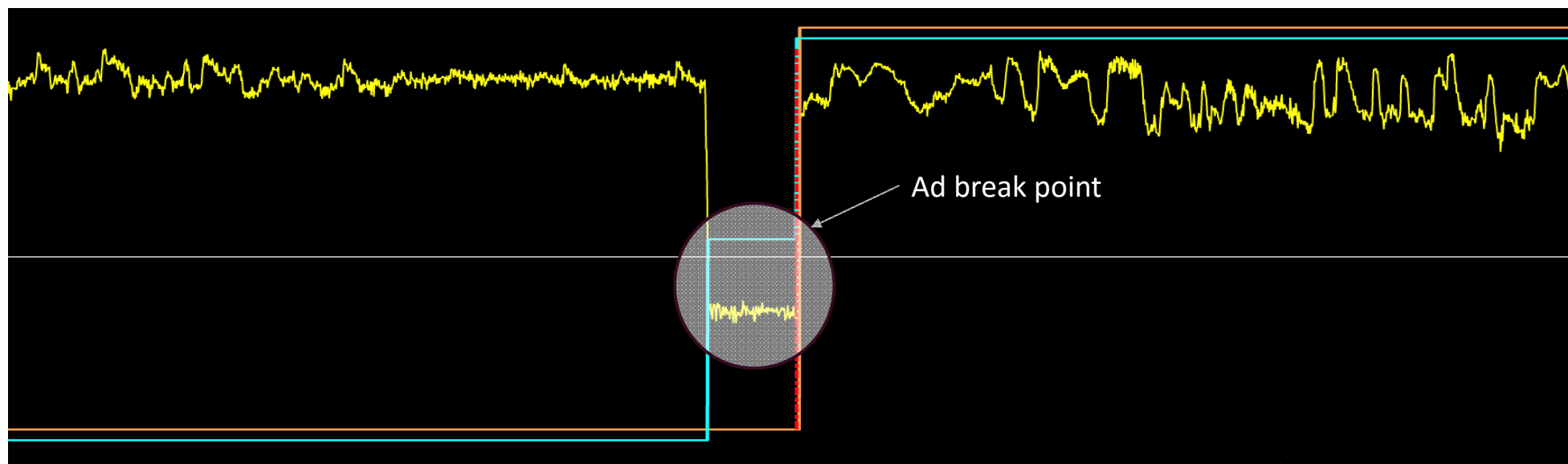


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# UNCOVERING HIDDEN DATA IN AUDIO TO AUTOMATE AD DETECTION FOR VOD



CYBER RESONANCE

# AGENDA

- ❑ **Define VOD and DAI**
- ❑ **Problem Definition**
- ❑ **Solution Requirements**
- ❑ **Final Product Results**
- ❑ **Challenges Encountered**
- ❑ **Matlab Tools**
- ❑ **Product Demo**
- ❑ **Conclusion**



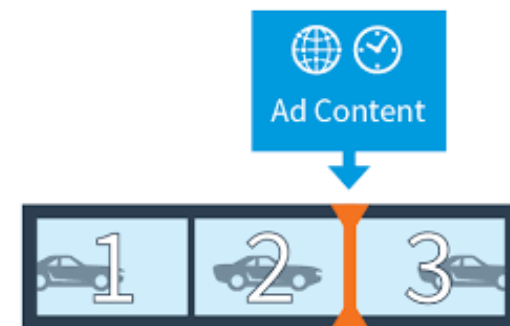
# VOD AND DAI

## ❑ Video on Demand

- Viewers choose their own content
- Can be viewed on a variety of devices

## ❑ Dynamic Ad Insertion

- Advanced advertising opportunities
- Advertisers target ads that can be swapped in/out



