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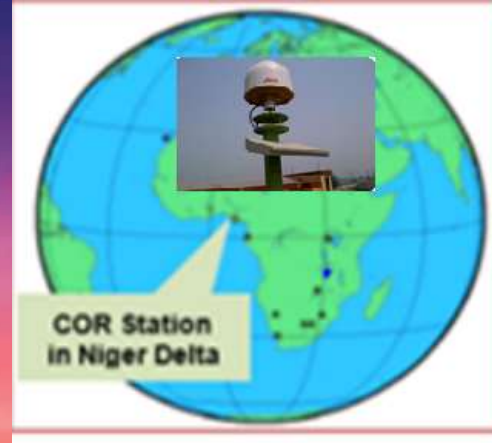
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GNSS CORS Technology Implementation in the Oil and Gas Industry -Benefits & Challenges.

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Outline

- Introduction
- Business case
- GPS CORS Implementation
- Business value derived
- Conclusion

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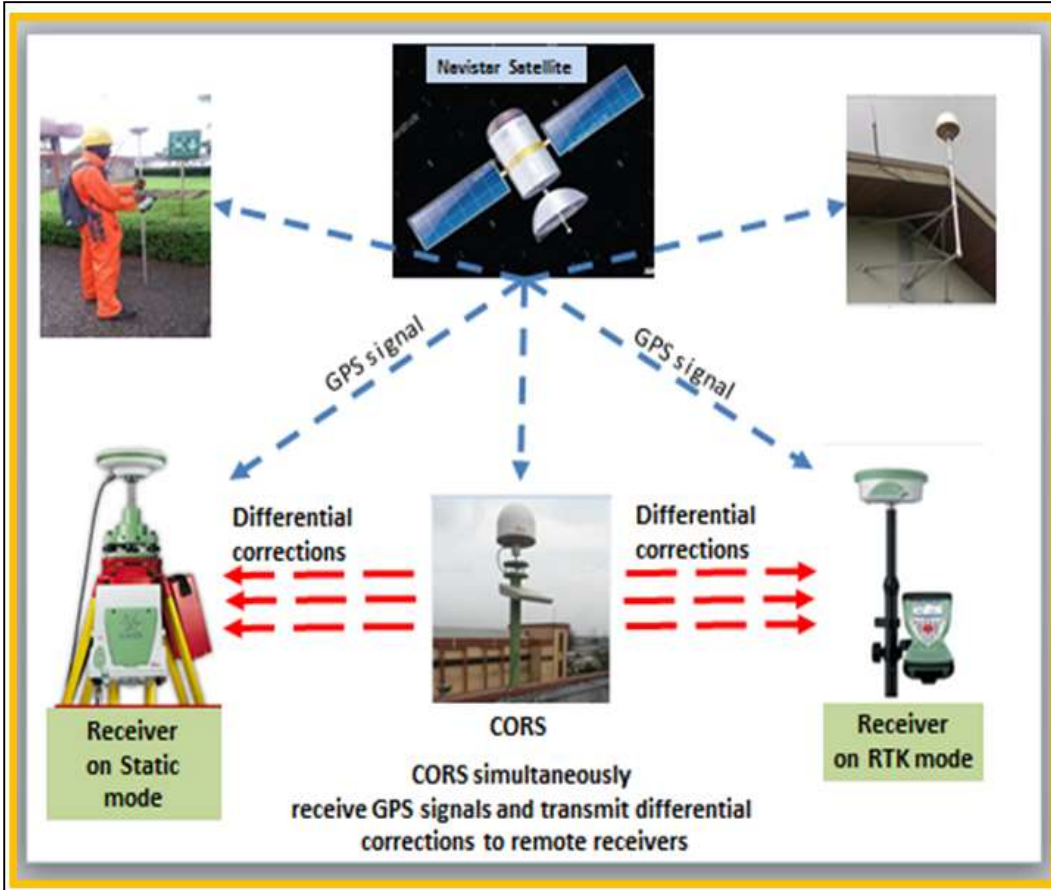


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Introduction



WHAT IS CORS?

