Seismic Data Management

SOFTWARE, WORKFLOWS AND SERVICES

Troika enables competitive advantage by helping to future-proof seismic libraries and deliver fast access to the right data. We provide a comprehensive suite of software and expert support services to recover data and condition datasets for computing and analytics.

www.troika-int.com

Troika is a major supplier of Seismic Data Management utilities to the upstream oil & gas industry

Data discovery, QC repair, meta-data extraction and imaging at very fast speed

WHO USES TROIKA

- Governments worldwide (NDRs, datarooms)

- Oil & gas companies (major, super major & NOCs)

- Speculative (multi-client) data suppliers

- Data transcription centres

- Service companies

WHY THEY USE TROIKA

- Maximising the value of their most important assets

- Improving the quality (reliability) of the data

- Decreasing the time to load, making the business more efficient

- Increasing knowledge of data in the business

- Reading and extracting metadata to populate the master database

Seismic Data Management | Software, Workflows & Services

MOU Signed between SEG and OSDU

THE SEG FORMATS REMAIN THE INTERNATIONAL EXCHANGE STANDARDS

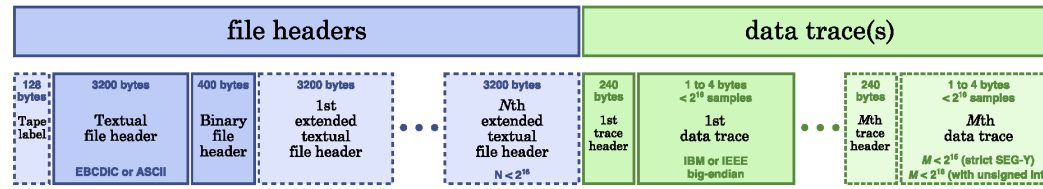SEG   MDIO   ZGY   VDS

NOD (formerly NPD) Announcement

Facilitating Machine Learning

SEG-Y seismic data exchange format

SEG — SOCIETY OF EXPLORATION GEOPHYSICISTS

KEY

mandatory | optional

What is SEG-Y?

– Widely adopted binary file standard for seismic data, especially industrial seismic reflection data.
– Maintained by the SEG Technical Standards Committee.
– Updated to accommodate high-capacity media and trends in seismic acquisition, such as 3D, time lapse, very high trace-densities, and microseismic monitoring.
– Files contain 2 or more file headers, one textual and one binary, followed by one or more data traces, each with one or more headers.
– Latest version, SEG-Y Rev 2, was ratified in April 2017.
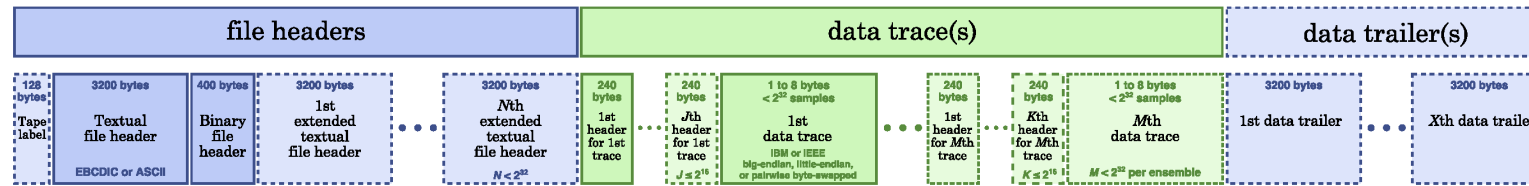– SEG-Y is not intended as a field recording format; see the SEG-D and SEG-2 formats.

Rev 0 — 1975

file headers | **data trace(s)**

3200 bytes	400 bytes	240 bytes	2 or 4 bytes < 2^{16} samples		240 bytes	2 or 4 bytes < 2^{16} samples
Textual file header	Binary file header	1st trace header	1st data trace		Mth trace header	Mth data trace
EBCDIC			IBM, big-endian			$M < 2^{15}$ (strict SEG-Y) $M < 2^{16}$ (with unsigned int)

Changes from Rev 0 to Rev 1

– File may be written to any medium resolvable to a stream of variable length records.
– Data word formats expanded to include IEEE 32-bit float, and 8-bit integers.
– Some additional fields in the binary file header and trace headers, others clarified.
– Textual file header can be ASCII encoded.
– Extended textual file header introduced, using a stanza layout.
– Trace identification expanded, and engineering conversions introduced.
– Note that little-endian byte ordering is not compliant with Rev 0 or Rev 1.

