

# Advanced Coding for Complex Sensor Systems

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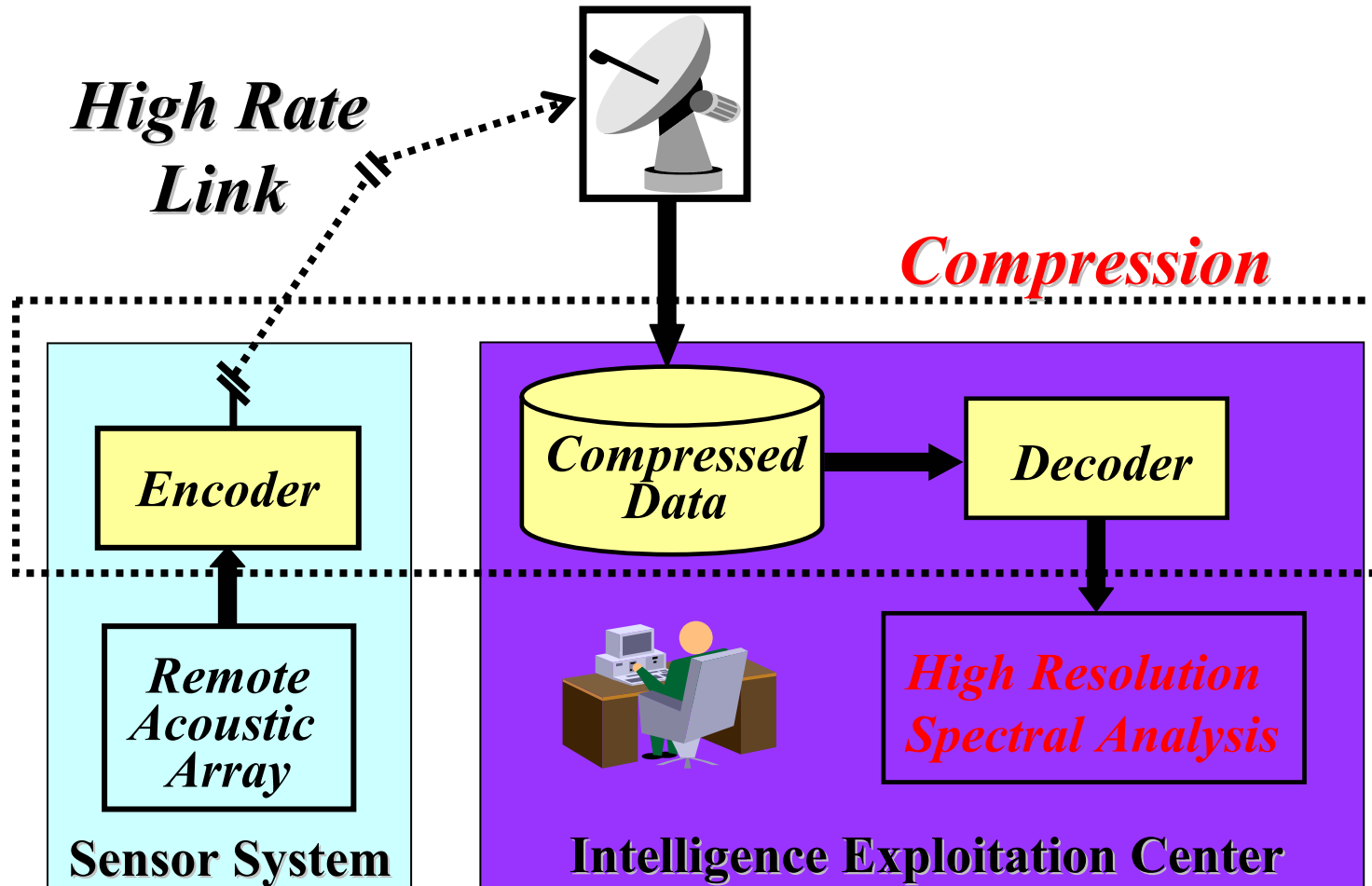
The logo for the MITRE Technology Program, featuring a stylized graphic of stacked blocks in yellow, orange, and blue to the left of the text.