- Continuously Operating Reference Stations -an assemblage of GPS/GNSS receivers, computer system with data storage and remote communication capabilities.
- Application in the oil and gas industry in Nigeria- positioning & mapping



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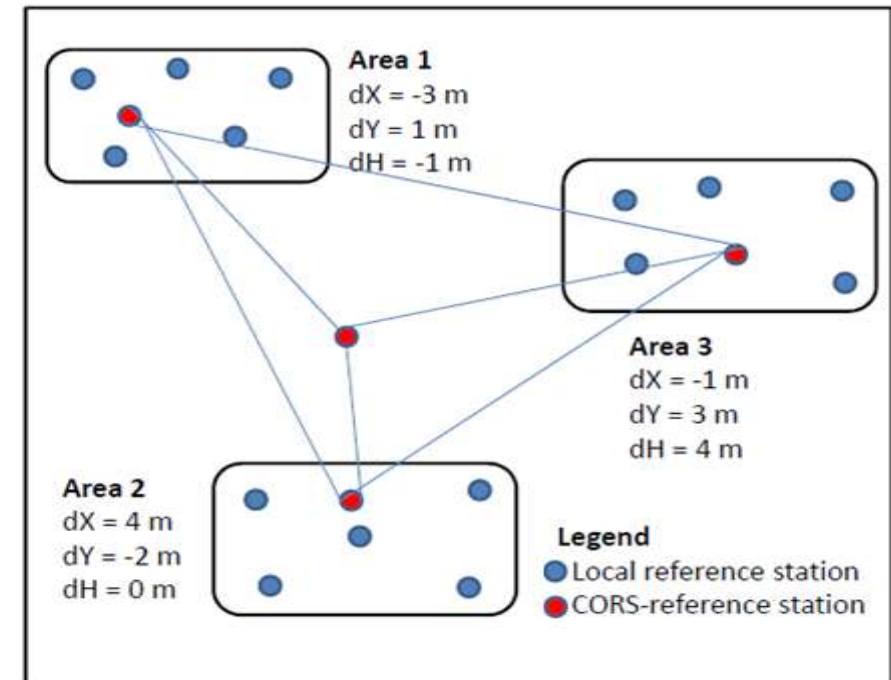


Business Case

- Geodetic data integrity issues – e.g. wells placement impact
- Coordinate inconsistencies across fields – pipelines connecting multiple fields
- Datum harmonization issues – modelling - flood mitigation and pipeline
- Searching and insitu checking control (reference) pillars is required in difficult swamp terrains
- Limited range, communication and equipment issues – conventional RTK



Whole area: defined consistent in WGS84



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GPS CORS Implementation

1. Planning / Design phase

❑ Site selection:

- open Sky including avoidance of multipath errors
- uninterrupted power supply
- redundant communication options;
- security of the hardware
- site suitability testing –trial logging at multiple sites

❑ Network design & operational coverage.

❑ Data storage and Management

❑ Equipment Selection:

- choice of receiver model, antenna type (choke ring) & communication.



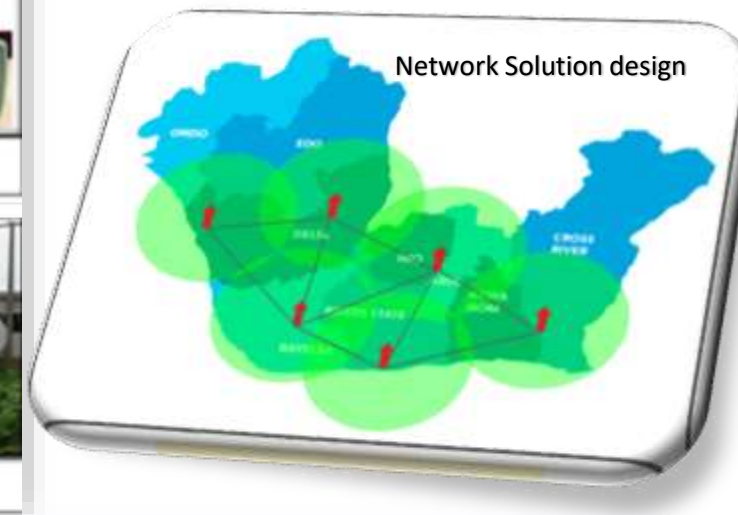
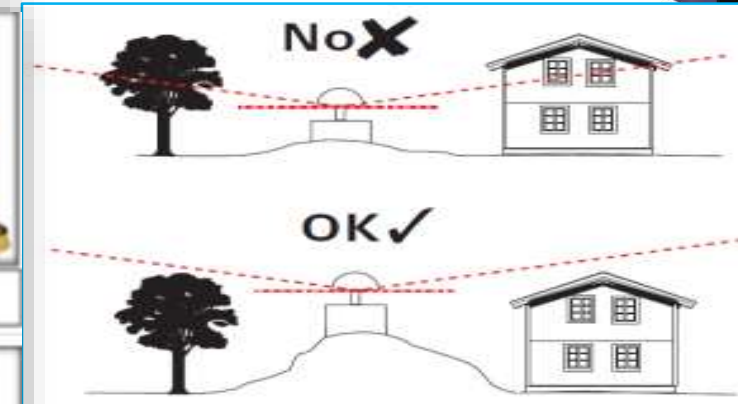
Choke ring antenna