Rev 1 — 2002

file headers | **data trace(s)**

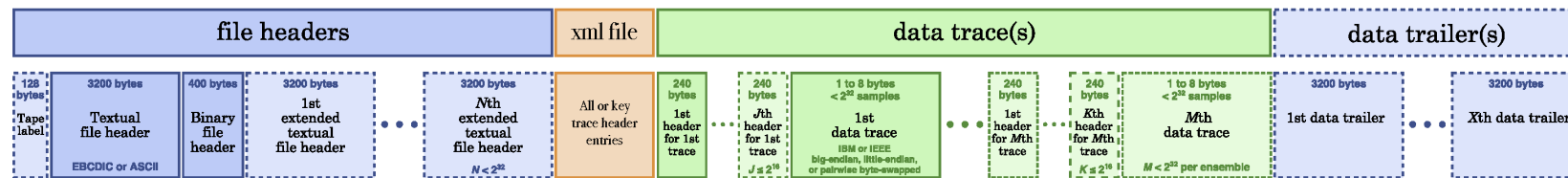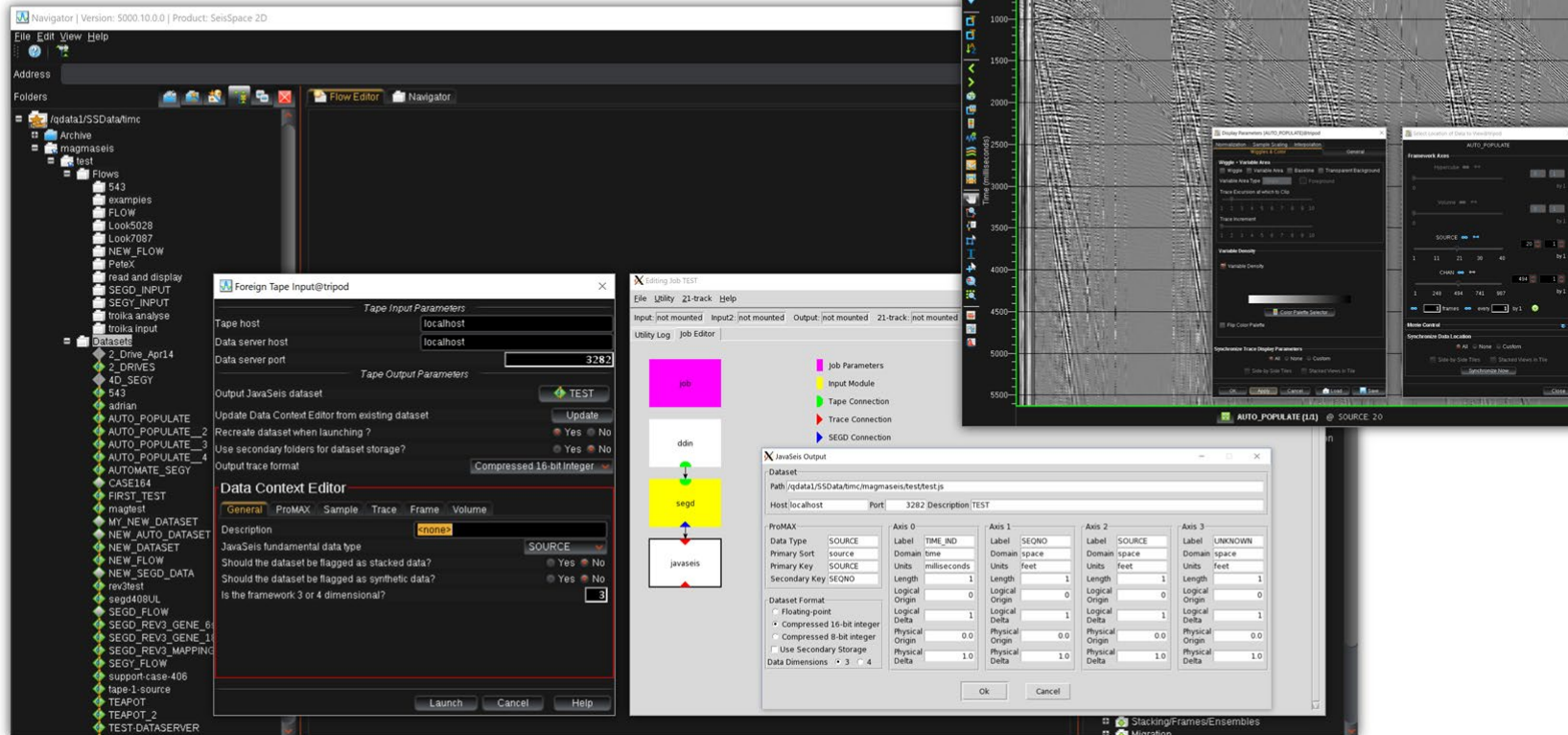| 128 bytes	3200 bytes	400 bytes	3200 bytes		3200 bytes	240 bytes	1 to 4 bytes < 2^{16} samples		240 bytes	1 to 4 bytes < 2^{16} samples
Tape label	Textual file header	Binary file header	1st extended textual file header		Nth extended textual file header	1st trace header	1st data trace		Mth trace header	Mth data trace
	EBCDIC or ASCII				$N < 2^{15}$		IBM or IEEE big-endian			$M < 2^{15}$ (strict SEG-Y) $M < 2^{16}$ (with unsigned int)

