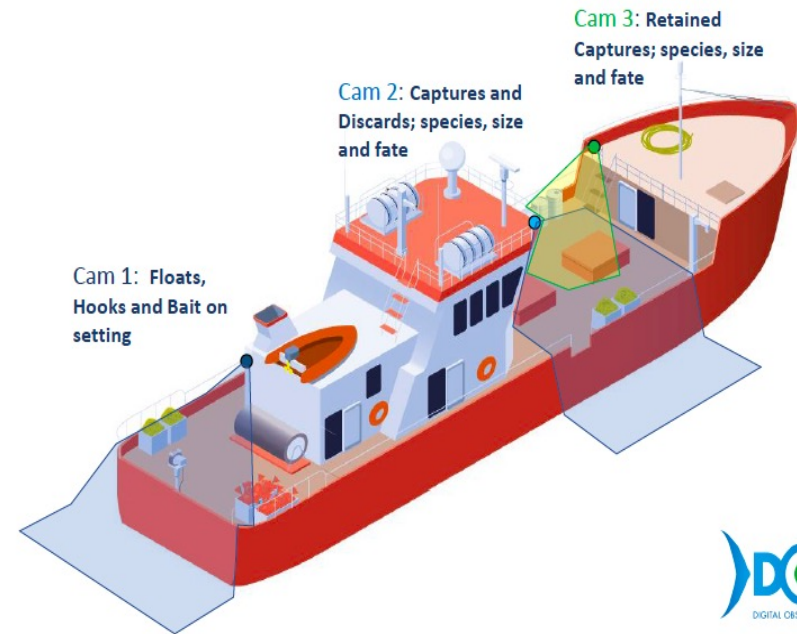


source: Digital Observer Systems (DOS)

# EM SYSTEM AND EQUIPMENT

On longlines, the cameras should provide a view of the setting of the longline, bait information, whether mitigation techniques are being used (e.g. tori lines), hauling of the longline, all hooked species (both retained and discarded) and the size of the specimens. On most of tuna longlines, **at least 3 cameras** are needed to cover fishing activities.

## LONGLINE



C1: Stern camera



C2: Fishing deck 1



C3: Fishing deck 2



source: Digital Observer Systems (DOS)

# EM Programme Standards

## Objectives of the Programme

- What is the objective? Science vs. compliance? Both?
- Scope of fleets
- Data collection coverage,
- Data review coverage

## Institutional Structure and management of the Program

- Regional vs National EM Scheme
- Coordination among Programmes
- Responsibilities of each party (IOTC, flag State, etc.)
- Who will store the data and for how long the video footage raw data,
- who and how will design and maintain the databases to incorporate EM analysed data (e..g. IOTC Secretariat),
- how to perform quality assurance of EM review centers, who will be responsible for training EM analysts,
- who will be responsible to approve EM service providers,
- who owns the data, confidentiality rules to protect business confidential data embedded within the EM records.



# EM Data Standards

- **EM System and equipment**
- **EM Data collection, storage and submission: ROS Minimum Standard Data Fields**, autonomy and storage capacity to store all recorded imaged and sensor information for a certain period of time, that should be at minimum a complete trip, enough image quality, data extraction and submissions to the designated review and analysis centers, etc.
- **EM data analysis, extraction and submission to IOTC:** a dedicated software to facilitate the review of images in an effective and efficient way to record all IOTC ROS “mandatory reporting” data fields and its **output format should be compatible with current IOTC databases.**
- **EM Maintenance:** The EM equipment should be programmed to send automatic alerts of malfunctioning in real time to EM Program management.

# IOTC EM

- OBJECTIVES AND SCOPE?
- COORDINATION AND COMPATIBILITY? - Human observers and **Regional Observer Scheme minimum standard data fields?**
- CONFIDENTIALITY? - As human observer/transshipment program data?
- COMPLIANCE?
- EM EQUIPMENT – Minimum data standards developed
- EM COVERAGE AND REVIEW RATE? - Same requirement as Human Observers as discussion starting point.

**ALL PENDING FOR DISCUSSION**

Q & A



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