GNSS Receivers



Communications



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GPS CORS Implementation

2. Installation

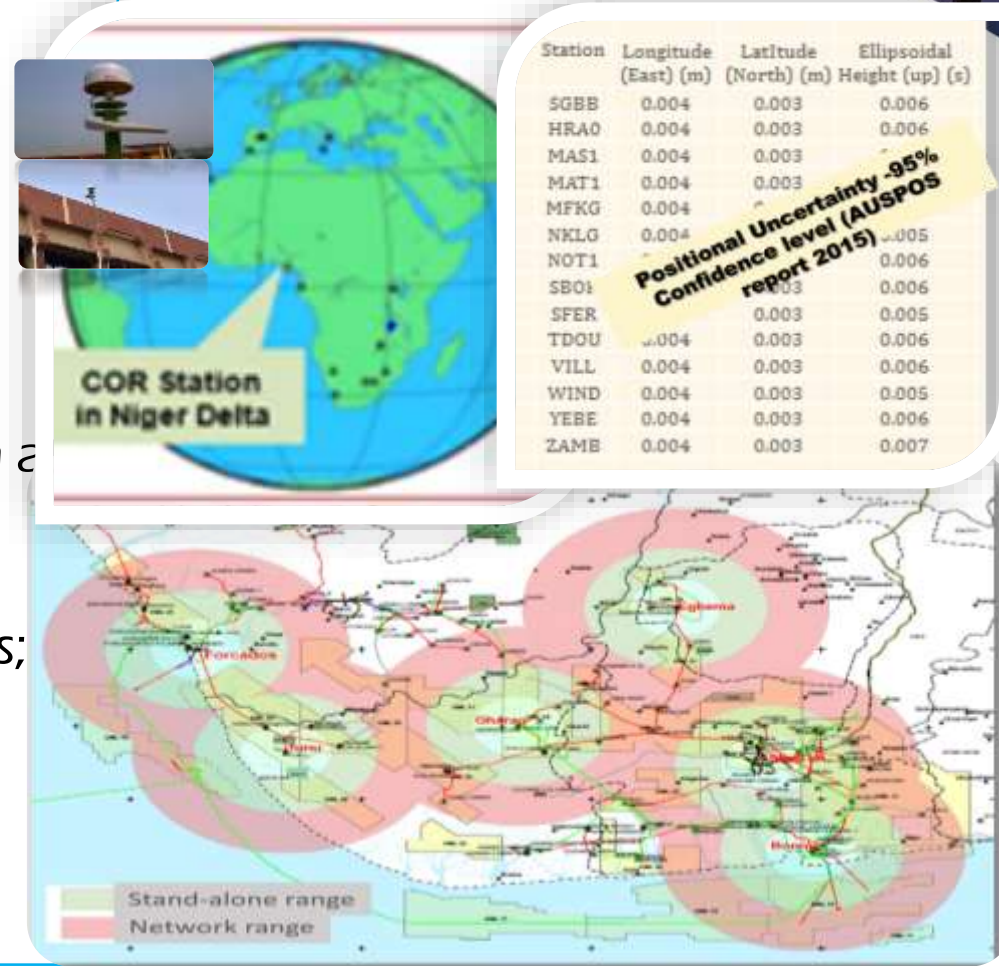
- ❑ Site preparation –antenna mount; Cabinet and station modules; communication systems
- ❑ Station Configuration / activation;
- ❑ Measurements / logging

3. Assurance and validation

- ❑ Equipment and range testing by users - accuracy of 0.02m at 15km & 30km ranges in RTK mode for radio & GSM transmissions;
- ❑ Validation by AUSPOS using neighboring IGS COR stations; published coordinates (ITRF2008 & WGS 84).