Changes from Rev 1 to Rev 2

– Support for little-endian byte ordering, and pairwise byte-swapping.
– Provision for up to 65 535 additional trace headers; bytes 233–240 for names.
– Up to $2^{32} - 1$ samples/trace and traces/record, and $2^{64} - 1$ traces/line or traces/file.
– Arbitrarily large or small sample intervals.
– Additional sample formats, including IEEE 64-bit floats.
– Microsecond precision in time and date stamps.
– Additional precision on coordinates, depths, elevations, and more CRS support.
– Extended textual file header stanzas must start at 3200-byte boundaries.
– Stanzas may appear after the last data trace in a data trailer.
– Flexible trace header mapping via extended textual file header definition.
– XML allowed in extended textual file header and data trailer.

Rev 2 — 2017

file headers | **data trace(s)** | **data trailer(s)**

128 bytes	3200 bytes	400 bytes	3200 bytes		3200 bytes	240 bytes	240 bytes	1 to 8 bytes < 2^{32} samples		240 bytes	240 bytes	1 to 8 bytes < 2^{32} samples	3200 bytes		3200 bytes
Tape label	Textual file header	Binary file header	1st extended textual file header		Nth extended textual file header	1st header for 1st trace	Jth header for 1st trace	1st data trace		1st header for Mth trace	Kth header for Mth trace	Mth data trace	1st data trailer		Xth data trailer
	EBCDIC or ASCII				$N < 2^{32}$		$J \le 2^{16}$	IBM or IEEE big-endian, little-endian, or pairwise byte-swapped			$K \le 2^{16}$	$M < 2^{32}$ per ensemble			

Rev 2.1 — 2023

file headers | **xml file** | **data trace(s)** | **data trailer(s)**

128 bytes	3200 bytes	400 bytes	3200 bytes		3200 bytes		240 bytes	240 bytes	1 to 8 bytes < 2^{32} samples		240 bytes	240 bytes	1 to 8 bytes < 2^{32} samples	3200 bytes		3200 bytes
Tape label	Textual file header	Binary file header	1st extended textual file header		Nth extended textual file header	All or key trace header entries	1st header for 1st trace	Jth header for 1st trace	1st data trace		1st header for Mth trace	Kth header for Mth trace	Mth data trace	1st data trailer		Xth data trailer
	EBCDIC or ASCII				$N < 2^{32}$			$J \le 2^{16}$	IBM or IEEE big-endian, little-endian, or pairwise byte-swapped			$K \le 2^{16}$	$M < 2^{32}$ per ensemble			

Troika's Magma software was selected to handle all Foreign Tape Input into the Halliburton Landmark SeisSpace® Seismic Processing System

MARLIN
Seismic Data Trawler

An intelligent disk trawler for identifying seismic file information and extracting basic metadata. The software launches Midi and Minima software as and when required for data transcription and/or QC.

