GPS DATA INTEGRATION INTO GIS FOR OFFSHORE FACILITIES MANAGEMENT – CHEVRON NIGERIA EXPERIENCE

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Key words: geo-information, geodetic services, GPS data integration, GIS technology adoption.

SUMMARY

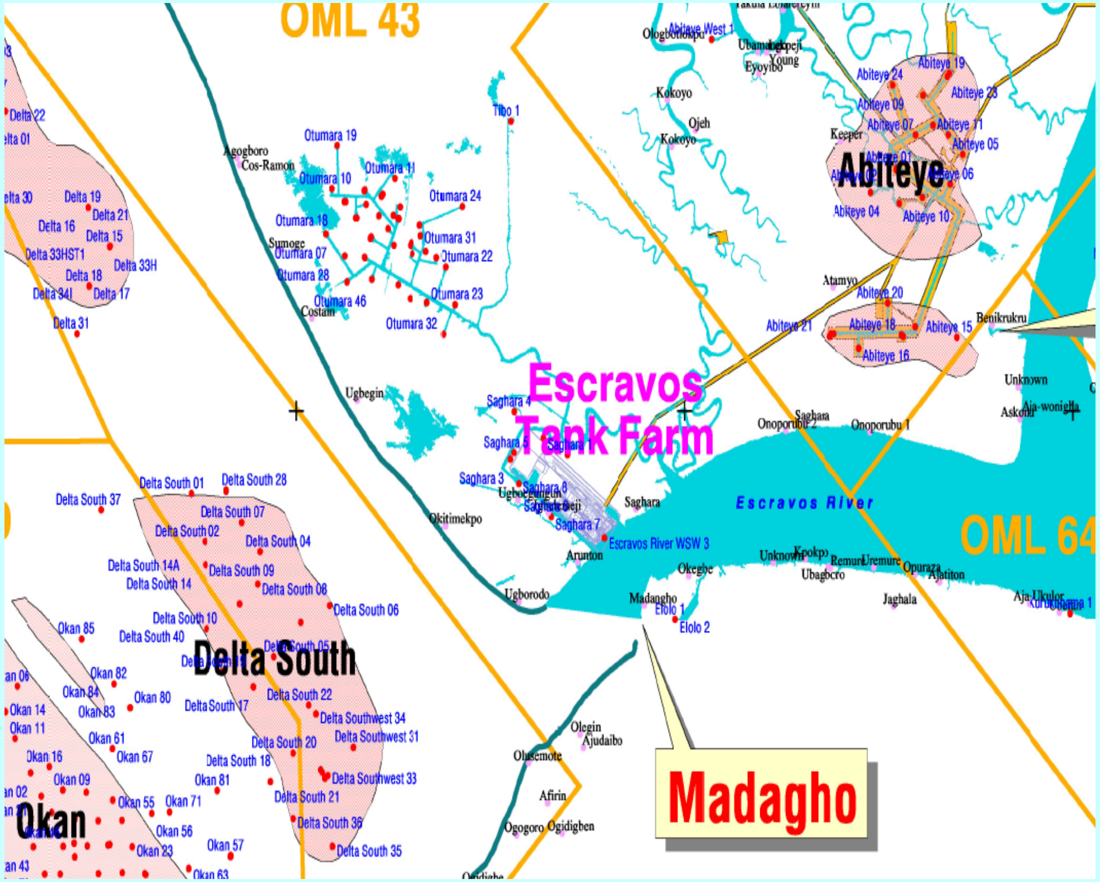
The revolution of Geodetic information for operational and facilities management, and change in paradigm motivates GIS technology adoption by Chevron Nigeria. The production and management of geo-information, to cope with the increased demand for geodetic services within chevron naturally informed the need for modern methods of data capture.

When Chevron Nigeria was faced with problems of having different types of survey information, which were based on different reference datum. The Company decided to use GPS technology (LEICA GPS System 500 with SKI-Pro software) in 2002 to capture both spatial and attribute information of all offshore facilities (oil wells, jacket orientation, helicopter landing, etc.) in the Niger Delta area of Nigeria and exported data captured for use in ArcGIS.