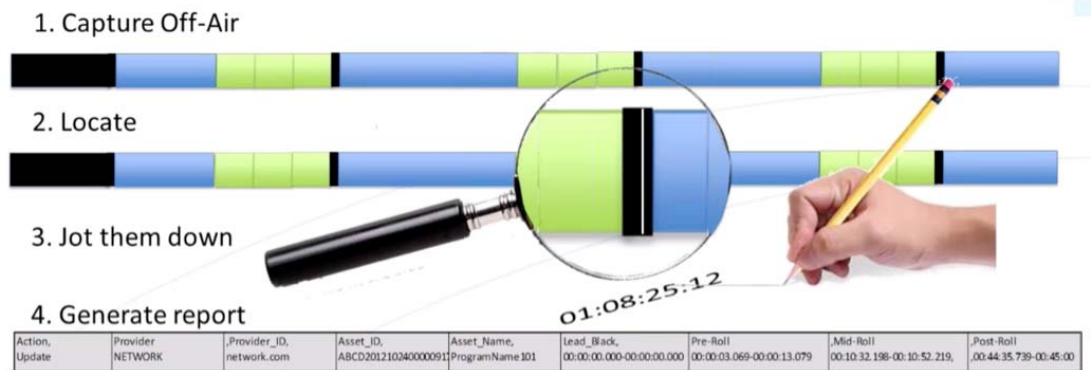
# PROBLEM DEFINITION

## ❑ Manual identification of content

- Time consuming & inaccurate
- Requires large staff and high cost

## ❑ Existing solutions

- Low accuracy rate (~80%)
- CPU intensive
- Slow



# SOLUTION REQUIREMENTS

## Accuracy

- 95% transitions detection

## Error detection/correction

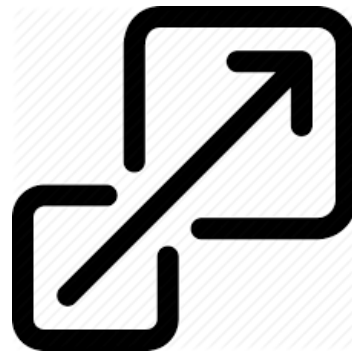
## Real-time & batch

## Speed

- 60 minutes < 60 seconds

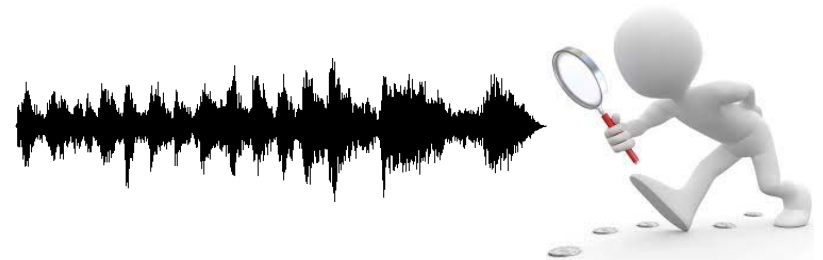
## Supportable & Scalable

## Utilize MATLAB



# PRODUCT (MEDIA DETECTIVE)

- Tested and verified across all genres at 99.8% accuracy
- Supports Windows and Linux
- Process 3 hour show in 12 seconds
- 12 months R&D, 3 months of Build, 2 months of QA and 1 month to create Production version



