Overview of NFWF grant to develop video monitoring for full-retention fisheries

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INCORPORATED

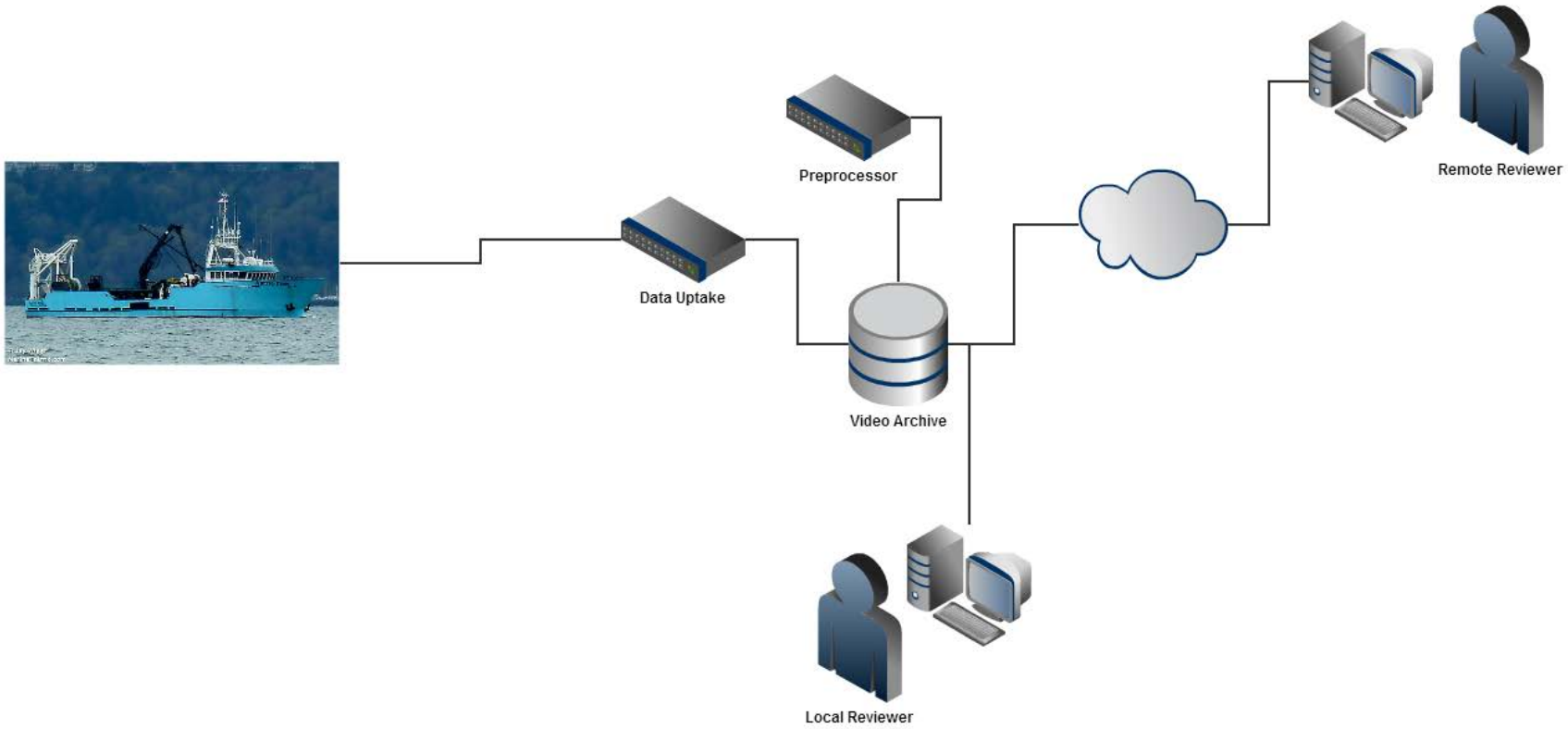
System Design Principles

- Entire trip should be captured
- Integrity of footage must be maintained
- Trip review must be:
  - Timely (results in hours, not days)
  - Cost effective vs at-sea observers
  - Auditable (all reviewer actions are incorporated into the video archive)

Architecture

- System is composed of three modules – all can run on same computer or scale to run on multiple computers
  - Data uptake
  - Preprocessor
  - Reviewer user interface
- This approach also allows for maximum flexibility – one component of the system can be improved with out affecting the others

