



Sensors

Shared Use of DGPS for DP and Survey Operations

David Russell

Veripos

October 17-18, 2006

[Return to Session Directory](#)



Shared Use of DGPS for DP and Survey Operations

18th October 2006

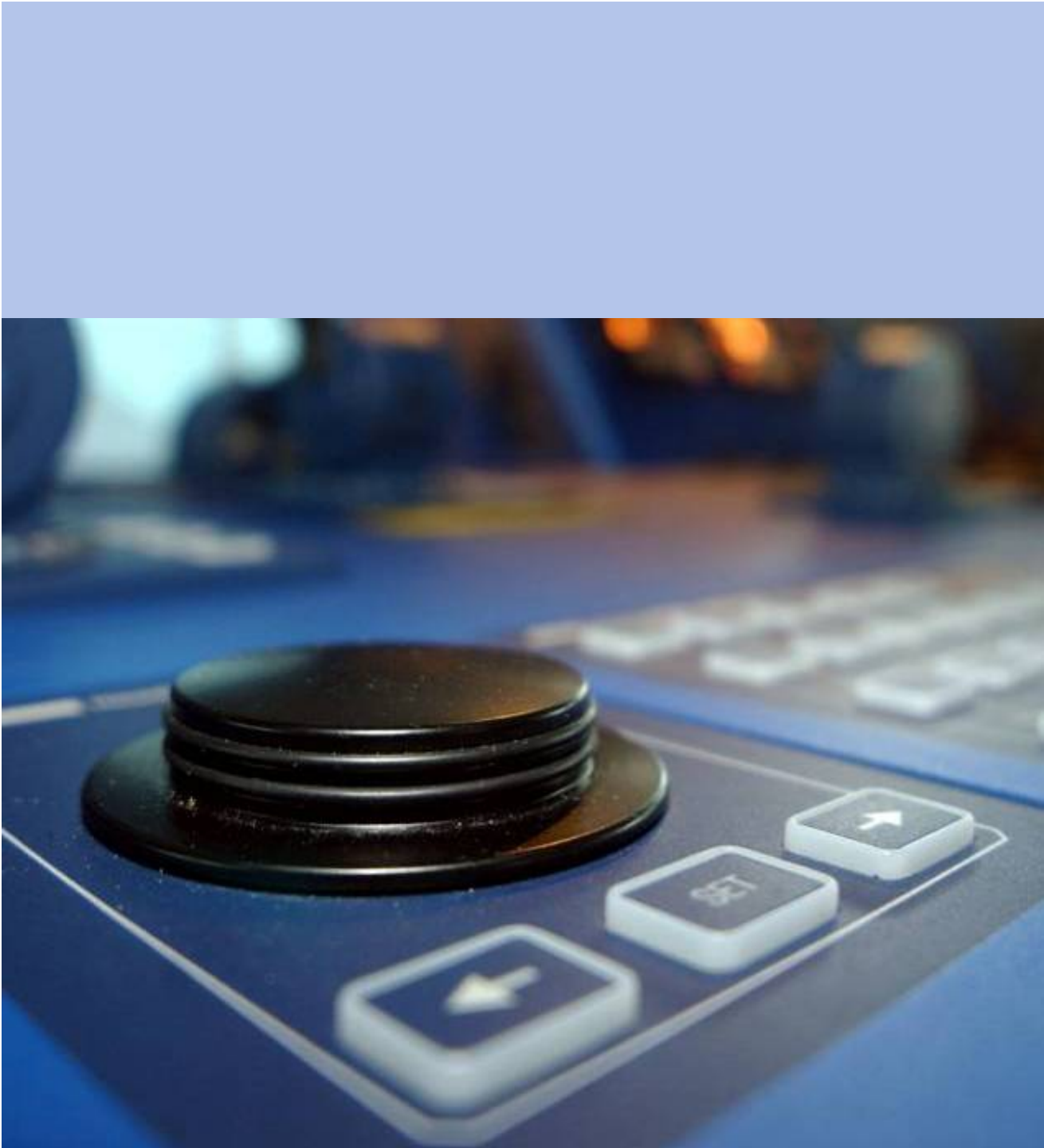
Presented by: David Russell

Technology Development Manager - VERIPOS

DYNAMIC POSITIONING CONFERENCE 2006 – Houston



Positioning for Success



Summary

- Background
- Characteristics of Positioning
- Shared Use
- Conclusion
- Recommendations

Background

- Positioning critical to DP operations
- Changed model of onboard positioning
- Apparent removal of complexity
- Are things better?
 - Increased accuracy
 - Increased reliability
 - Increased usability
 - Increased complacency?
 - Decreased costs?
- DPO / Surveyor role reversal
- **Issue - Change Control of system**
- **Should systems be shared between DP and other operations?**



What's it All About?

