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NDSF HDTV Motion Recording System Study for *Alvin* and *Jason*
Summary Document

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The NDSF HDTV Motion Recording Study for *Alvin* and *Jason* conducted by the Advanced Imaging and Visualization Lab at the Woods Hole Oceanographic Institution has determined the following:

- File-based media recording represents a quality conscious and cost effective step forward for the recording of HD and SD motion imagery provided that these recording systems are integrated with a true long-term data archiving solution (one with a shelf life of 30 years or more).

- The study concluded that LTO drives represent the best archiving path forward at this time.

- Implementation of a file-based media recording architecture will help to standardize the motion imagery data products from both the *Alvin* and *Jason* vehicles.

- The major implementation issues of using file-based motion imagery recorders are the relatively large file size and data corruption potential. We believe that these issues can be easily overcome through implementation of improved concept of operations in the field and further dialogue with the original equipment manufacturers.

- This recording architecture improves the scientific community and NDSF end user's access to high quality imagery while minimizing the costs of storage media and expensive playback devices.

- Implementation of reusable drives for the primary acquisition of motion imagery also helps to reduce the daily operational costs.

- The file-based design architecture, described in the report, is capable of supporting legacy NDSF video distribution formats and is also a viable means of migrating legacy data onto current NDSF, accessible data and archiving formats.

- Current industry standard file-based recording hardware has matured to a level where it can be operated in the field and has been tested on a number of expeditions in 2010.

- Current industry standard file-based recording hardware compatible with the proposed HD and SD motion imagery recording architecture is available from a number of manufacturers at a relatively low cost ($3-4,000.00 per recorder for example.)

- The imagery data files are easily manipulated using COTS tools and are accessible from both Macs and PCs.

- The study recommends file-based media recording for HD and SD motion imagery on the *Alvin* and *Jason* platforms.

The following tables illustrate the operational day rate costs of various distribution media for typical *Alvin* HD operations using between 1 and 4 recording systems. These values are calculated for *Jason* in the third table.

Alvin HD Motion Recording on ProRes (Ki Pro) File-Based Recorder

Number of HD Cameras Recorded	Length of Drive	File Storage/Drive	HDV Tape Media Cost/Drive	External Drive Cost/Drive	LTO Archive Tape Cost/dive
1	6 hours	451.8 GB	$60.00	$90.36	$19.88
2	6 hours	903.6 GB	$120.00	$180.72	$39.76
3	6 hours	1355.4 GB	$180.00	$271.08	$59.94
4	6 hours	1807.2 GB	$240.00	$361.44	$79.52

Alvin or *Jason* HD Motion Recording and Archiving Costs Per Hour

Number of HD Cameras Recorded	Length of Drive	File Storage/Drive	HDV Tape Media Cost/Drive	External Drive Cost/Drive	LTO Archive Tape Cost/drive
1	1 hour	75.3 GB	$10.00	$15.06	$3.31
2	1 hour	150.6 GB	$20.00	$30.12	$6.63
3	1 hour	225.9 GB	$30.00	$45.18	$9.94
4	1 hour	301.2 GB	$40.00	$60.24	$13.25

Jason SD Video Recording on ProRes File-Based Recorder

Number of SD Cameras Recorded	Length of Drive	File Storage/Drive	HDV Tape Media Cost/Drive	External Drive Cost/Drive	LTO Archive Tape Cost/drive
1	1 hour	22.2 GB	$10.00	$4.44	$0.98
2	1 hour	44.5 GB	$20.00	$8.88	$1.95
3	1 hour	66.7 GB	$30.00	$13.32	$2.93
4	1 hour	89.0 GB	$40.00	$17.76	$3.91

Current Operational Media Cost considerations between *Alvin* and *Jason* based upon 6-hour dive

Platform	Science Copy	Science DVD	Archive Copy	Recording Time	Cost Per 6 hour Dive w/o labor
Alvin	$10.00/hour	None	$10.00/hour	6 hours	$120.00
Jason DVD		$0.50/hour	$0.50/hour	6 hours	$ 6.00
Jason	$10.00/hour		$10.00/hour	6 hours	$120.00

Recommendations forward

At this time the AJA Ki Pro meets the requirements for HDTV and SDTV file-based recording. Though it is possible that other devices may mature quickly in the next year the Ki Pro represents the best step forward at this time. The operability and compatibility with the existing video plant designs on *Alvin* and *Jason* make this device as easy integration effort. The implementation of field file-based recording systems mandates changes to the video data distribution plan and the video archiving method. There may be a desire to maintain a dual archive system in the short term until such time that the file-based solutions and access-distribution systems catch up with the recording format.

Currently *Jason* has been operating in the field since August with a Ki Pro HD recorder as an interim recording solution for the NDSF HD camera system. A similar system was tested on the *Alvin* for the fall dive series. To date, the feedback from both platforms has been favorable.