Requirements Discussion/Survey

NIMA-Standards

POC Bernie Brower

NSES-Kodak

bernard.brower@kodak.com

+1 585 253-5293

Introduction

- NIMA would like to ensure that the JPEG 2000 standard will meet the NSGI architecture requirements (and each of the components within).
  - Understand the current and future requirements
  - Understand the shortfalls of today's compression and architecture standards
- JPEG 2000 is more than just a new compression or a replacement compression, it is a change in how images are stored, processed, transmitted and displayed
  - Adjust the parameters of the flexible JPEG 2000 standard to meet the current and future requirements for compression and architecture requirements
- JPEG 2000 can improve many aspects of the NSGI architecture to meet or exceed current and future requirements

NIMA
Systems Engineering Services

First Questions

- What are your biggest issues operationally?

NIMA
Systems Engineering Services

Second Questions

- What features/capabilities are driving your acquisitions?

NIMA
Systems Engineering Services

Introduction

- Review the importance of the requirement and capability
  - Meeting the requirements
  - Importance of improving
  - Willingness to give up capability
- Review of requirements and capabilities
  - Compression quality versus compression ratio
  - Compression algorithm selection
  - Processing data (image or compressed data)
  - Speed of fulfillment
  - Tools

Ranking of issues

- Meeting today's requirements
  - Not a requirement, exceeding, meeting, sometimes not meeting, not meeting, future requirement
- Importance on improving this
  - Number one, high, medium, low, not at all
- Willingness to sacrifice current capability/requirements
  - Not willing, little willing (depending on what is gained), willing

Meeting Operational Requirements

Requirements

- Compression versus Image quality
  - Image Quality
  - Image size for storage and transmission
  - Bandwidth constraints (low bit rate transmission)
  - Too many choices of quality/bit rate
  - Not enough choices of quality/bit rate
  - Progressive transmission
- Compression selection
  - Too many compression algorithms
  - Too many choices (quality versus bit rate)
  - Does not compress my data type (complex, MSI, HIS, DTED, LIDAR, . . .)
  - Matching compression precision with image precision

Meeting Operational Requirements

Requirements

- Processing
  - Need to decompress before processing for any application
  - RRDS Generation
  - Storage of RRDS files
  - Transmission of RRDS files
  - Speed of chipping data
  - Speed of changing compression algorithm
  - Speed of change compression ratio/quality
  - Generation of overview image
  - Speed of display
  - Speed of zoom, scroll, interactions
  - Enhancement of data (MTFC, DRA, TTC)

Meeting Operational Requirements

Requirements

- Speed of fulfillment of data required
  - Interactivness with imagery to select required data
  - Speed of fulfillment of data once selected
  - Ease with selection of data
- Tools
  - Commercial software availability
  - Interactiveness with commercial applications (Word, PowerPoint, Photoshop, PDF, . .)
  - Ease of use of tools for compression
  - Free viewer of data
  - Functional tools for applications (exploitation, broad area search, simple display)
  - Tools have too many options for users (need simple tools)

NIMA
Systems Engineering Services

Current Requirements Survey

Requirements Survey: Input Data

- Data Type
  - ❑ Single band
    - ❑ Visible
    - ❑ SAR
    - ❑ IR
  - ❑ Multiple Band
    - ❑ Color
    - ❑ Multispectral (4 – 16)
- Data bit depth
  - ❑ 8
  - ❑ 12
  - ❑ Other (11)
- Image size limitation
  - ❑ _____
- Data Compression
  - ❑ 4.3 DPCM
  - ❑ 1.3 or 2.3 DCT
  - ❑ NITFS JPEG 8 bit
  - ❑ NITFS JPEG 12 bit
  - ❑ JPEG
  - ❑ JPEG 2000
  - ❑ No compression
  - ❑ Other: _____
  - ❑ Other: _____
- Processed data
  - ❑ RRDS

Requirements Survey: Local Processing

- Display data
  - ❑ Decompression
  - ❑ Enhancements
    - ❑ DRA
    - ❑ MTFC
    - ❑ TTC
  - ❑ RRDS
  - ❑ Spatial image chipping
  - ❑ RRDS generation
  - ❑ Change compression algorithm
  - ❑ Change compression ratio
  - ❑ Change bit depth
  - ❑ Enhancements
  - ❑ Thumbnail generation
  - ❑ Other: _____
  - ❑ Other: _____

Requirements Survey: Throughput

- Clients
  - ❑ _____
  - ❑ _____
  - ❑ _____
- Requests/day
  - ❑ Average: _____
  - ❑ Peak: _____
- Transfer Time
  - ❑ Average: _____
  - ❑ Worst: _____
- Simultaneous TCP/IP Transfers
  - ❑ Average: _____
  - ❑ Peak: _____
- Online Storage
  - ❑ _____

Requirements Survey: File Conversions

OUTPUT

INPUT

File Formats	TFRD 1.3 DCT	TFRD 2.3 DCT	TFRD 4.3 DPCM	JPEG 8-bit	JPEG 12-bit	JPEG Lossless	NIMA Method 4	Uncom-pressed NITF	Uncom-pressed TIFF 6.0	Uncom-pressed JFIF	Uncom-pressed GIF	Uncom-pressed Sun Raster
TFRD 1.3 DCT												
TFRD 2.3 DCT												
TFRD 4.3 DPCM												
JPEG 8-bit												
JPEG 12-bit												
JPEG Lossless												
NIMA Method 4												
Uncom-pressed NITF												
Uncom-pressed TIFF 6.0												
Uncom-pressed JFIF												
Uncom-pressed GIF												
Uncom-pressed Sun Raster												

Requirements Survey: Output Data

- Data bit depth
  - ❑ 8
  - ❑ 12
  - ❑ Other
- Processed data
  - ❑ Enhancements
    - ❑ DRA
    - ❑ MTFC
  - ❑ RRDS
- Image products
  - ❑ General product
  - ❑ MTI
  - ❑ ATR/Classification
- Image dimensions
  - ❑ Spatial Chip
  - ❑ Resolution change
  - ❑ Quality Change
- Data Compression
  - ❑ 4.3 DPCM
  - ❑ 1.3 or 2.3 DCT
  - ❑ NITFS JPEG (8 bit, 12 bit)
  - ❑ JPEG
  - ❑ JPEG 2000
  - ❑ No compression