August 2005

- *Vessel reports unstable positioning from DGPS. Vessel suspends operations due to unavailability of surface positioning, which previously had been acceptable.*
- *Surveyor had disconnected cables, reconnected incorrectly for DP and had changed hardware configuration, both to address survey requirements*
- *Vessel lost over a day of operational time whilst problem was fixed*
- *Cost was approximately equivalent to 1-year of DGPS costs*



What's it All About?

September 2005

Vessel reported complete loss of positioning

On inspection, installation had been reconfigured to provide positioning to survey area

Reconfiguration of hardware by surveyors left no output to DP

Vessel on stand-by for several hours whilst fix was effected



USER TYPE 1

Navigation and positioning for vessel station-keeping

- Diving
- Construction
- Pipe-lay
- Heavy lift

USER TYPE 2

Navigation and positioning for survey applications

- Seismic survey,
- hydrographic survey,
- construction and pipe-lay support
- Positioning of vessels and structures

Two General Types of User



Requirements for DP Operations (User Type 1)

- Both precision and accuracy are important for DP operations
- DP position reference must provide a reliable & stable position solution
- Validity and quality of instantaneous position solution has to be assessed immediately so action can be taken – must be user friendly
- Other reference systems such as acoustics, taut-wire – mean less dependence on DGNSS

Requirements for Survey Operations (User Type 2)

- Absolute accuracy and precision are required
- Data logging, subsequent review and post-processing of data
- Position quality involving complex statistical analysis

Use of DGPS for Survey and DP Operations



Shared Use of DGPS

Data provided by service provider generally categorized by:

- Type of delivery mechanism for corrections
 - Level of position accuracy it can provide
- Consideration must be given to the performance specification of the system being shared to ensure it meets the requirements of the sharing party

Additional things to be considered for shared Use of DGNSS:

- Available level of service and technical support
- Access to reference station information and infrastructure redundancy
- Quality control (e.g. broadcast integrity)
- Comprehensive system monitoring and performance analysis

