

# JPEG 2000 Report for WA DLI

## Presentation for WALIS

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# Agenda

- JPEG 2000 Report – Why and How?
- Technology Highlights
- Adoption Trends
- Impact of adopting JPEG 2000 by WALIS agencies
- Conclusions and Recommendations
- Q&A

# JPEG 2000 Report

## Objective

Assess the feasibility of adopting the JPEG 2000 standard for the compression of digital imagery and its potential impact on operational and archive storage requirements

# JPEG 2000 Report

## Why and How?

- Anticipated growth in image quantity and size
- Need to reduce archival storage and image management costs
- Improve interoperability and processes
- Questionnaires and face-to-face meetings
- Onsite visits
- Existing knowledge and additional research

# Technology Highlights

- Wavelet based image compression
  - Similar to ECW
- Embraced by ISO (ISO/IEC 15444-1)
  - Vendor and customer participation
  - New features are being added
- Supports lossy and lossless compression
  - Space savings of 2.5 – 25x
- Well suited for geospatial applications
  - Multiband support (65,535 bands)
  - Bit depth (1-32 signed/unsigned)
  - Extensive metadata support (e.g. GML schema)

# Technology Highlights

## Limitations

- No floating point data types
- Metadata standards lagging behind (e.g. GMLJP2 standardised in 2006)
- Poorly designed index structure for larger images
- Practical input-size limitations for seamless compression (~256TB)
- Potential incompatibilities between implementations
- Potential patent infringements

# JPEG 2000 Adoption Trends

- Embraced by defence community in the US
- Already implemented and used by global geospatial vendors (e.g. BAE, GD, NG, ESRI)
- Cooperation between organisations increases awareness and drives the need for a common standard (GA, NGA, NASA, USGS, DIGO)
- Problems experienced and anticipated by WALIS not unique (e.g. Victoria DSE)
- Image vendors likely to abandon proprietary formats

# Impact of JPEG 2000 Adoption on WALIS Agencies

## Disk Storage Infrastructure:

- Cost savings approx. \$100K and \$215K for current year (Midland and Floreat)
- Better use of network storage devices
- Lower disk performance requirements

## Workflow Improvements:

- JPEG 2000 files are easier to load, copy & transfer
- Reduced need for portable drives
- Maximise benefits of SLIP infrastructure
- Make wider range of products available via Internet

# Impact of JPEG 2000 Adoption on WALIS Agencies

## Metadata support:

- Currently data and metadata are handled separately (e.g. Excel spreadsheet)
- ISO 19115 data, ANZLIC and GML schemas can be embedded into image files

## Image management:

- Variety of tools and methodologies currently used for managing geospatial data
- Metadata could be extracted for XML-based indexing, cataloguing and searching
- Commercial and free tools available

# Impact of JPEG 2000 Adoption on WALIS Agencies

## Interoperability:

- Strong desire for better interoperability between organisations and software applications
- ISO standard is more likely to be adopted
- Leading GIS software vendors already support JPEG 2000

## Image Quality

- Available lossless compression
- Better quality at high compression ratios (software dependent)

# Conclusions

- ISO endorsement
- Long list of powerful features
- Enables novel solutions to imminent imagery size problems
- Acceptance is gaining momentum
- Immediate tangible benefits for WALIS agencies
- Some vendors slow to implement it
- Compatibility issues

# Recommendations (WALIS)

- Gradual adoption to minimise disruptions
- Leverage SLICP's purchasing power with software and imagery vendors
- Investigate commercial opportunities for imagery archived but not published
- Formulate strategies, standards and policies consistent with JPEG 2000
- Investigate the use of JPEG 2000 metadata features in applications such as WA Atlas and Interragator

# Recommendations (Midland)

- Update DLI's scanning system to DSW700
- Archive all new aerial images with JPEG 2000 lossless
- Consider replacing portable drives with network-based storage
- Consider using JPEG 2000 lossy for final mosaics
- Investigate how to take advantage of JPEG 2000 metadata capabilities for searching / indexing and cataloguing of image assets

# Recommendations (Floreat)

- Integrate ERM JPEG 2000 SDK into in-house applications handling broadcast data
- Discuss with CSIRO enhancements of IMAPP and CAPS applications
- Convert broadcast data to JPEG 2000 lossless before archiving
- Where possible convert proprietary formats to JPEG 2000
- Make JPEG 2000 an option for final products
- Commercial use of intermediate data via IWS

# Recommendations (others)

- Consider JPEG 2000 format for purchases outside SLICP
- Communicate JPEG 2000 requirements to software vendors
- Convert own imagery to JPEG 2000 before archiving
- Examine if resource could be combined to develop XML-based image search/catalogue system
- Use JPEG 2000 for imagery disseminated online

# Q&A