- The Easy Way



# CHALLENGES ENCOUNTERED

## ❑ Gather large test dataset

- 500+ hours of content

## ❑ Measure success

- Manual tagging of Ad break points
- Statistical success/failure reporting

## ❑ Poor quality of content

- Filtering and rules

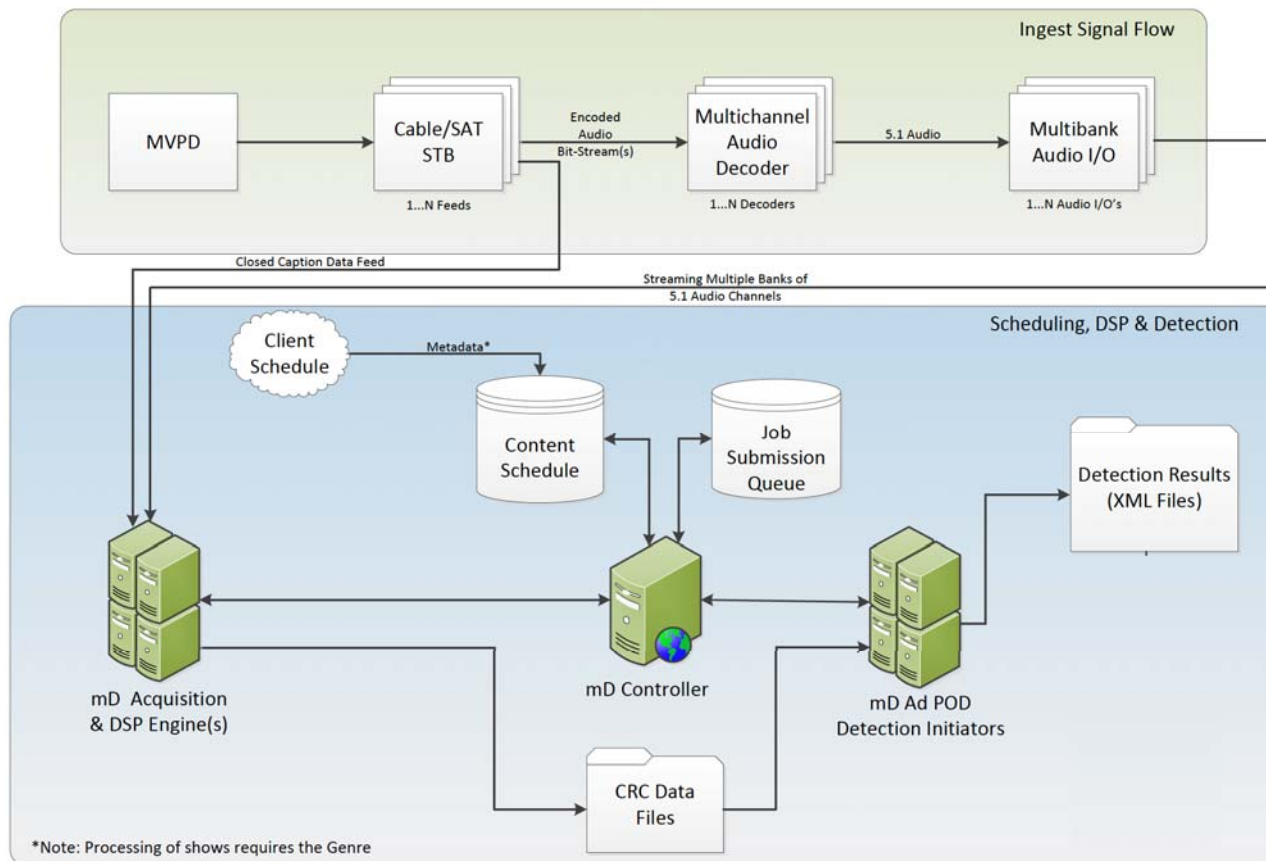


# MATLAB & TOOLBOXES

- ❑ **MATLAB 2017b**
- ❑ **Audio System (real-time)**
- ❑ **DSP System (real-time)**
- ❑ **Signal Processing (real-time)**
- ❑ **Wavelet (real-time)**
- ❑ **MATLAB Coder & Compiler (real-time/batch)**
- ❑ **Parallel Computing (batch)**
- ❑ **Statistics and Machine Learning (test harness only)**



