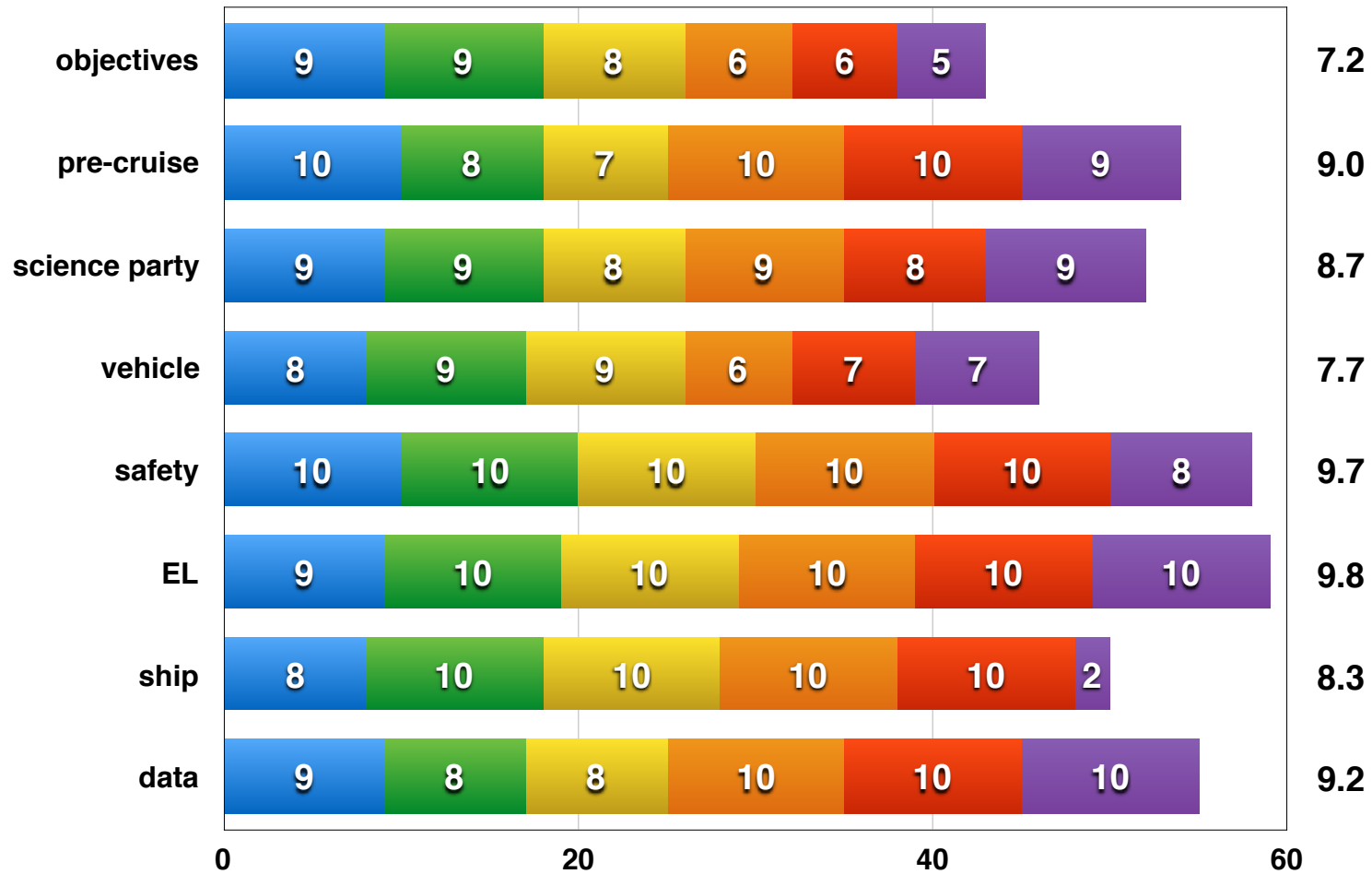


Summary of 2016 *AUV Sentry* Debriefs

6 Cruises, 6 Debriefs and 4 PCARs

Sentry late 2015 & 2016 PCARs (4 cruises, 6 PIs)



Sentry Debrief Highlights

- Overall, the PIs were pleased with *Sentry*'s performance and generally able to meet their science goals.
- Battery improvements in past year = “substantial” increase in bottom time and performance
- “Some of the easiest people to work with that the Chief Sci has encountered.”
- “Extremely efficient. The maps they produced were beautiful.”
- “Wanted to note that Carl was a really great contributor. He came to all the science meetings and provided great perspective on operational options.”