Performance & Characteristics of System & How they Apply to Each User Type

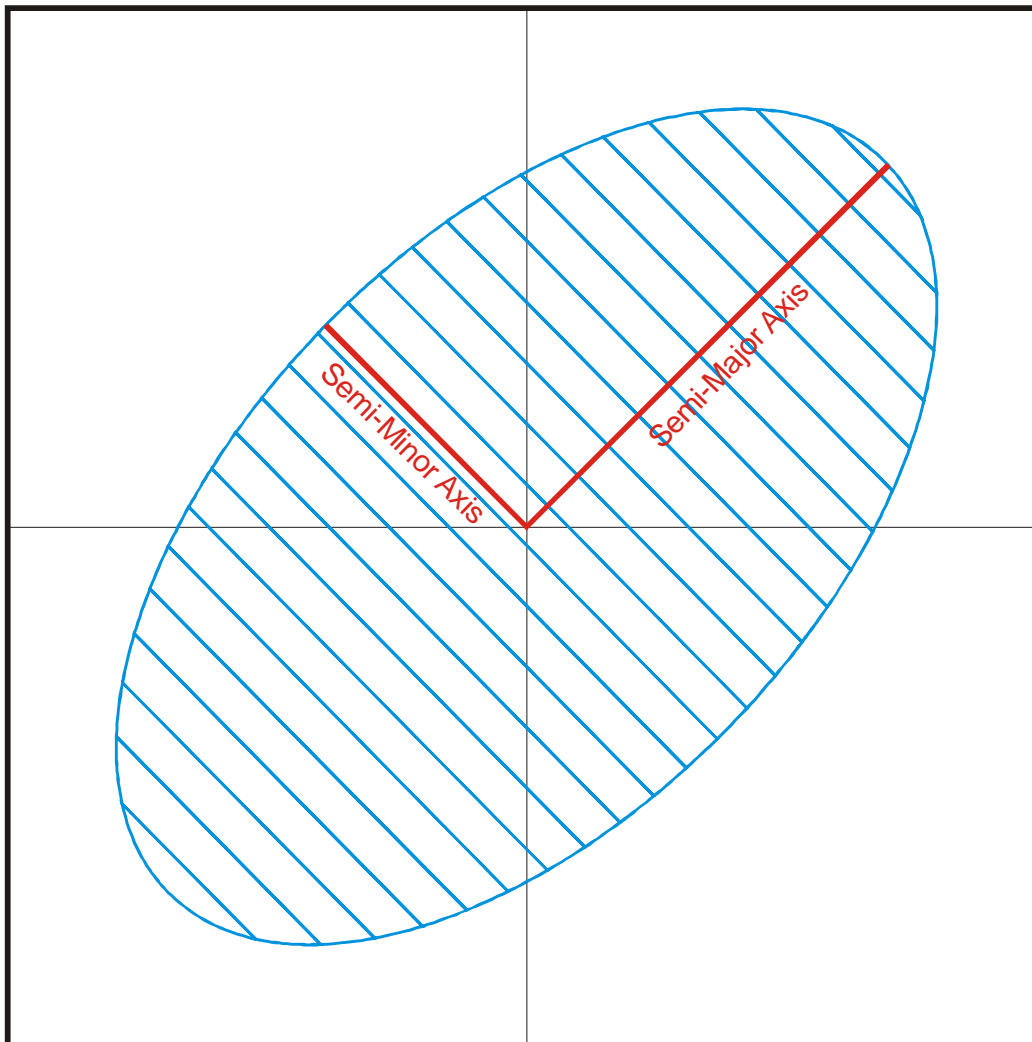
Existing Guidelines

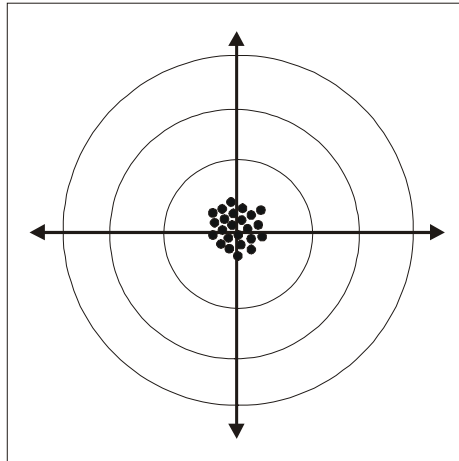
*UKOOA Recommendations
for Use of DGPS Offshore*

Defines

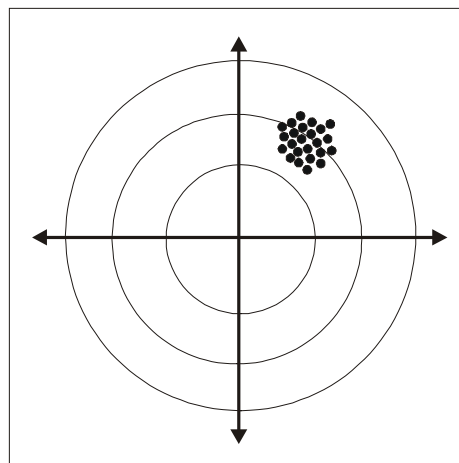
Precision

Reliability (MDE)