**MITRE**  
**Technology**  
**Program**

# Problem

- **Acoustic intelligence collection and exploitation burdened with:**
  - **Slow/limited delivery of acoustic data from the field**
  - **Low resolution spectral analysis**
- **Can commercial coding technologies:**
  - **Compress acoustic intelligence data, allowing faster transmission?**
  - **Provide high-resolution spectral analysis?**

# Background



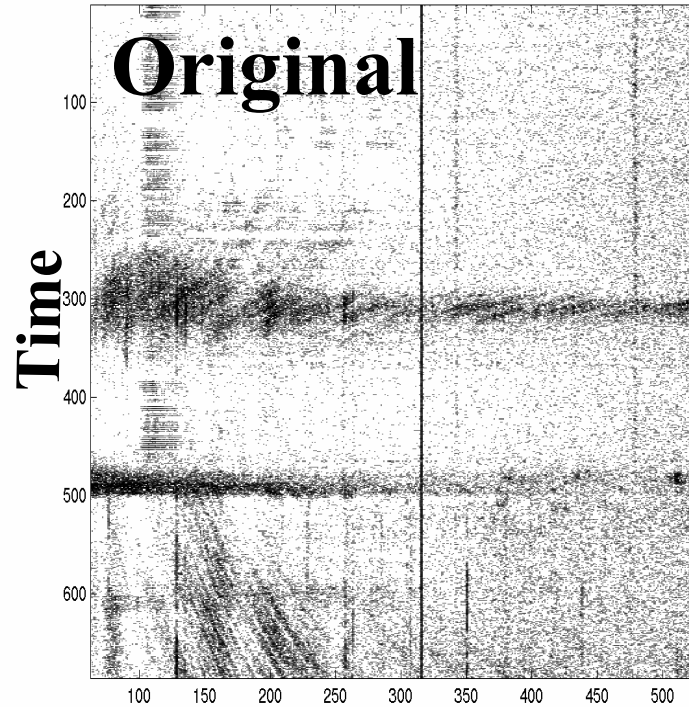
# Objective

- **Compression: apply audio and image coding standards to sonar data**
  - Obtain data from sponsors
  - Implement and test software codecs
- **Spectral analysis: adapt audio coding multirate filter banks**
  - Generalize Discrete Fourier Transform
  - Demonstrate high spectral resolution

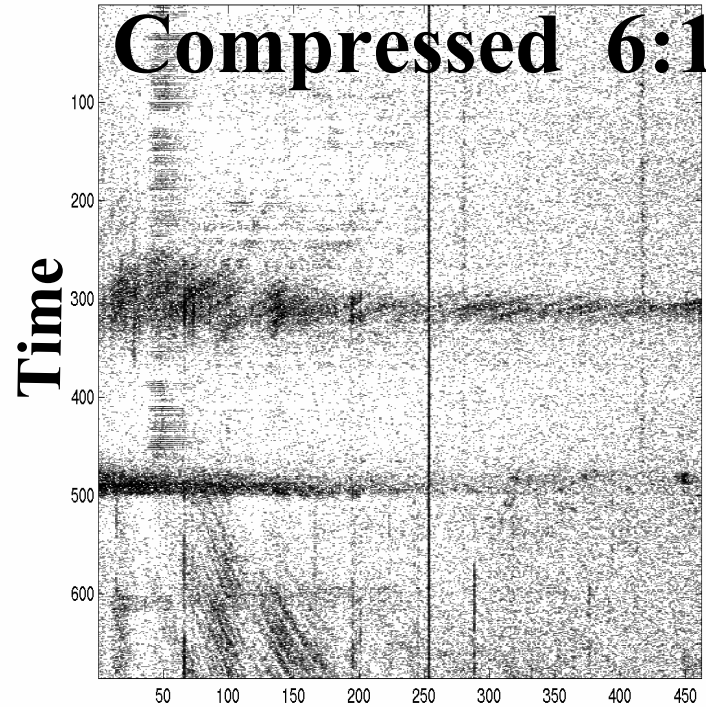
# Activities

- **Demonstrated lossless compression:**
  - 3:1 element-level data
  - 4:1 beam-level data
- **Demonstrated lossy compression:**
  - 6:1 single beam audio coding
  - 20:1 multiple beam image coding
- **Achieved very high spectral resolution with multirate filter banks**