Sentry Pre-cruise Recommendations

- “Limits on ops by seafloor slope should be documented and communicated during pre-cruise”
- Misunderstandings arise with first-time *Sentry* chief scis. More effort needs to be put into ensuring users have realistic expectations. Better documentation of specs and data (confusing “empty folders”).
- **Response:** We have added two new sections to the cruise planning guide including a matrix of capabilities. We will look for more ways to improve this communication.
- **Response:** We already have a document that explains the data organization but we will work to further improve it and we will produce a video introduction to *Sentry* data in 2017.

Sentry Pre-cruise Recommendations

- During site visit to new ship, bolt-hole patterns and cranes were not assessed. Consider adding to a standardized precruise checklist.
- **Response:** Both were assessed but the bolt pattern was not what was shown on the ship's drawings and the ship did not disclose that the crane had limited motion. Physical measurement of bolt patterns and demonstrated movement of the crane have already been added to the pre-existing standard checklist.

Sentry Performance Recommendations

- Vehicle had difficulty conducting tow-yo surveys in water column
- **Response:** The tow-yo was a developmental capability. We will better communicate this in the future.
- Photo surveys result in bottom contact (“bumps”) leading to damage; may need to assess survey design parameters. Maintaining spec’d altitude was challenging in steep terrain resulting in many photos (up to 50%) that were too far from or too near to the seafloor to be useful.
- **Response:** We continue to improve bottom following. We need to do a full bottom follower re-write. This is best done as a part of a command & control upgrade as significant testing is required.