Chevron Nigeria has found GPS to be a powerful, cost-effective data gathering tool. It is easily integrated into GIS and significantly improves the quality of information used in decision making. With update maps resulting from the integration of GPS and GIS, the company has benefited immensely from the combination of technologies which offer the potential of more and better spatial information for pipeline planning, decision making, and data management.

This presentation hereby highlighted the experience, the tasks, and moreover the challenges faced by Chevron Nigeria on the acquisition of GPS datasets for offshore facilities.

PROJECT STUDY AREA



GPS PRE-PLANNING

Figure 1: An Offshore Production Platform

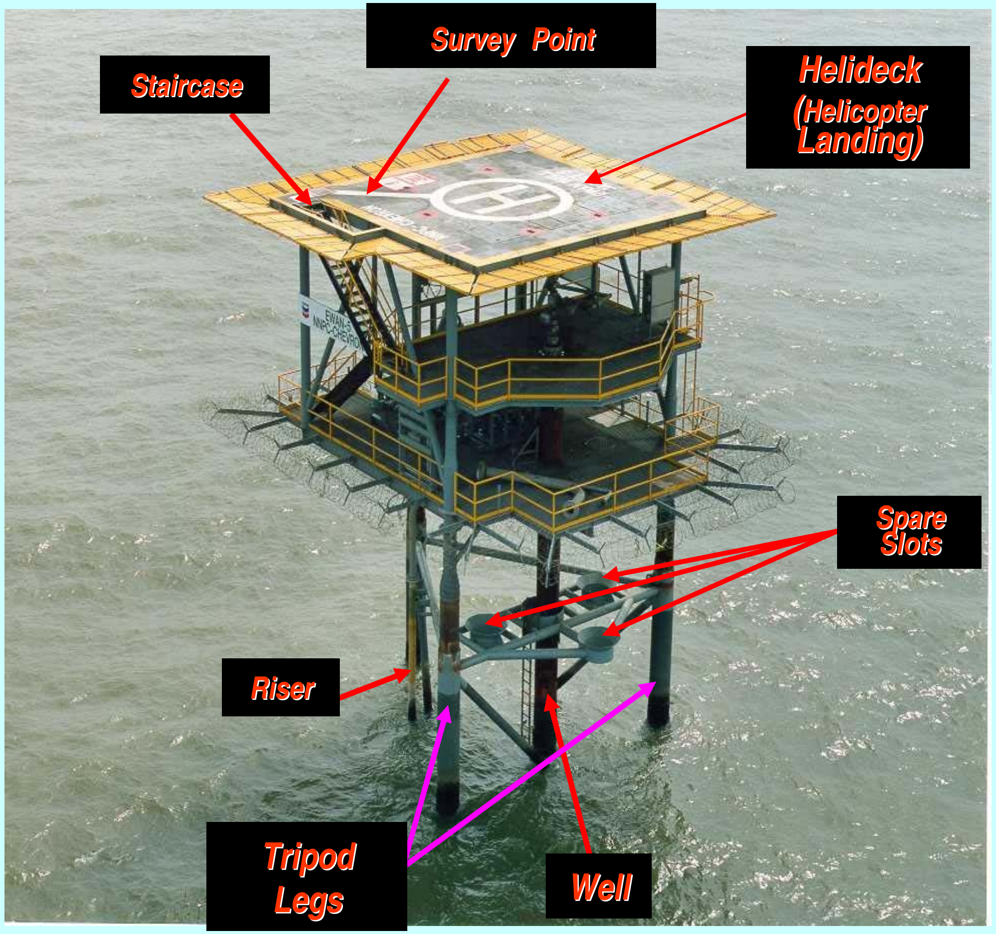


Figure 2: An Offshore Jacket

SAMPLE GPS & EXISTING DATA SETS

						GPS_RESULT_LAT/LONG		GPS_RESULT_GRID		EXISTING _GRID RECORD		DIFFERENCES_IN CO-OD (∆ E)	(∆ N)
S/n	Fac_ID	Point_Id	Well Name	Content	Status	Latitude (D M S)	Longitude (D M S)	Easting (M)	Northing (M)	MINNA_EAST	MINNA_NORTH	MINNA_EAST	MINNA_NORTH
1	DES	01-WH1	Well 1	Oil	Shut-In	5 36 52.888840 N	5 6 4.033170 E	297402.539	178471.810	297400.493	178470.188	2.046	1.622
2	DES	10-WH10	Well 10	Gas	Shut-In	5 35 26.210782 N	5 6 13.088448 E	297683.898	175810.038	297682.303	175808.675	1.595	1.363
3	DES	08-WH11	Well 11	Oil	Shut-In	5 35 52.335117 N	5 6 55.201496 E	298978.880	176613.706	298976.228	176611.679	2.652	2.027
4	DES	04-WH12	Well 12	Oil	Shut-In	5 36 13.332181 N	5 6 56.574557 E	299020.452	177258.617	299019.484	177256.437	0.968	2.180
5	DES	13-WH13	Well 13	Oil	Shut-In	5 34 8.216128 N	5 7 25.427714 E	299912.321	173416.974	299910.433	173414.265	1.888	2.709
6	DES	09-WH14	Well 14	Oil	In Use	5 36 4.091764 N	5 6 12.143644 E	297653.624	176973.396	297650.907	176971.161	2.717	2.235
7	DES	15-WH15	Well 15	Oil	Shut-In	5 34 49.572118 N	5 6 52.387027 E	298894.293	174686.027	298891.677	174683.758	2.616	2.269
8	DES	15-WH16	Well 16	Oil	Shut-In	5 34 49.496893 N	5 6 52.338082 E	298892.789	174683.715	298890.257	174681.954	2.532	1.761
9	DES	15-WH17	Well 17	Oil	Shut-In	5 34 49.487896 N	5 6 52.421947 E	298895.370	174683.442	298892.487	174681.650	2.883	1.792
10	DES	13-WH18	Well 18	Oil	Shut-In	5 34 8.135087 N	5 7 25.419998 E	299912.077	173414.486	299910.279	173411.850	1.798	2.636

Figure 3: Table Showing GPS Result in Geographic and Grid Coordinates.

