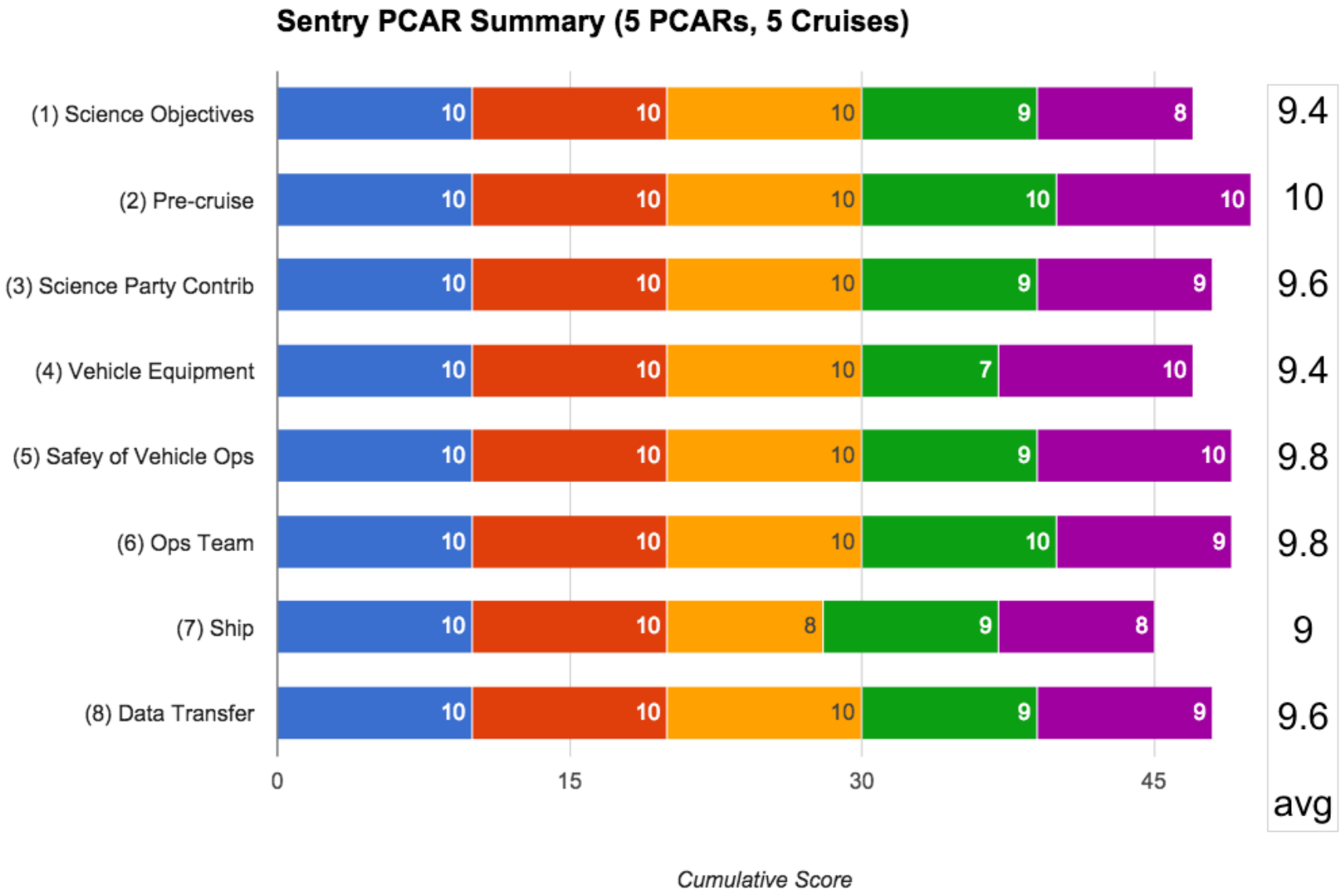
Summary of 2015 *Sentry* Debriefs

8 Cruises, 4 Debriefs, 5 PCARs


Sentry PCAR Summary (5 PCARs, 5 Cruises)
(1) Science Objectives
10
10
10
9
8
9.4
(2) Pre-cruise
10
10
10
10
10
10
(3) Science Party Contrib
10
10
10
9
9
9.6
(4) Vehicle Equipment
10
10
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10
9.4
(5) Safey of Vehicle Ops
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9
10
9.8
(6) Ops Team
10
10
10
10
9
9.8
(7) Ship
10
10
8
9
8
9
(8) Data Transfer
10
10
10
9
9
9.6
0
15
30
45
avg
Cumulative Score

Sentry Debrief Highlights

- Overall, PIs were very pleased with *Sentry's* performance and capabilities and were able to achieve their science goals
- Short shakedown cruise on *Sikuliaq* recognized by PIs as key to success for both field programs aboard new vessel

Sentry Debrief Highlights

- “Tremendous team work at sea largely due to great planning”
- “Choreography of multiple vehicles [*Jason* + *Sentry*] went really well”
- “Team is professional” … “well organized” … ”inspiring”.
- “Personnel is THE asset of the *Sentry* Team”

Pre-cruise - Recommendations

- For 1 cruise, USBL calibration took significantly longer than PI expected.