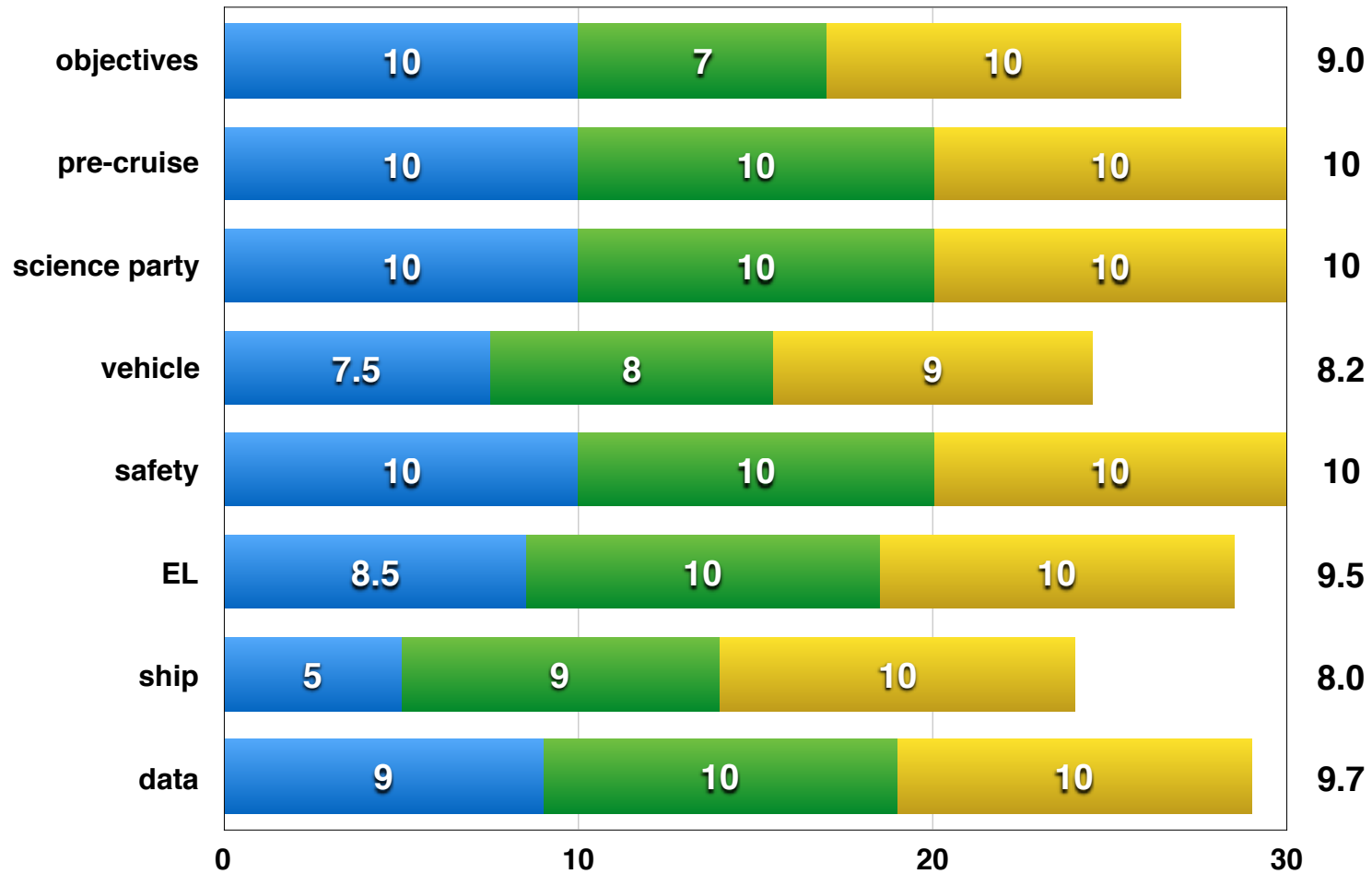
Sentry Ops Recommendations

- Capability to cache the data stream until link with acoustic comms can be established.
- **Response:** This is a significant engineering effort. We will submit a NOAA OE proposal Dec 23 which would help with this if funded.
- It would be appreciated if *Sentry* could support additional post-processing of bathymetry data at sea or onshore.
- **Response:** We are advocating for this as well. However it must be funded. This could be through a change in the day rate or through an additional contract with WHOI. The user guide gives budgetary recommendations for WHOI and independent contractors. Can DeSSC provide guidance?
- EL and EL-in-training continue excellent communication with science teams and ship's crews. Recommend commendation.

Summary of 2016 *Jason* Debriefs

5 Cruises, 5 Debriefs, 3 PCARs

Jason late 2015 & 2016 PCARs (3 cruises, 3 PIs)



Jason Debrief Highlights

- “Congratulations should be given to the *Jason* team for the success of the overhaul and their ability to work with the newly configured vehicle.”
- “The Chief Sci has known lots of ROV teams and would rank the *Jason* group highly among their cohort.”

Jason Debrief – Issues

- Weather calls were noted as being ambiguous to the science party at times.
- **Suggestion:** Can weather calls be more data-driven, for example using ship pitch-roll data or winch-strain gauges to establish benchmarks for go/no go on weather calls?
- **Response:** We have gained insight by using line tension and MRU data; we will expand this effort and do a better job of sharing data and criteria with PIs.

Jason Debrief – Issues

- Technical service cruises differ in fundamental ways from science cruises in terms of *Jason* team support. As a whole the *Jason* team is more familiar with science cruises.
- **Suggestion:** *Jason* team become better familiarized with requirements and expectations of technical cruises.
- **Response:** There is a learning curve that will ease with experience. We worked with RSN and ONC to understand objectives and we will continue to improve this aspect of pre-cruise planning.

Jason Debrief – Issues

- Operation of still camera systems can be non-intuitive/difficult and there could be better integration of metadata for imaging.
- **Suggestion:** Improvement of GUI for camera operation
- **Response:** We are assessing new cameras with a more user-friendly interface, and hope to replace the Super Scorpio soon

Jason Debrief – Issues

- **Suggestion:** Still image metadata should be recorded/displayed and stamped on DSC images.
- **Response:** We are now capable of offering these metadata on a single screen. The current setup is a legacy one that has been optimized for operational use by the *Jason* crew, but can be altered to better fit user needs. Pre-cruise notification is requested.