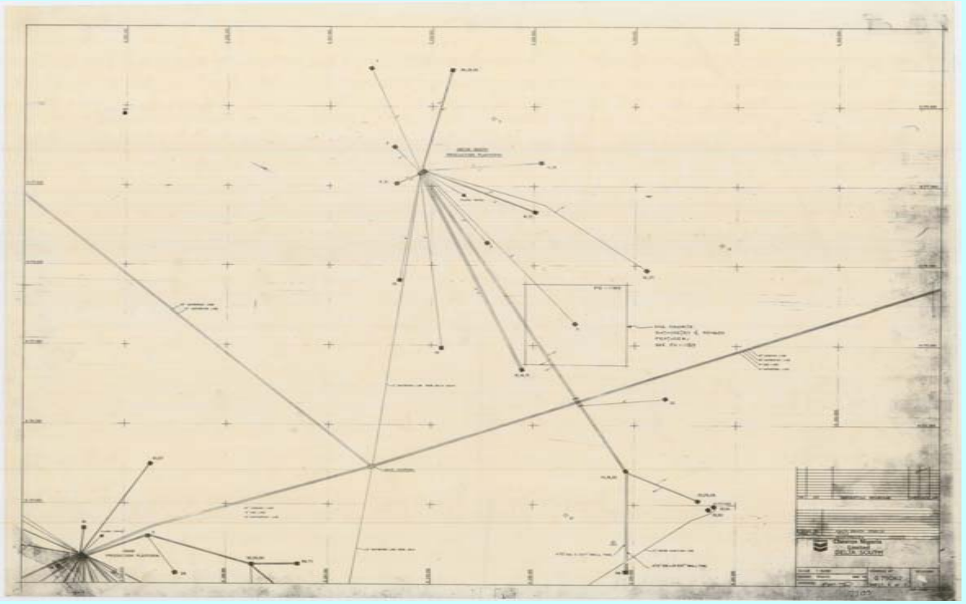


Figure 4: Scanned Analogue Map Before Data Integration Into GIS

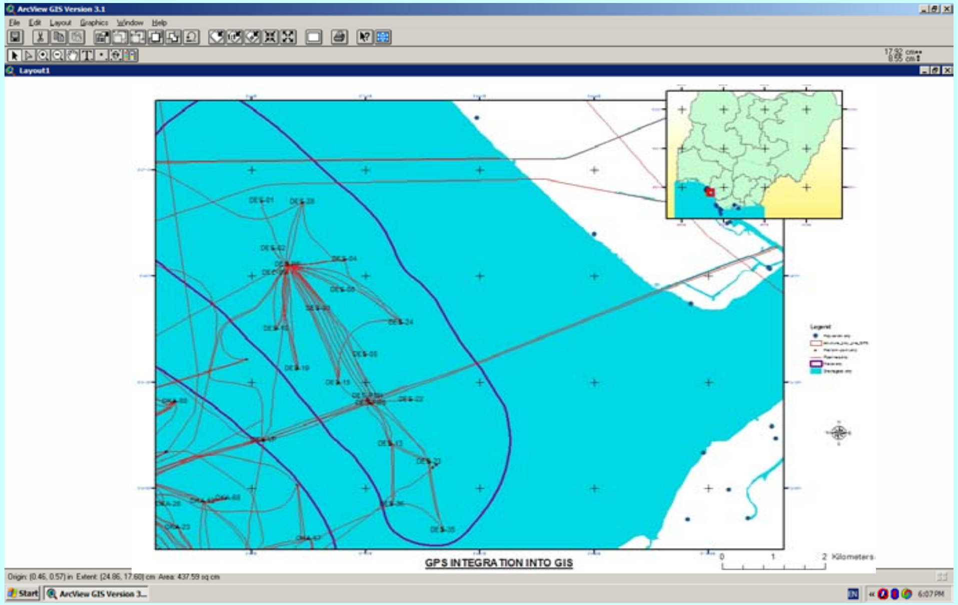


Figure 5: GPS Data Integrated Into GIS

CONCLUSION

– Sensitizing our customers toward adoption of new coordinate set for planning and design.

– Synchronization of all Spatial Database Engine (SDE) layer to the new coordinate set.

– Adoption of GPS in swamp and land locations (view blockage-mangrove forest)

– Control extension to land locations

– Tracking and documenting changes resulting from data dynamics

– More economic and efficient data updating approach

– Opportunity for deformation studies of Chevron facilities

– Survey-aware features position updating in GIS (survey analyst Ext)

– Provision of consistent data with known reliability in ArcIMS deployment

BIOGRAPHICAL NOTES

Surv. Emmanuel Olayinka Ajayi, born in 1957 is a fellow of the Nigeria Institution of Surveyors. Graduated in 1982 with a B.Sc in Surveying from University of Civil Engineering, Bucharest, Romania. Obtained M.Sc degree in Surveying (with bias to Geodesy) from University of Lagos, Nigeria in 1988 and MBA degree in Project Management from Obafemi Awolowo University, Ile-Ife, Nigeria in 2001. He was registered to practice as a Surveyor in Nigeria in 1989. He joined Chevron Nigeria Limited in 1994 as a Survey Engineer in the Facility Engineering Department and rose to the position of Chief Surveyor, GIS-Survey Unit, Chevron Nigeria Limited since May 1998.

Surv. Sylvester Efe Owhojeta, born in 1967 is a member of the Nigerian Institution of Surveyors. Graduated in 1991 with a B.Sc in Surveying, Geodesy and Photogrammetry from University of Nigeria, Nsukka, Nigeria. Obtained a Masters degree in Petroleum Economics from Ambrose Alli University, Ekpoma, Nigeria in 2005. He was registered to practice as a Surveyor in Nigeria in 2001. Up to date he has been practicing as a Registered Surveyor. Since July 2005 on contract engagement with the GIS-Survey Unit of Chevron Nigeria Limited, Escravos – Nigeria.

RECOMMENDATIONS

– Geospatial data should be saved and stored so that it may be retrieved later.

– GPS positional data should be used to upgrade a less accurate GIS base map.

– All digital maps should have their associated metadata tagged to them.

– By using accurate GPS points from a variety of projects can result in a digital base map that possesses a higher level of spatial accuracy in GIS environment.

– GPS data, combined with the field application of the conceptual work as presented in the study will generate more and better spatial information for offshore facilities planning, engineering, and research.

CONTACTS

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