  NOTE: 8-12 hours is stated in "DRAFT Scientists Guide to AUV Sentry Cruise Planning" (PDF at bottom of Sentry web page)

  –**Suggestion**: Provide this information more prominently on *Sentry* webpage

  –Response:

  •USBL calibration is required each time the system is installed any ship

  •Ships with embedded USBL do not require survey each time they are used

  •8 hours remains a reasonable estimate

  •In the observed case we believe unanticipated difficulties with transponder deployment/ recovery coupled with other considerations increased the time allowance estimate by 6 hours

Pre-cruise - Recommendations

- Despite extensive pre-cruise planning and ship visits, one ship lacked a functional bow-thruster, complicating launch/recovery. The PI and Ops Team were equally surprised by this.
  - **Recommendation**: Routinely confirm that ship has operational bow thruster during pre-cruise planning (don't assume that ship's systems are all functional). This is especially important with new vessels.
  - **Response: Agreed**

Vehicle Performance - Recommendations

- MB unit was serviced by manufacturer prior to cruise and was not sufficiently tested in factory prior to shipping/integration on vehicle (failure of manufacturer)
  - **Recommendation**: Implement routine dunk test to test all sensors prior to cruise

Vehicle Performance - Recommendations

– **Response:**

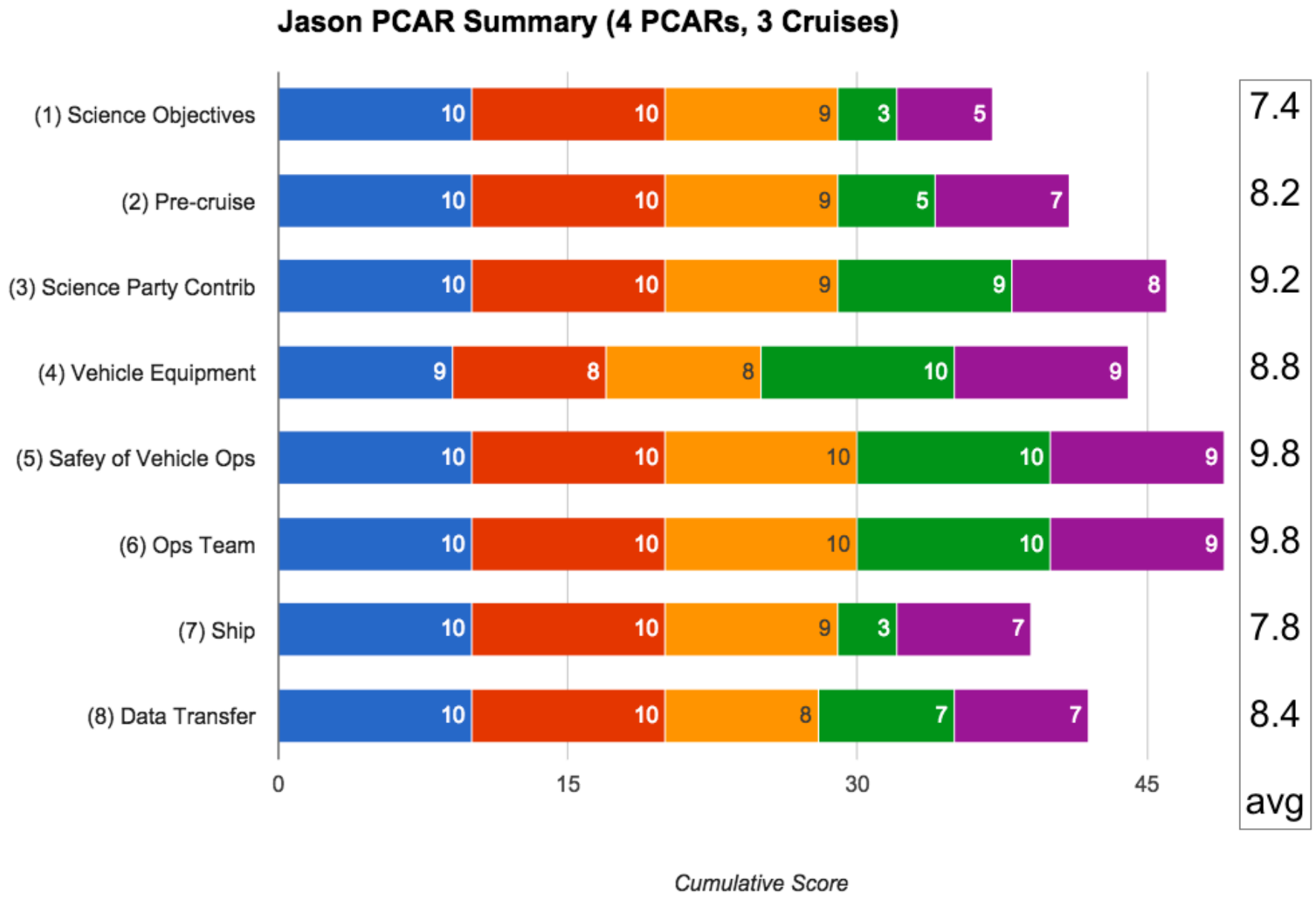
- Agreed
- Poor support from Reson is the main contributing factor to difficulties encountered. In a recent notable case, it was clear that the equipment was not only incorrectly configured but that it had not even been tested prior to shipment.
- Both WHOI and MBARI have had recurring issues with this vendor and we are working collectively to assist Reson to supply us with the best service possible.
- While Reson still offers the best solution to deep sea mapping, we are actively monitoring the development of competitive solutions