- Efficiently identifies your seismic data
- Search by file or line name, encapsulation, format
- Report on possible duplicates
- A GUI to build and run Midi jobs
- Run prebuilt Midi workflows
- Build and run custom Midi jobs
- Launch Minima for interactive QC

GEOM
Fast 3D Dataset Geographical Analysis

Within a few seconds this utility reports key parameters including spacing and extents of inlines, crosslines and x,y coordinates for a 3D dataset as a geometrical quality control check prior to lengthy data loading operations.

Geom will calculate and output Inline/Crossline corner points, survey azimuth, bin dimensions, tracecount, etc. and optionally an outline surface type image. Geom can be used to validate and gain assurance that your data meets your basic requirements. Geom is a high speed Post-stack SEGY 3D Data Geographical Analysis tool which allows the user to collect fast information on:

- Textual Headers

- Trace Headers Bin Spacing

- Inlines/Crossline and X/Y Coordinates

- Geometrical Corner Points

- Shapefiles

- Logfile including all of above, including the ability to export Header Definitions for integration into Macros or other text files

137 GB ANALYSED IN LESS THAN 12 SECONDS

MINIMA
QC and Rationalise SEG-Y and Navigation Data

Rationalizes 2D and 3D SEG-Y data on disk and provides the opportunity to repair datasets to prepare them for problem-free uploading to workstations for processing, analysis, interpretation and other applications.