Our still camera is a self-contained system and it does not allow a means of overlaying external metadata onto an image. Note: burning in overlays alters an image permanently. We provide sidecar files with metadata for each still image. Users can use image-altering software (e.g. *ImageMagick*) to overlay metadata on their copies of the images.

Jason Debrief – Issues

- Intensive operations with many short dives can be taxing for *Jason* personnel, especially since launch/recoveries require whole team.
- **Suggestion:** Can members of science party or ship's crew be used for less technical aspects of LAR?
- **Response:** We are exploring ways to reduce the number of people required for *Jason* LAR. We have used external crew and will continue crew training.

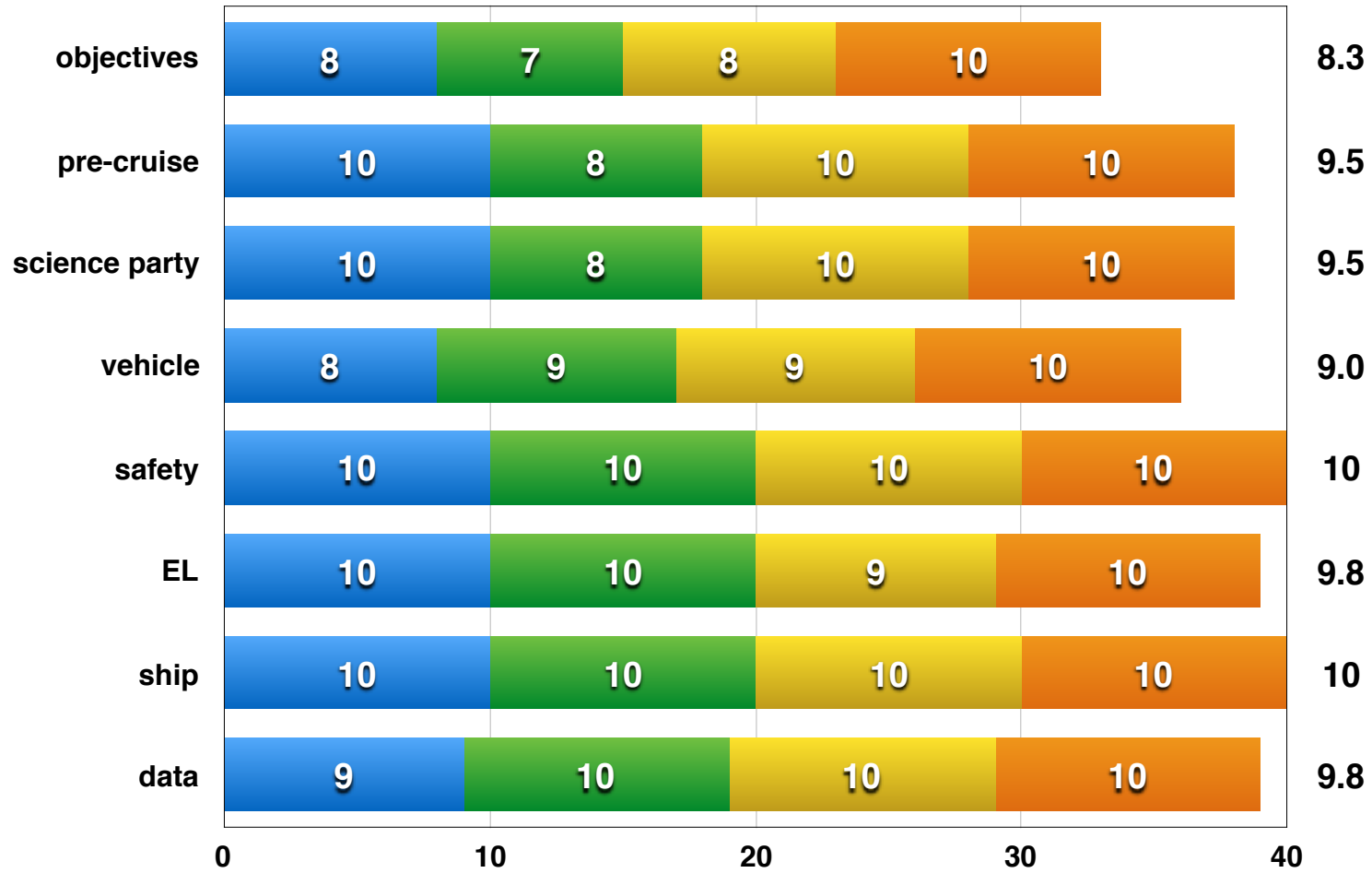
Jason Debrief – Issues

- In cases where deck space is very limited, especially for technical work in single-body mode, *Medea* takes up significant space.
- **Suggestion:** Can *Medea* be left on the dock?
- **Response:** When operating in single-body mode, yes.

Summary of 2016 *Alvin* Debriefs

3 cruises, 2 debriefs, 3 PCARs

Alvin 2016 PCARs (2 cruises, 4 PIs)



Alvin Debrief Highlights

- Overall, PIs were pleased with the performance and capabilities of the *Alvin*, with most of the objectives accomplished.
- Given the complexity of the research planned for the cruises this year, and extensive challenges that the team faced, the PIs were impressed by the professionalism of the *Alvin* Group, their tireless work ethic, and excellent communication between the EL and PIs.

Alvin Pre-Cruise - Recommendations

- Pre-cruise planning was very successful and thorough. There were multiple points of contact throughout the planning process which made it difficult for PIs to navigate.
- **Suggestion:** Clarifying from the beginning who should serve as *Alvin* POC.
- **Response:** The group will add pre-cruise information (including POC) to the *Alvin* User Manual.

Alvin Operations – Recommendations

- Ascent/descent times and battery performance were better than expected in general
- **Response:** New weight dropper design enables faster descent/ascent
- Variable ballast seawater pump required rebuild at sea, no problems thereafter
- **Response:** First major seawater pump failure in 20 years.
