
Telepresence Procedures and Policies for Use on MBARI Research Vessels

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Telepresence System

Philosophy

The goal of telepresence tools on MBARI vessels are to (1) provide scientists with real-time, remote access to video and other data collected on MBARI's research vessels, (2) enable scientists and engineers to remotely participate in real-time decisions and equipment operation, and (3) to extend MBARI's outreach efforts offshore through coordination with media and members of ITD.

Capabilities

The current telepresence system combines video and data feeds from MBARI's vessels for broadcast to telepresence users. Effective telepresence presents video imagery (e.g., ROV & control room cameras) and associated contextual data (e.g., vehicle position, sensor data, and shipboard audio) merged with video. Contextual data is currently limited to screengrabs of common use applications in the control room and viewed through a web portal. Audio on RVs *Rachel Carson* and *Western Flyer* is shared through teleconferencing applications for home users

through a patch circuit that bridges the teleconferencing client to the Telex® intercom system. The network bandwidth required to support sending video and data ashore can also be configured to support robust remote access to shipboard computers and sensors, allowing for remote operation and debugging of at-sea equipment. More detail is available in the [At-Sea Procedures and Controls](#) section.

Procedures

Telepresence Requests: MBARI Internal/External Proposals

Telepresence support is requested through the MBARI proposal process to support internal projects. The number of telepresence days requested for a project is entered with ship request forms. Updated rate guidelines will be provided during the proposal cycle. This will inform the Division of Marine Operations (DMO) that increased service and support has been requested, and allow for appropriate budget allocations once ship schedules have been established.

Telepresence Requests: Precruise

Planning for telepresence for upcoming MBARI cruises should be entered in the precruise entry form, and telepresence operations require preliminary approval, training, and other administrative needs (e.g., VSAT service changes). The precruise form includes a section to request telepresence support, including your intent to livestream an event, and the identity, affiliation, and foreign-national status of each individual proposed for access to the livestream. Any revision to planned telepresence support on an upcoming cruise should be communicated clearly to the DMO Director. For the Western Flyer, requests for telepresence should be placed at least 3 weeks in advance of a cruise to allow for changes in MBARI's VSAT service contract. Once the request has been processed, any changes to the requested dates may come at additional costs.

At-Sea Procedure and Controls

The following procedures concerning the initiation, operation, and completion of a telepresence session are meant to provide a clear understanding of the identities of the participants involved (ashore and at sea) and information being livestreamed.

1. Before operations are initiated, a designated, onboard point of contact (POC) should inform the Chief Scientist, Captain, and Chief ROV pilot (if applicable) that they are about to start telepresence operations.
2. The POC may connect the audio system to the telepresence computer. No audio is live at this point.

3. A general announcement should be made on the intercom that telepresence is coming online. Any indicator lights and status monitors (in progress) should be enabled.
4. The POC or a shore operator can enable the video feed on the telepresence application and subsequently enable the ship's audio for the call.
5. Another announcement should be made on the intercom that the feed is live, and the POC shall identify parties expected to connect to this call based on the submitted telepresence participant lists and updates provided by the Chief Scientist.
6. Upon entry or exit to the call, participants must announce their presence or departure to keep the ship participants informed of who is joining or signing off telepresence. Automated systems may supersede this policy in the future.
7. Parties online should conduct themselves to the standards listed in the [General Conduct Recommendations](#) section.
8. Once relevant operations are completed, the POC shall ensure that all video and audio streaming has ceased, disable the audio bridge and any software with access to video broadcasting, and announce that the feed is deactivated on the intercom. All annunciators must reflect these changes.

Audio

Bidirectional audio is possible through two currently supported interfaces:

- [Webex](#) Teleconference connected to the ship's Telex® intercom (primary)
- [Mumble](#) VOIP software applications (backup)

The intercom system on the ship is primarily a mission-critical system for the safety of all on-board operations, but is also an important source of contextual information for telepresence participants. To ensure its priority for safe ship operations, the telepresence system interface to the [Telex®](#) system has a single button disconnect, to be used as needed if telepresence operations interfere with critical ship communications. These buttons have been installed in all ROV control rooms near science user stations. Additional disconnect buttons can be added to other spaces as needed. Any party on board with concerns about the audio connection can immediately disconnect the audio system. Telepresence participants are notified that they may be disconnected at any time for safety communications purposes. Telepresence audio must be isolated from ship's audio during critical operations on board, ultimately controlled by ships personnel in accessible locations.

Video

Video is assembled from a variety of control room sources on both vessels, and merged into a single stream to the teleconferencing application for transmission from ship to shore using [Open Broadcaster Software](#). Leveraging an isolated controller device, the ElGato StreamDeck, the broadcasted telepresence scene (e.g., *Main HD + PIP*, *Launch + Recovery*, *Control Room*, *Technical Difficulties*) can be selected by accessing the controller in the control

room. If there is an immediate need to stop broadcasting, selecting the Technical Difficulties button will disable all video.