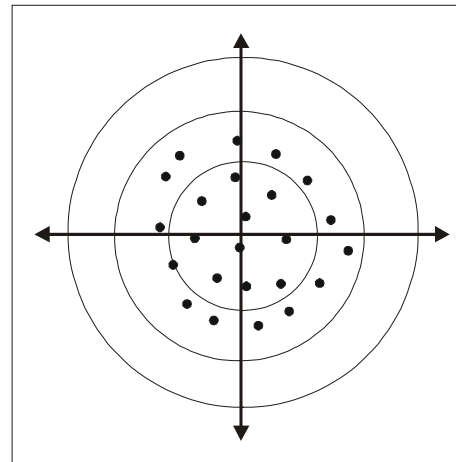




Precise & Accurate



Precise & Inaccurate

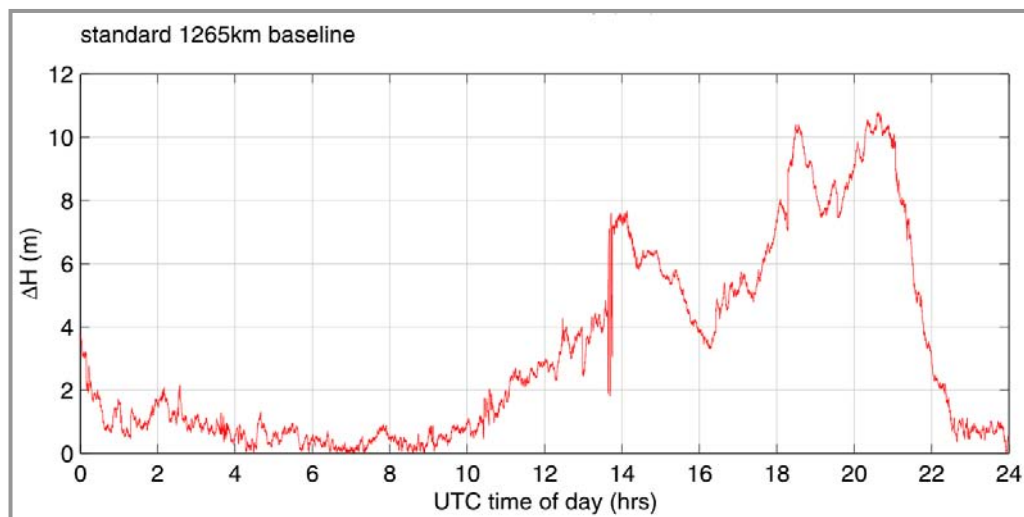


Low Precision

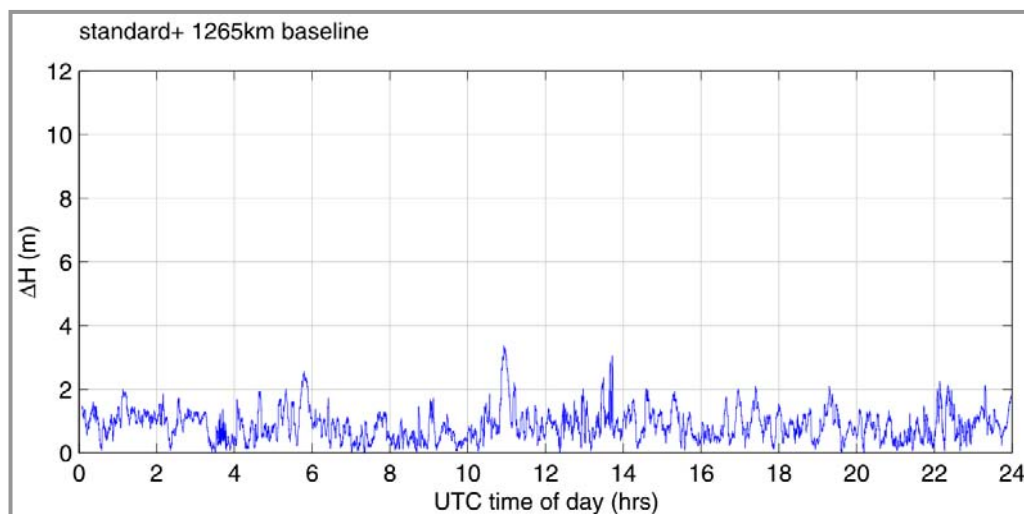
Accuracy v Precision (NOT THE SAME)

Factors Affecting Precision

- Increased age of corrections
- Interruption to satellite tracking
- Radio-frequency Interference
- Ionosphere scintillation
- Loss of correction data
- Specification of equipment used
- Quality of installation
- Adjustments to GPS network
- US DoD e.g. jamming or SA



Slow drift in position caused by ionosphere activity – DP systems using age of correction or number SV or Fix mode to determine quality of position will potentially see this as good quality