- Ground fault in battery required port call for repair
- **Response:** The noted fault (ground) occurred during dives and was likely not present at the start of diving. Measures have been taken to prevent similar problems in the future.

Alvin Operations – Recommendations

- **Suggestion:** Given the extensive time between *Alvin* cruises (~6 mo), it might be beneficial to have engineering time at sea built in to the schedule to ensure systems are working.
- **Response:** When possible, engineering dives are planned after long periods with no operations to identify problems in advance of science activities.

Alvin Operations - Recommendations

- A CASIUS (USBL) survey resulted in lower precision than prior calibrations; post-processing of nav data was not produced; camera had persistent condensation issues.
- **Suggestion:** Clarify ownership of the USBL the system and ensure it is maintained.
- **Response:** The Atlantis USBL system is a shared (*Alvin/Atlantis*) asset. Both groups are working together to expand expertise. In 2016 the *Alvin* Group invested in new USBL equipment, an upgrade to Generation 6, significant spares, and a major transceiver repair. Upgrades will be installed prior to commencement of dive operations in March 2017.

Alvin Operations - Recommendations

- **Suggestion:** Expand sparing for camera systems.
- **Response:** New cameras are being evaluated and purchases are planned for 2017.
- **Suggestion:** Processed navigation is an essential data product and should be produced by the *Alvin* Group.
- **Response:** The post-dive 'renav' processing pipeline is in initial evaluation. *Alvin* and *Atlantis* SSSG techs are working together to refine the process and offer it as a standard capability for future cruises.

General Recommendations

- *Alvin* requires information and data from the science team, particularly in advance of the cruise and dives (e.g., underlay maps, launch points).
- **Suggestion:** Clarify in the *Alvin* user guide what data will be needed during the cruise and preferred formats to help streamline the data transfer.
- **Response:** Revisions to the *Alvin* User Manual will include an outline of required pre-cruise information and data formats. Planned improvements to NavG will allow greater flexibility for input formats.