- An interactive view on your data, display sections and slices

- View and compare locations from 2D seismic and navigation files

- Report and highlight data inconsistencies

- Produce 2D and 3D shapefiles

- Condition the data

- Commit changes to original files or write new volumes
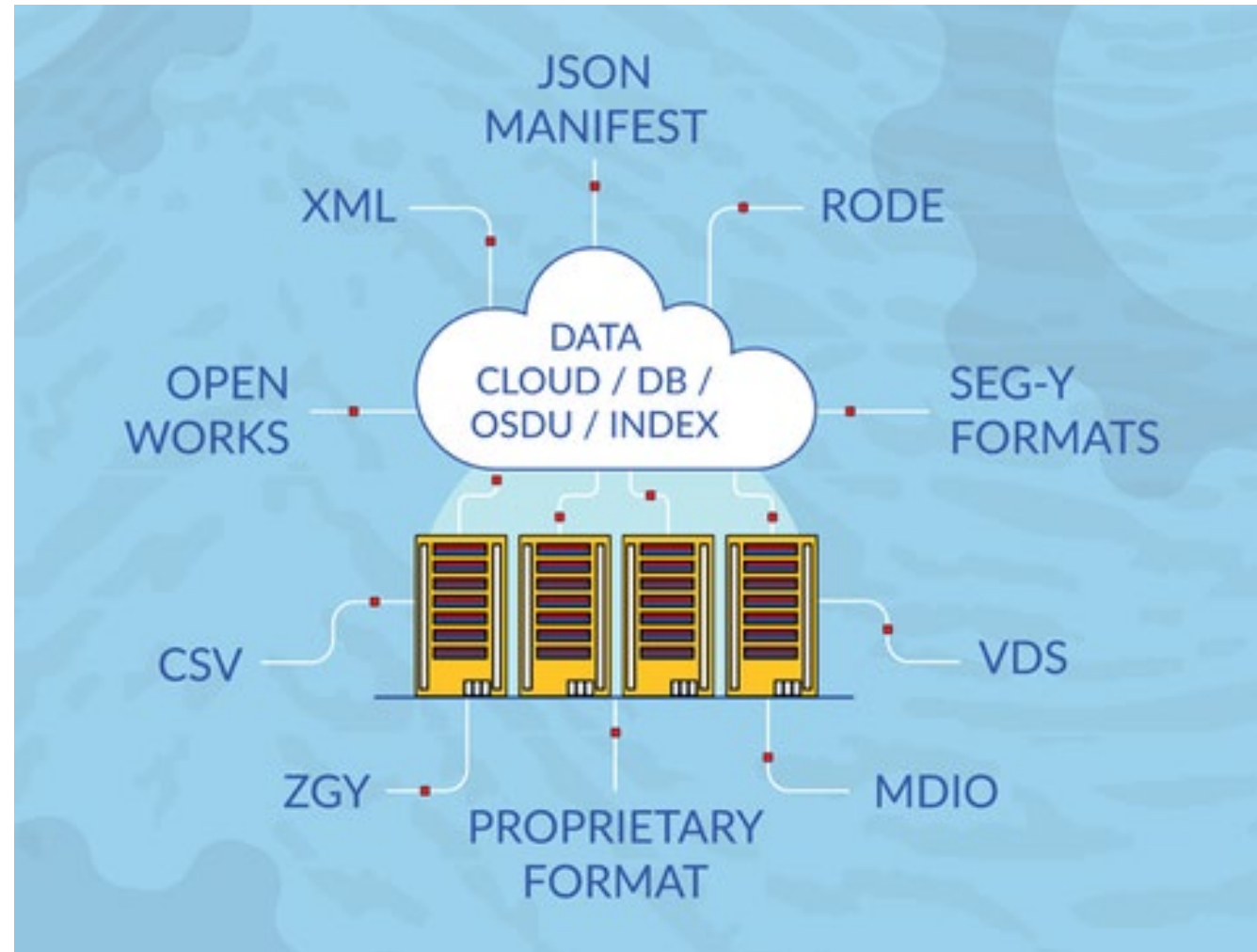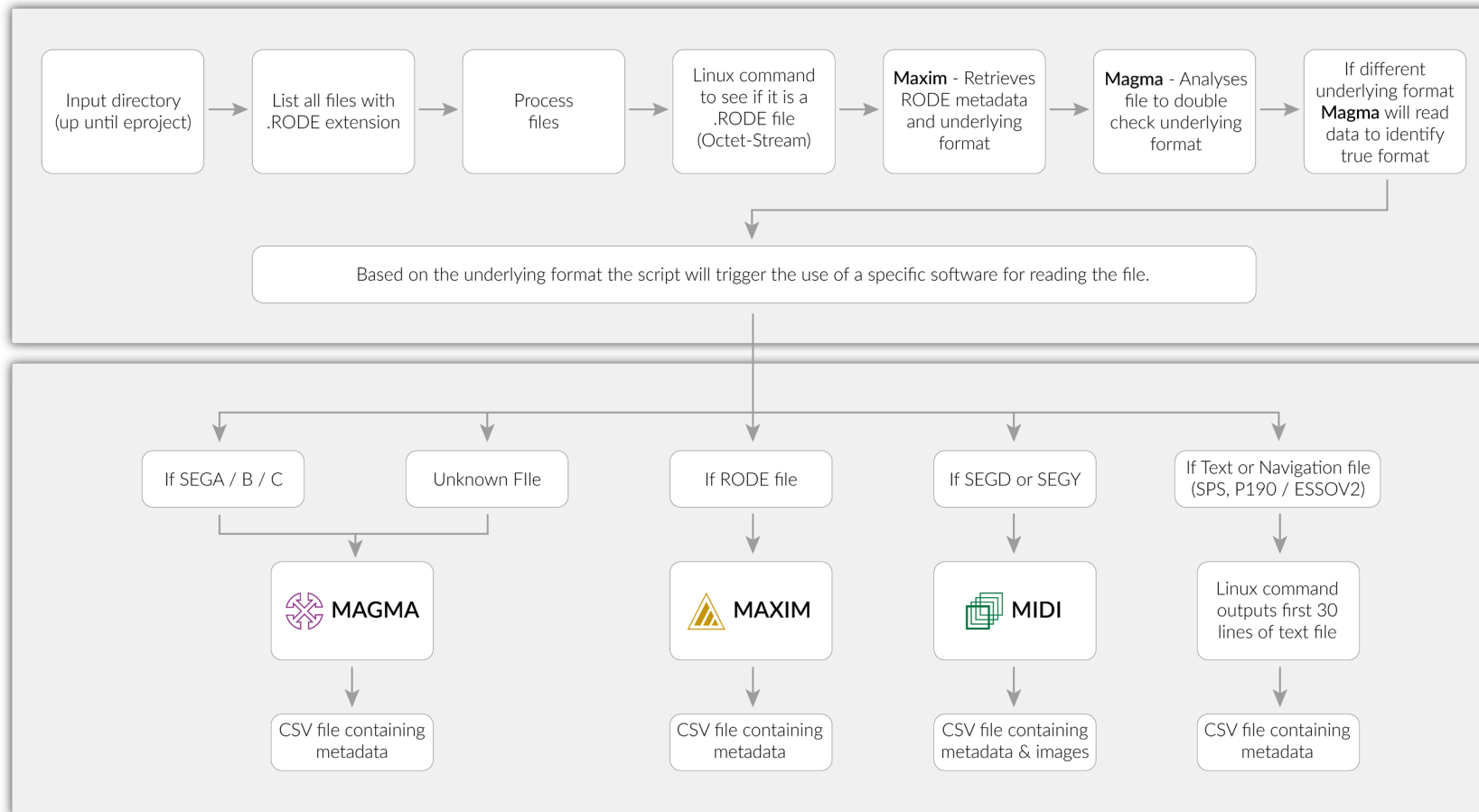
- Create navigation files from seismic headers
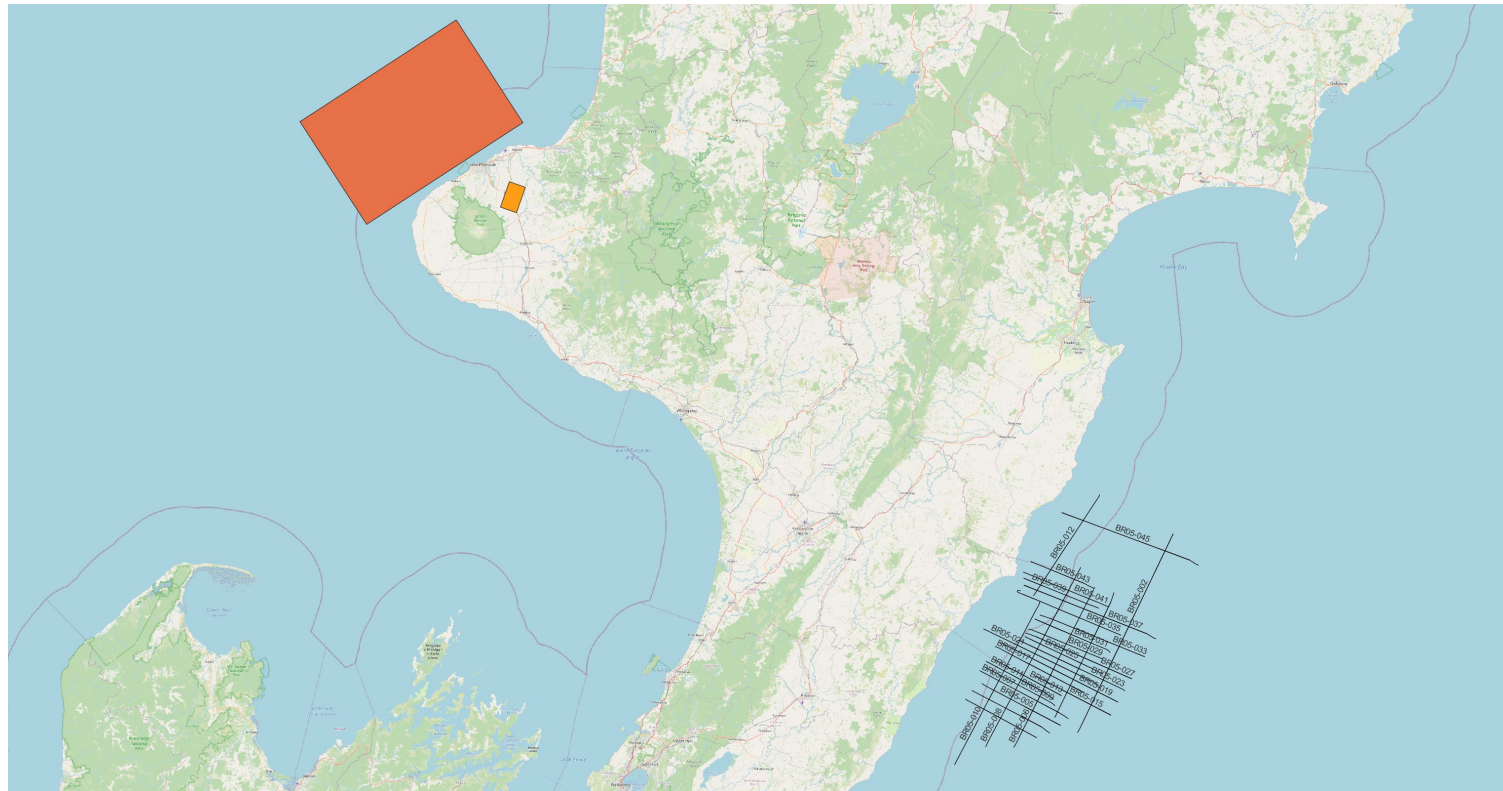
Select CRS