Operations - Recommendations

- *Sentry* recoveries sensitive to weather, especially when out of water before taglines are hooked.
  - **Suggestion**: If possible, consider moving bales higher or adding an additional set of higher bales for challenging weather conditions
  - **Response:**
    - Agreed
    - Prior to the next significant overhaul of the vehicle we will review the potential for structural modifications to enable the movement/addition of the bales

Summary of 2015 *Jason* Debriefs

4 Cruises, 4 Debriefs, 4 PCARs


Jason PCAR Summary (4 PCARs, 3 Cruises)
(1) Science Objectives
10
10
9
3
5
7.4
(2) Pre-cruise
10
10
9
5
7
8.2
(3) Science Party Contrib
10
10
9
9
8
9.2
(4) Vehicle Equipment
9
8
8
10
9
8.8
(5) Safey of Vehicle Ops
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10
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10
9
9.8
(6) Ops Team
10
10
10
10
9
9.8
(7) Ship
10
10
9
3
7
7.8
(8) Data Transfer
10
10
8
7
7
8.4
0
15
30
45
avg
Cumulative Score

Jason Debrief Highlights

- Overall, PIs continue to be pleased and impressed with the *Jason* team's work ethic, problem-solving skills, and general willingness to work with PIs.
- *Jason* is taking on additional responsibilities related to emplacing and servicing cabled observatories, and this represents new challenges in operations and capabilities.

Jason Debrief – Operations

- On one cruise, a challenging recovery led to an extended hold in shallow water that exacerbated wear issues on cable provided for *Jason* ops (leading to near failure of cable)

- See earlier slides pertaining to this issue

Jason Debrief – Issues

- Repeated ground faults on thrusters and manipulators led to early recoveries and lost bottom time

- Over time the thruster connectors experienced increased failures due to bending strain in cables causing early failure. During the present overhaul these cables will be better supported and more frequent replacement will become standard maintenance.
- Kraft manips are reaching end of life; to be phased out
  - Schilling T4: superior design with better reliability
  - Will retain Kraft in case of need for force-reflecting

Jason Debrief – Issues

- Rented Reson Multibeam could not be integrated on *Jason,* leading to lost dive time
- **Suggestion**: *Jason* cruises with Reson may need additional mobilization time to accomplish proper integration and testing

- Agreed but better planning for *Jason* should not require added mobilization time. Dock testing prior to departure is advised (ref. *Sentry* responses)

Jason Debrief – Issues

- On one cruise, inefficiencies related to watch schedule changes were noted to disrupt active operations
- **Suggestion**: *Jason* should consider alternate watch schedules

- Solutions we are considering:
  - Pre-watch meeting with oncoming watch leader, watchstanders at the remote monitor to receive turnover from watch leader in van and observe operations prior to entering van via headset comms. Results in 15 minute increase in watch.
  - Staggered watch relief, i.e., 1 hour offset: 8-12, 9-1, 10-2, etc. This provides continuity as two of the watchstanders will have been involved rather than having three new watchstanders.

Jason Debrief – Issues

- The time from vehicle recovery to PIs acquiring dive data is not as rapid as expected
- **Suggestion**: The frequency of data delivery (post- and intra-dive) should be established during pre-cruise discussions

- A shift to video recording via hard drive produces a better more sustainable data product but requires some additional steps in the post-processing pipeline to be taken, leading to some initial delays in data delivery at sea. We expect any delays will be reduced or eliminated in the near future.
- Quite often the dive data is ready to be copied onto the chief scientist's drive before the drive has been returned to the data processor. Once the data processor receives the drive, the several hour process of copying can start.

Jason Debrief – Issues

- On one cruise there were some difficulties with deployment/recovery due to limited reach by the knuckle crane

- The vessel operator would not allow removal of the bulwark to place the crane at the edge of the vessel, as we do on other ships. The result is two feet less room between the vessel and *Jason* during launch and recovery.

Jason Debrief High Notes

- “I can't say enough about the hard work and professionalism of the *Jason* team, and the EL in particular. The word "heroic" comes to mind.”

- “Another improvement […] is that the H264 continuous video files are now automatically generated in the .mkv format with the data, time, position, etc. overlays embedded in the subtitle tracks. Very good improvement.”