The following video feeds have been connected to the telepresence system:

- ROV primary science camera
- Deck/Moonpool cameras (for launch and recovery view)
- ROV control room video
- Auxiliary PC video (for science software broadcasts, i.e. sonars & sensors)
- Science instrument video (e.g. DeepPIV, low light camera)

Teleconferencing

The teleconferencing application currently in use is [Webex Events](#). This application has been chosen for the following reasons:

- Webex Events can restrict access to a designated list of participants. Each participant can be identified by an email address included in pre-cruise forms. Additional participants can be approved through consultation of the Chief Scientist, Chief Pilot, Captain and DMO administration.
- Participants are designated as panelists (speaking audio access) or attendees (listen only). Participants can be shifted between groups to enhance participation or limit chatter on the call.
- Webex Events allows a host to manage all participants, muting their audio or video, or expelling a participant if necessary.
- Webex provides the most stable 720HD video stream from all evaluated platforms.

Policies

Telepresence technologies are powerful tools that expand participation in at-sea research and engineering activities for MBARI vessels. Handled properly, telepresence can allow users to participate in ship-board activities without interrupting the science and/or ship's operations, or overstepping the privacy of shipboard personnel. Here we discuss etiquette and conduct that, if adhered to, will provide a high-quality telepresence experience for all involved partners.

General Etiquette for Telepresence Participants

1. Only enable your microphone if you are talking to other participants.
2. Disable your personal computer camera; unnecessary video streaming through the telepresence application will adversely impact livestream quality.
3. Conversations should be short and concise to minimize distractions between teleconference participants and the ship or control room. The telepresence host or POC can disable the audio bridge, as necessary.

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4. Be aware that latencies exist due to satellite and microwave communications. Wait for a quiet period in the control room before interrupting.
 5. All telepresence participants should be muted by the Telepresence Host or POC during critical operations such as ROV launch and recovery.

General Conduct Policies for Telepresence Participants

An MBARI employee on shore is required to act as the host and enforcer of these policies.

1. Video or audio of telepresence operations shall only be recorded with consent from the Chief Scientist, and notification to all participants.
2. Telepresence sessions can be initiated only with consent from the Chief Scientist, Chief ROV Pilot (if applicable), and the ship's Captain.
3. Telepresence participants shall only share connection details with approved participants and with the consent of the Chief Scientist. Notification any changes in telepresence participation should be sent to relevant parties outlined in the [Participant Approval](#) section.
4. Livestreaming to audiences beyond telepresence participants can be initiated only with consent from the Chief Scientist, Chief ROV Pilot (if applicable), and the ship's Captain.
5. Imagery or audio obtained through telepresence can be shared on social media only with consent from the Chief Scientist (see Social Media Policy below).
6. Any party on board with concerns about the audio connection can immediately disconnect the audio system.
7. All participants must be approved as discussed in the [Participant Approval](#) section.

Social Media Policy

Participants in MBARI's telepresence operations are asked to not post data/images on personal websites or social media outlets unless permission is obtained from the Chief Scientist. This policy covers all employees regardless of whether ashore or at sea while working in support of an MBARI-sponsored project. Please note all media and related data will generally remain on hold for two years after data collection, at the discretion of the Chief Scientist. During that period, the primary data collector/user has exclusive use. Any release during that time must have prior approval from the respective researcher.

Participant Approval

Although MBARI's telepresence system originated in response to sea-going personnel restrictions associated with the COVID-19 pandemic, participants may be allowed access to telepresence operations for several reasons, such as;

- Science activities:

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- ROV dive participation
 - Data processing
 - Cruise operation discussions
 - Technical support
 - Outreach activities:
 - Livestreams sessions (e.g., live classroom and MBA interactions, media broadcasts)
 - Non-livestream sessions (e.g., media interviews, outreach video collection)
 - Technical Activities:
 - At-sea system debugging
 - Remote system operation
 - Multi-ship coordination

All Participants

It is preferred that the names of all telepresence participants are submitted in precruise forms for MBARI research vessels. Approval of participants should include the entire duration of expected telepresence activities during the research cruise. Supplemental approvals are possible for additional participants to accommodate changes in cruise plans. The approval process for science, outreach, and technical participants are described below:

- Science participants: Access to telepresence operations shall be granted through the Chief Scientist.
- Outreach participants: All outreach activities should be described in precruise submissions and shall be conducted only with the approval of the Chief Scientist. For non-social-media outreach activities, the approval procedure is the same for science participants. Live streaming events require Chief Scientist, Captain, Chief ROV Pilot (if applicable), and ITD Director approval.
- Technical participants: In most cases, the approval process for technical participants are the same as science participants. For instances where the participant will have at-sea control of MBARI assets, approval must be sought from the Chief Scientist, ship's Captain, and Director of DMO. A procedure for appropriate ship intervention must be submitted to the POC in the event of system malfunction or loss of connection.

Any participants that fall outside the above three categories should first seek approval through the Chief Scientist, and if needed, that request will be shared with additional required personnel. Finally, for safety and regulatory reasons, the Director of DMO shall have access to all telepresence streams initiated from the ship. During these situations, the Director of DMO shall notify the ship's Captain, Chief ROV Pilot (if applicable), and Chief Scientist before joining the telepresence session.