Apply and Output Shape File

Post To GIS system

Facilitating Machine Learning

The scope of work

- Master database had become out of sync with the data

- Re index required

- Roughly 800,000 files in Rode encapsulation all of which were an unknown format

Troika's solution

- Troika supplied an automated solution to extract metadata & make sure the data was in sequence

- The client then had all the information needed to identify the data and decide which process should be used in the next phase

- Shell had allocated 14 months for the project and Troika delivered it in 4 weeks
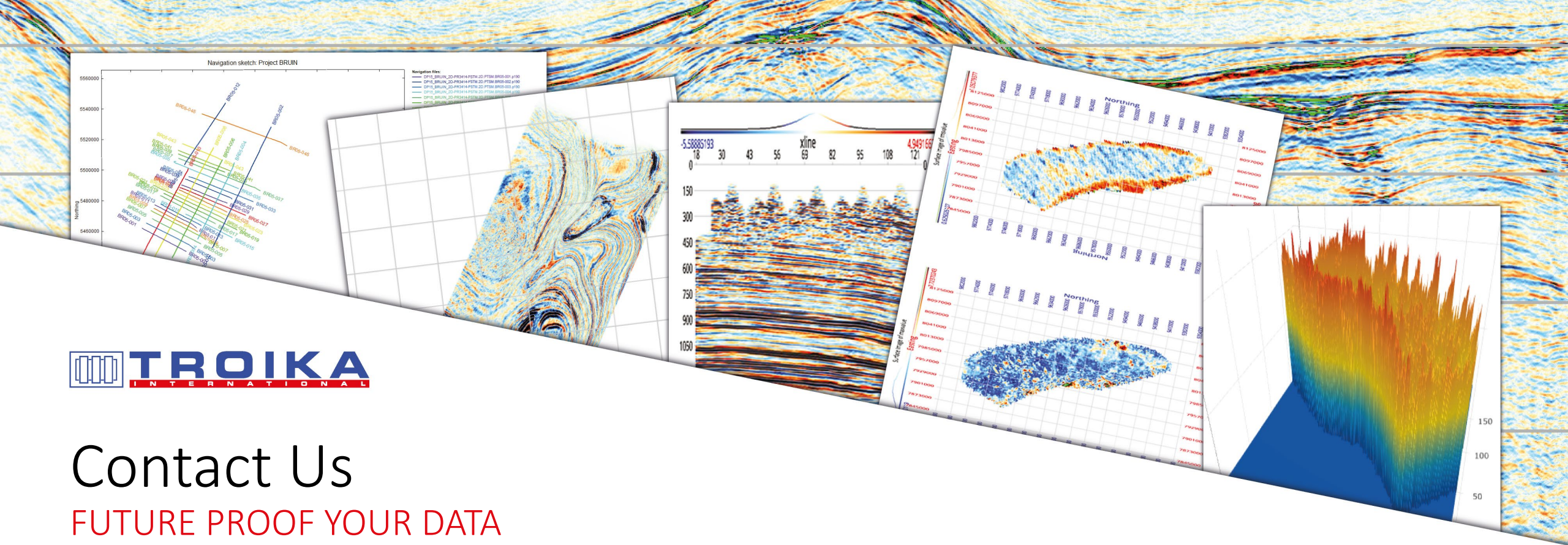
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FUTURE PROOF YOUR DATA

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