4. Network solution

- ❑ Activate RTK / DGPS data transportation system via the internet leveraging GSM service provider



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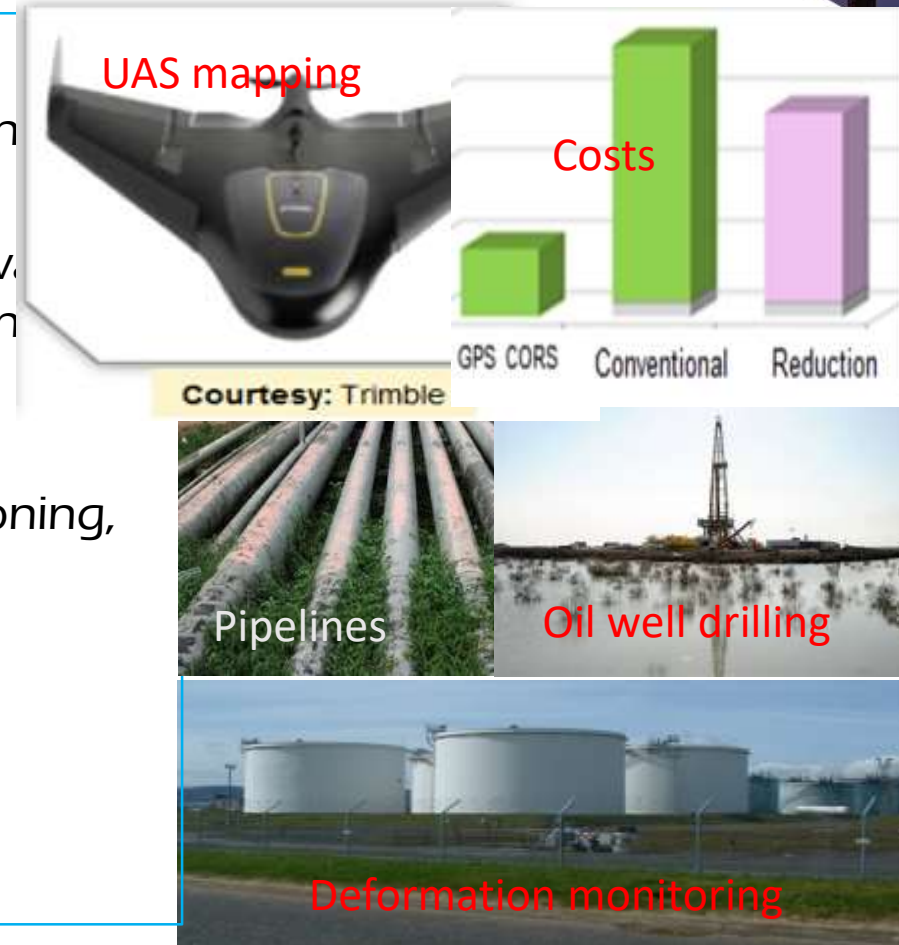


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Business value derived

- ❑ Eliminated data integrity issues
 - ✓ No coordinate inconsistencies & a great tool for datum harmonization
- ❑ Reduced safety exposure of field personnel
 - ✓ No more search for control pillars in crude oil infested and flooded swamps
 - ✓ Capability to monitor personnel in remote sites for quick evacuation in event of security and safety incidents
- ❑ Significant cost savings from application to projects
 - ✓ 60 - 75% cost reduction banked in 3D Seismic acquisition; Well positioning, and pipeline laying support works
 - ✓ Yearly survey costs reduction of between 15-20 percent is assured
- ❑ Other critical use cases in the oil industry include:
 - ✓ UAS support for large scale mapping and flares inspection
 - ✓ Deformation (subsidence) monitoring of oil storage tanks;
 - ✓ Decommissioning & Restoration of wells, burrow pits and pipelines



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Challenges & Conclusion

Challenges

- Limited in-country expertise -single sourced “specialist”.
- Defective power supply in-country -significantly constrained choice of stations to oil facilities.
- Limited 4G LTE internet services within the oil industry operational areas -forcing dependence on rather expensive standalone VSAT communication option.
- Prospective users are constrained to acquire compatible Radio/GSM modem for connectivity to the base stations.



Conclusion

The implementation is a game changer in Survey service delivery within the oil industry, and should be extended to establishing Land Information Systems (LIS) in developing Countries including Nigeria that are yet to implement.

Interestingly, the service can be commercialized to generate additional revenue stream

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