# PRODUCT – COMPONENTS



# DEMONSTRATION VIDEO

# TIME STAMP VISUALIZATION TOOL



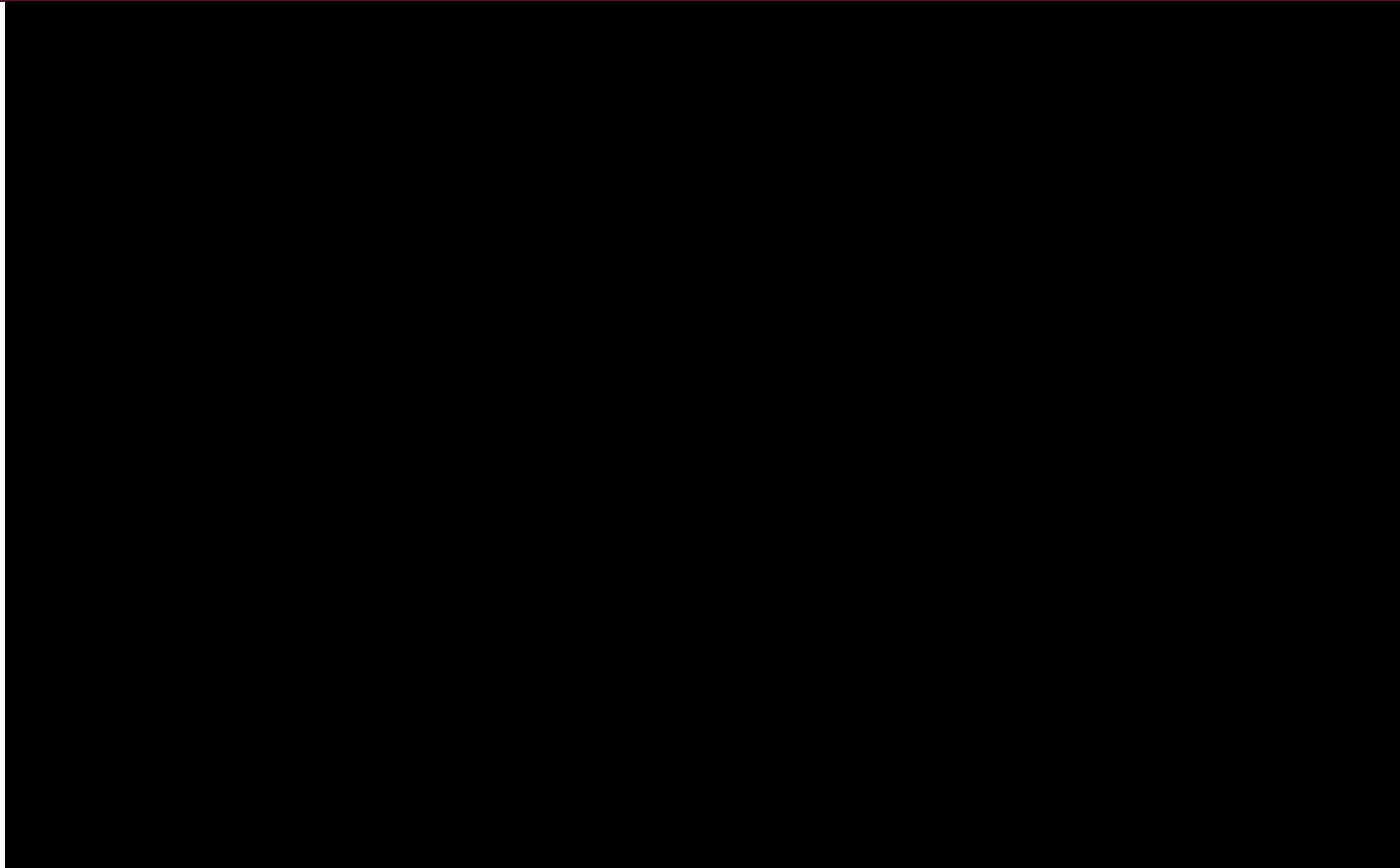
# TIME STAMP VISUALIZATION TOOL



# TIME STAMP VISUALIZATION TOOL



# DEMONSTRATION VIDEO - VISUALIZATION



# CONCLUSION

- Processes all Genres
- Accuracy > 99.8%
- 60 minutes in under 5 seconds
- Runs local or in the cloud
- Process Jobs in parallel
- MATLAB and Java