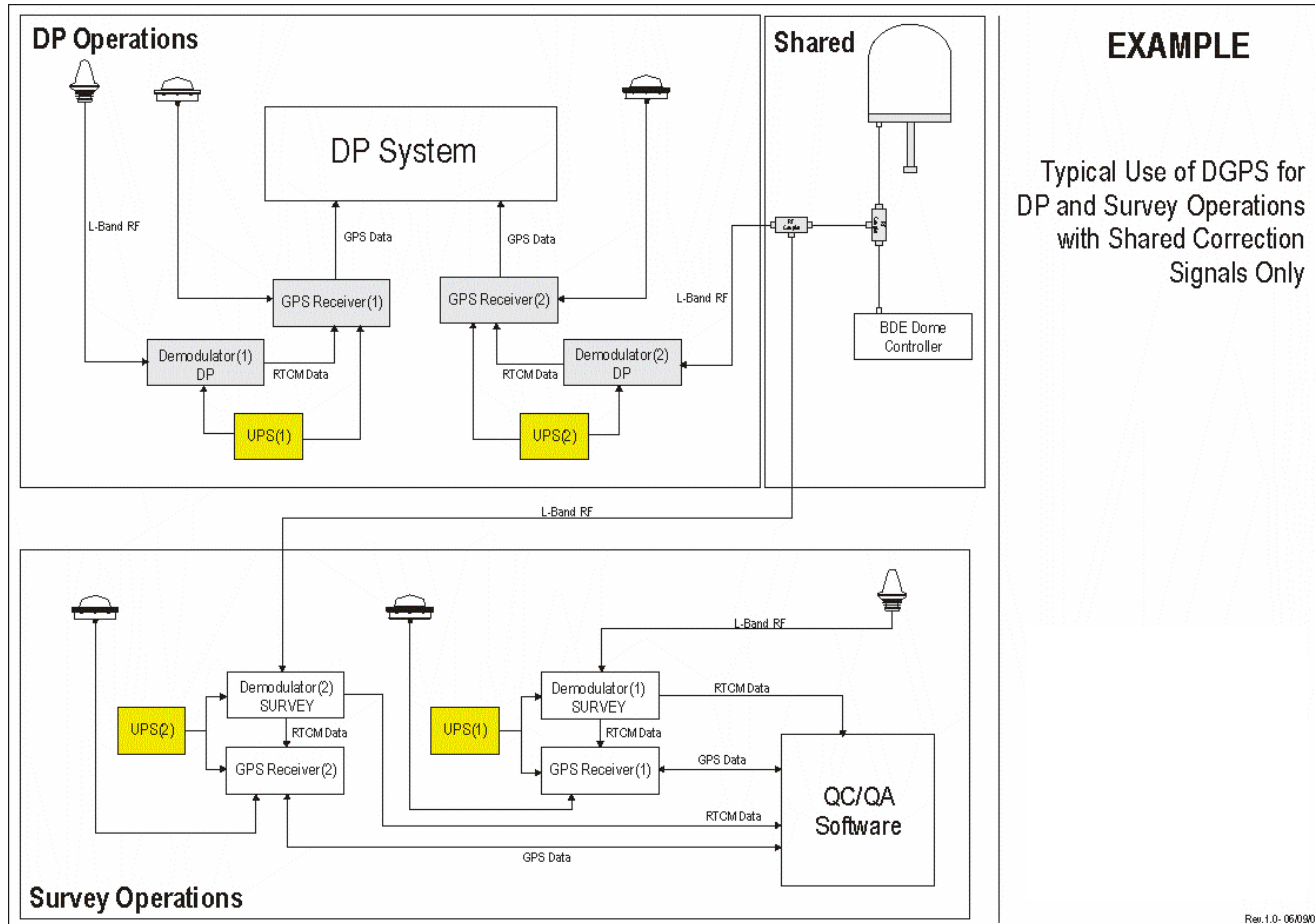
Problem fixed by having dual-frequency system, which may be a requirement of sharing party but not installed

Accuracy v Precision (NOT THE SAME)

