Integrated Exploration Platform:
Software Tools for *Multidata Visualisation* and *Integrated Interpretation*.

The Centre for Exploration Targeting (CET)
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The Geological Survey of Western Australia (GSWA)
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Talk Outline

i.  Launch: Integrated Exploration Platform.

ii.  Overview of the IEP.
    - Multidata Visualisation Tools
    - Feature Evidence Feedback Tools

iii.  ArcGIS Workflow with the IEP.

iv.  On-going Work.

v.  Questions.
The Launch of the IEP
First Public Version - Free

- The first public version of the IEP is available today [http://www.WAEExplorationPlatform.com](http://www.WAEExplorationPlatform.com) (Geolocked to datasets within WA).

- Software toolset for ArcGIS with a novel computer-assisted and interpreter-driven approach to integrated multidata interpretation.

- Will continue to evolve based on industry feedback and suggestions, in order to continue in adapting to the needs of the industry.

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The Integrated Exploration Platform

1. Visualisation tools to support multiple 2D and 3D data (A suite of blenders).

2. Intelligent interpretation support tools (feature evidence toward quantifying confidence).

Multidata Visualisation Tools

1. Human perception sensitive colour maps
   - Reduce bias from the human visual system.

2. The Dynamic Range Compression filter
   - High pass filtering and data range compression for enhanced display of high-dynamic-range data.

3. A suite of blending tools
   - Interactive visualisation of multiple layers of data simultaneously.
1. Visualisation Tools in the IEP

*Human Perception Sensitive Colour Maps*

Kovesi, P. 2015. [Good Colour Maps: How to Design them]
2. Visualisation: Working with Signal Compression

- Geophysical data (e.g. magnetic data), can have a large range of values that cannot be displayed natively on computer screens – *Signal Compression*. 

![Histogram Equalisation](image1.png)

![Linear Normalisation](image2.png)
2. Visualisation: Working with Signal Compression

Histogram Equalisation  Dynamic Range Compression

(Kovesi, P. 2012)
Kovesi, P. 2012. [Phase Preserving Tone Mapping of Non-Photographic High Dynamic Range Images]
3. Visualisation Tools in the IEP

Blending DRC Filter Results
3. Visualisation Tools in the IEP

2D Data Blenders

Circle Blender

Barycentric Triangle Blender

Clique Blender

Linear Blender

Bilinear Blender

Kovesi et al. 2014. [Interactive Multi-Image Blending for Visualization and Interpretation]
3. IEP 2D Data Blenders
3. Visualisation Tools in the IEP

3D Data Blenders

Cross-section Data Blender

Single Volume Blender: Sphere Data Mode

Dual Volume Blender: Slice Similarity Mode
3. IEP 3D Data Blenders
1. Visualisation tools to support multiple 2D and 3D data (A suite of blenders).

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Structural Interpretation of Magnetic Data

- For structural interpretation, interpreter seeks discontinuities (edges, ridges, valleys).

GSWA magnetic data (RTP-DRC) from West Kimberley

Edge Signal

Valley/Ridge Signal
Feature Evidence Tools in the IEP

Magnetic data

Ridge strength map (+ve Phase Symmetry)

Valley strength map (-ve Phase Symmetry)

Edge strength map (Phase Congruency)

CET Grid Analysis Extension (for Geosoft Oasis Montaj)

http://www.geosoft.com/pinfo/partners/CETgridanalysis.asp
Feature Evidence Tools in the IEP
Visualising Evidence

- A spell-checker equivalent for interpretation.
  - Visual feedback on data evidence.
  - Quantitative measure of feature evidence.

[Improving assessment of geological structure interpretation of magnetic data: An advanced data analytics approach]
An example of using multidata evidence to realign (in yellow) one of the original structural interpretation (red dashed lines).
ArcGIS Workflow with the IEP

- Load GeoTIFF and grid datasets
- Load Interpretation Shapefiles

- Export Blends as GeoTIFFs
- Save Interpretations as Shapefiles
On-going Work

➢ Improving the interface for better usability and flexibility to different workflows.

➢ Next phase of interpretation support tools.
  ▪ Lithology and texture analysis.

➢ More advanced tools dealing with 2D and 3D datasets (for example):
  ▪ Exporting voxel subsets.
  ▪ Importing 3D surfaces.
  ▪ Custom colour maps.
  ▪ Custom data stretches.
The Integrated Exploration Platform

- Register and download the IEP at http://www.WAExplorationPlatform.com
- Demo space with the IEP on the show floor.
- Two posters on the IEP tools for visualisation and feature evidence.

Thank you.

Questions?

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