# Highlight

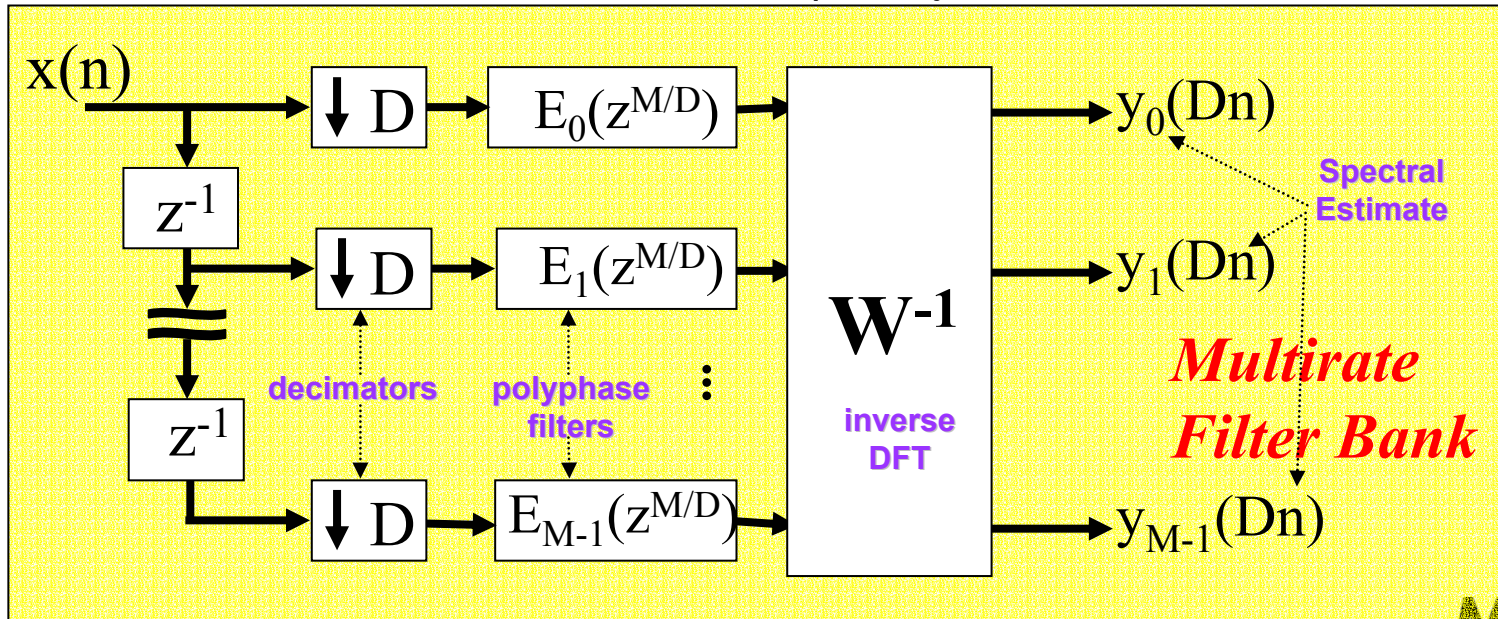
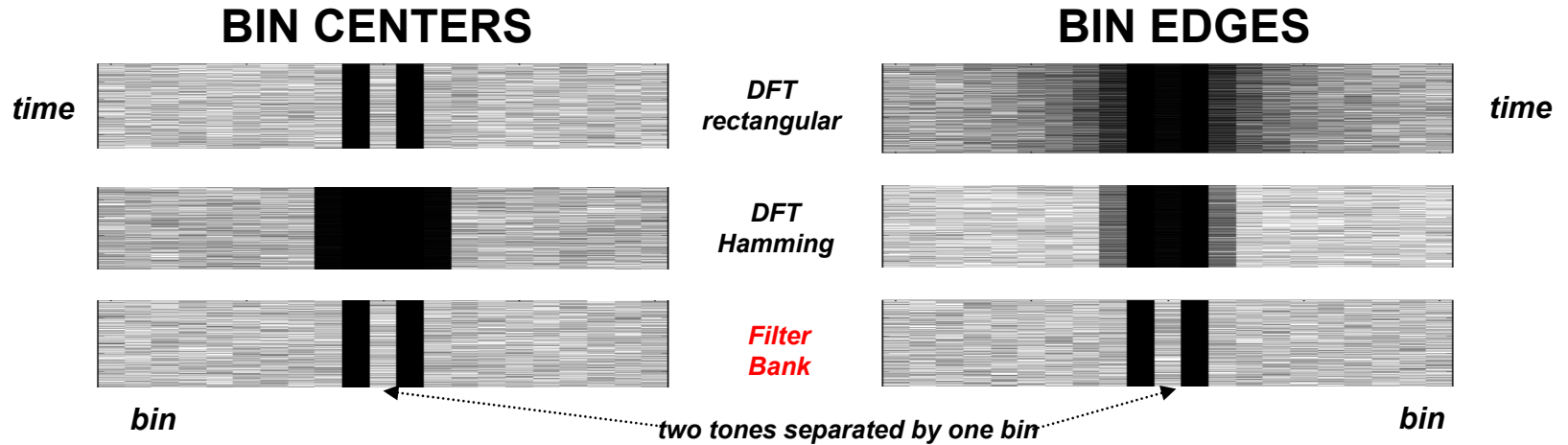


Original  
Frequency  
Bin



Compressed 6:1  
Frequency  
Bin

# Highlight



# Impacts

- **Navsea & Advanced Systems Technology Office:**
  - Sonar working groups participation
  - MITRE Technical Report disseminated
  - Requested MITRE presentation
- **USGC: Requested MITRE presentation**
- **ONI:**
  - Regular acoustic data source
  - Meetings held with analysts
- **D600: Collaborated on IG for audio coding**
- **W406 Netted Sensors MSR: Analyzed air acoustics with high-resolution spectral analysis**
- **Submitted paper to peer-reviewed journal**

# Future Plans