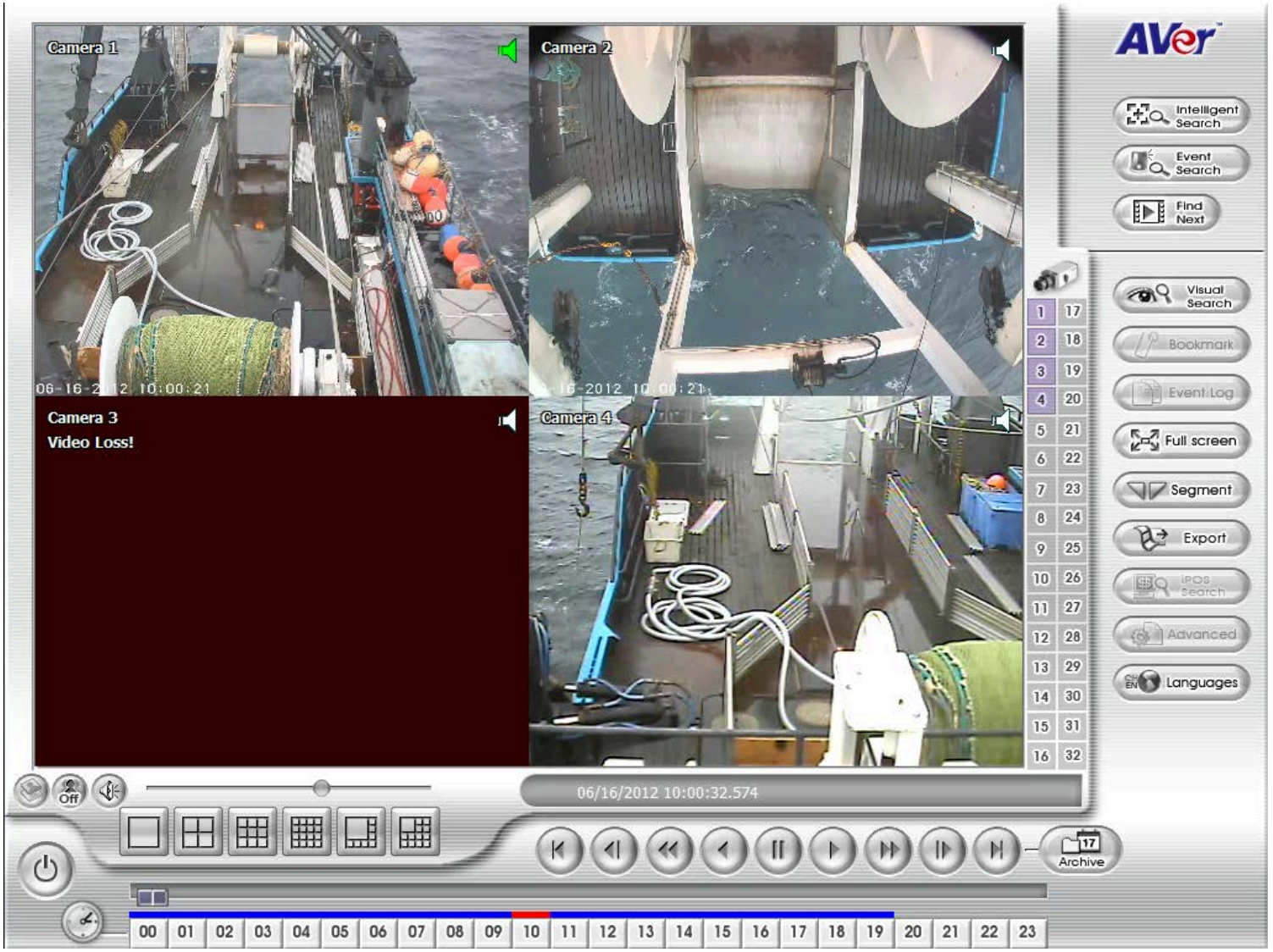
Architecture Diagram



Data Uptake Module

- Collects data from camera and feeds the video archive
- Allows for easy adaptation to many different sources of video
- Timestamps for capture time and uptake time (ignore time imprint in test video)
- Checksums or digital signatures are created here, ideally running on the boat

Cameras


Camera 1
Camera 2
Camera 3
Video Loss!
Camera 4
AVer
Intelligent Search
Event Search
Find Next
Visual Search
Bookmark
Event Log
Full screen
Segment
Export
iPOS Search
Advanced
Languages
06/16/2012 10:00:32.574
Off
Archive
00 01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23

Preprocessing Module

- Identifies any activity on the back deck and generates a graph of activity level and annotation of particular events (reel turning, hatch open?)
- Simple computer vision methodologies, available today
  - Masking
  - Motion detection
  - Simple structural analysis
  - Optical flow for reel movement and direction
- Many different versions/configurations depending on vessel and fishery
- Other sensor data can be integrated with the video data (hydraulics, GPS, etc)