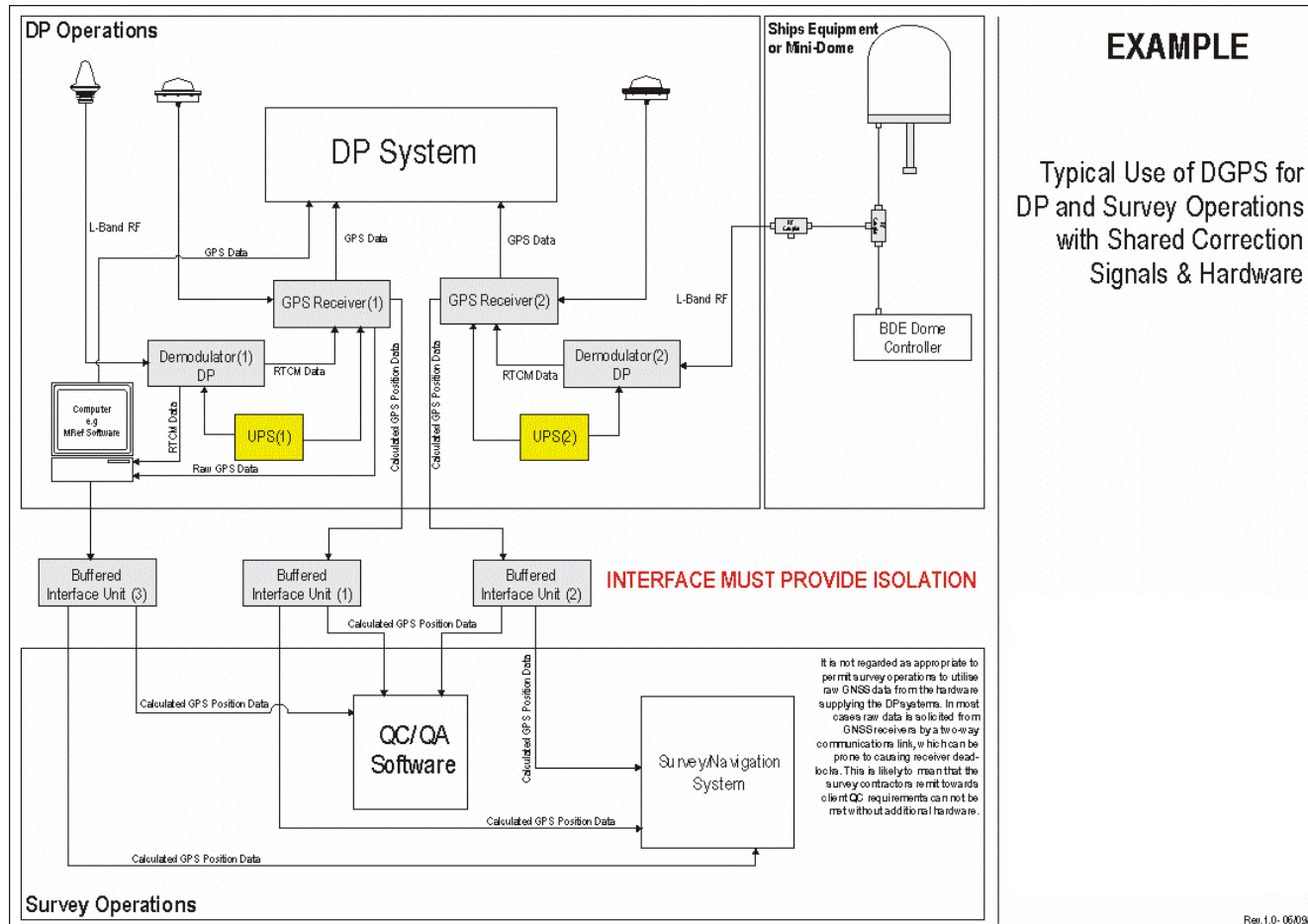
Factors Affecting Accuracy

- Satellite geometry through
 - Elevation mask
 - Satellite Masking
 - Satellite de-selection
 - Changing constellation
- Change of reference stations
- Ionosphere activity
- Conflicting geodetic datum
- Local multi-path e.g.
 - Working close to structure / platform
- Crane movements
- Helicopter operations
- Adjustments to GPS by US

Schematic – Hardware Not Shared



Schematic – Hardware Shared



Risks of Sharing

Risk of Sharing Correction Signal

- No inherent risk provided the correction signal meets the technical requirements of each sharing party
- Can be significant commercial implications when using a system installed for DP operations only, which is then used for survey operations

Risks of Sharing Hardware

- There is a risk associated with sharing hardware
- Potential for one user to adversely impact the other which may result in degradation of the position solution
 - Changing of GPS configuration during operations
 - Changing of reference station selection



Conclusions

- Satellite navigation technology continues to develop and will remain the system of choice for surface positioning
- Use of the same DGPS correction service on a single vessel for different applications should not present operational issues
- There is a risk associated with the sharing of GPS and DGPS hardware

Recommendations

When considering sharing a DGPS system for use in both DP and Survey operations the following is recommended:

- Conduct a rigorous and comprehensive risk assessment
 - before mobilization
 - include service provider and experienced DP and Survey personnel
- Implement any training requirements identified during risk assessment

Recommendations cont..

- Procedures should be produced and implemented that mitigates all identified risks including:
 - System configuration
 - Communication
 - Definition and ownership of responsibilities
 - Change management process to cover modifications of system installation and settings
 - Contingencies
- Toolbox talk completed by DP and survey personnel on the vessel before installation and should address all procedures and methods
- All parties involved in using the systems should possess appropriate levels of competency as defined by associated recommendations and guidelines (e.g. UKOOA)
- Lastly, consider if sharing is really necessary especially take into account the safety and commercially critical nature of positioning

Thank you for your attention

QUESTIONS



Positioning for Success