Reality Check

The E&P industry has experienced avoidable costs in its encounters with the science and methodology of geodesy and cartography. The following are explicit case histories of real problems that have occurred. They serve to document the fact that real opportunities for cost savings are available to the industry. You may click on any of the common issues below to be taken directly to that section.

Choosing the wrong spheroid

- During a survey close to the boundary of the Danish and Norwegian sectors of the North Sea the client requested that the survey data be presented in UTM coordinates, Zone 31 North referenced to the ED50 datum.
- The on-board surveyors having acquired the raw data referenced to the WGS84 datum made a mistake in post-processing, when the geographical coordinates were converted to grid coordinates.
- Specifically, they incorrectly used the WGS84 spheroid rather than the International 1924 spheroid.
- If we consider a point in the middle of the survey area: Latitude: 57º 30' 00" N, Longitude: 04º 30' 00" E and compute derived XY coordinates.
- The difference between correct and incorrect derived coordinates is:

Spheroid	Northing	Easting
WGS84 (Incorrect)	6374038.31 mN	589891.94 mE
International 1924 (Correct)	6374182.35 mN	589896.39 mE
Difference	144.04 m	4.45 m

Incorrect translation parameters

- In a survey performed in the Caribbean the client requested that the final survey data be provided in Old Trinidad Datum of 1903, although the original data was to be acquired in WGS84.
- The transformation between the two datums involved a simple three parameter shift (translation parameters only) from WGS84 to OTD03.
- However, during the conversion an error of over 1000 meters was introduced by using the parameters incorrectly.
- Consider the following point, referenced to the WGS84 datum: Latitude: 10º 30' 00" N, Longitude: 60º 30' 00" W.
- Converting this location to OTD1903 in both the correct and incorrect manner reveals:

	Latitude	Longitude
Correct signs	10° 29' 46.641" N	60° 30' 02.641" W
Incorrect signs	10° 30' 20.125" N	60° 29' 57.128" W
Difference	1043.47 meters	

- This kind of error can be avoided by CLEARLY labeling whether the parameters are LOCAL to SATELLITE, or vice verse. Contacting someone who knows the difference is much more cost effective than guessing.

Datum errors - Rotations

- A seismic survey was being positioned using DGPS supplied by Company X. The data required a seven parameter datum transformation to convert the data from WGS84 Datum to Indian Datum 1830 (UTM Zone 43 N).
- The datum transformation parameters were supplied and verified.
- The parameters were entered into the nav. system and applied.
- A non-obvious positioning error of 87 meters was produced.
- There are two possible conventions that can be applied to datum transformation rotations. One is positive clockwise and one is negative clockwise.
- The choice of convention is made by the software company.
- In this case, the software applied the negative clockwise convention and the datum parameters were expressed in the positive clockwise convention.
- If we consider a starting point as follows: Latitude: 19° 09' 56.231"N, Longitude: 72° 47' 01.455"E and transform it using both correct and incorrect sign conventions:

Correct	Incorrect	Differences
2120353.67 mN	2120408.25 mN	54.58 m
266975.95 mE	267043.96 mE	68.01 m

- This kind of subtle error can be avoided by insisting upon a test point from the persons supplying the transform parameters. This information will allow the software package to be tested before it is trusted.

Map Projection Parameters - Error

- A survey was conducted on shore China and the final data had to be supplied to the client in the China Grid System referenced to the Beijing Datum of 1954.
- All parameters were 'correctly' entered into the INS and the survey was acquired.
- However, a serious mis-tie was found between the seismic data and a series of down hole logs.
- The mis-tie was calculated to be approximately 1.5 kms.
- The problem was caused by a simple mistake in one of the grid parameters of the map projection.
- The China Grid System is very similar to the UTM system with one exception... the scale factor is 1.0 rather than 0.9996.
- Incorrect entry of this parameter produced the following error:

Beijing 1954	China Grid	UTM	Difference
106° 50' 00" E	3428782 mN	3427410 mN	1372 m
30° 58' 00" N	675169 mE	675099 mE	70 m