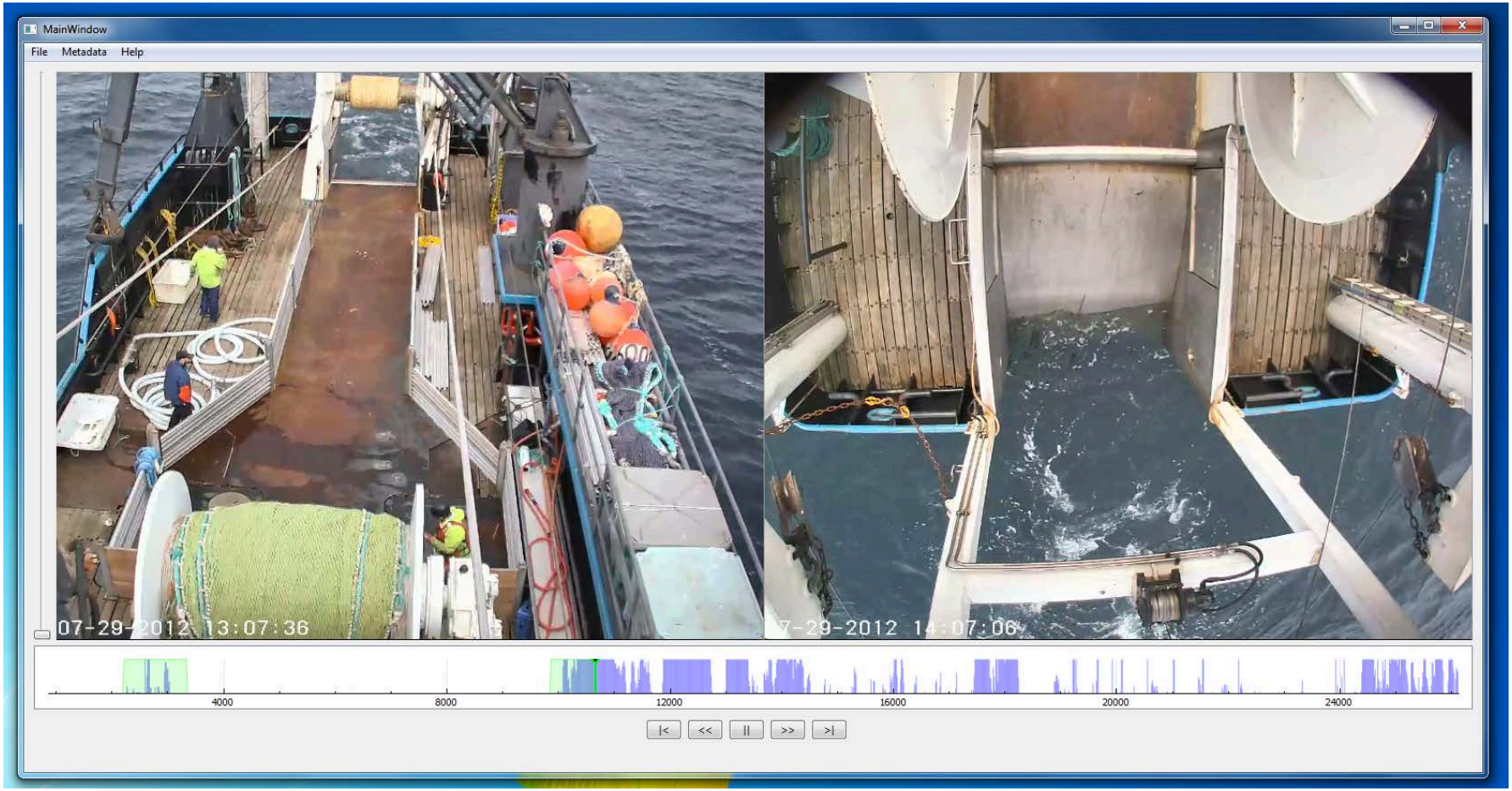
Preprocessing Module

- Red contours are too small to register
- Yellow contours suppressed by structural analysis
- Green contours are registering as activity
- White contours indicate 100% probability of deck activity

Reviewer User Interface

- Displays the trip video along with graphs of activity and other annotations created by the preprocessing module
- Allows the user to create “bookmarks” for any events that require further review or possible enforcement action
- Reviewer could be co-located with processor, or offsite
- Verifiable standard of review – timeline highlighting and logging of all user access and playback
- Final output of the review process is a summary report for the trip in question
  - Total footage
  - Reviewed sections
  - Gaps or camera problems
  - Bookmarked events
  - Discard estimates
- Industry, reviewers, enforcement could all have secure remote access to video archive and review metadata

Reviewer User Interface



- Graph in blue is activity recorded by the preprocessing module
- Green areas on the graph have been reviewed

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