Optimizing Seismic Operations by Breaking Silos and Leveraging Data

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Introduction

The context of the seismic industry has drastically changed during the last decade. Exploration is decreasing while operators are focusing on optimizing their current assets. The consequence is twofold:

- The seismic acquisition parameters must be carefully selected as new acquisitions are usually defined to overcome quality issues obtained with previously acquired surveys without too much “a priori” knowledge and with mainstream techniques.
- The cost of operation is a constraint more than ever.

To overcome these challenges, a wholistic approach is required (Zajac, Ten Kroode, & Bottomley, 2022). The challenge is then for the various stockholders of a given project to work in a more collaborative way.

Silos Everywhere

When considering a seismic operation as a whole, the complexity is striking. First, timewise: A typical seismic project timeline (Figure 1 (a)) exhibits various phases involving different actors from multiple companies. Only some of the survey actors are interested in all phases, whereas some inputs may be relevant to the efficiency of the project. For example, involving the processing teams during the planning phase may help optimize the geometry and other acquisition parameters. Likewise, the survey execution phase (Figure 1 (b)) involves different actors from various companies, offshore or onshore, and everybody must have the right level of information for the job.

Data as an Enabler for Better Collaboration

Fortunately, today's technology can provide tools, the cornerstone being the data. The seismic data is the bread and butter of our industry, but a lot more can be done by using the vast amount of data generated during all the phases of the project (Figure 2).

Use Cases Examples

One prominent area where the proper usage of the operational data can bring value, is the monitoring of how the project is moving forward. Simultaneous Operation (SIMOPS) management systems are commonly used during seismic operations (Pemberton, Darling, Koheler, & McDonald, 2015). It is applied on towed streamer and ocean bottom (OBN) operations, with even value seen when the activity level is increased (whether seismic and / or non-seismic). The usage of this data platform is regularly extended to seismic survey-related information, supplying the right level of information to the various stakeholders of the project and simplifying the decision-making process.

Another area where collaboration can help optimize a survey is selecting suitable seismic parameters. For example, reducing the source volume and moving toward point source is appealing (Dhelie, et al., 2017).

It is even more suitable for shallow water environments. To be successful, source modelling, adapted to the survey geometry, the geology and the receiver, is critical. This is the guarantee that the acquisition will provide the most optimal data quality. Again, good collaboration and easy data exchange help define fit-for-purpose survey parameters.

Conclusions

Today seismic industry has antinomic requests: on the one hand, the most advanced acquisition techniques need to be applied to ensure the imaging improvement required to optimize operators' assets. On the other hand, this has to be cheap… There are many opportunities for optimization based on the proper usage of the data available, but also the expertise available in our industry. This requires us to work closer together as an industry and improve the way we collaborate.

References

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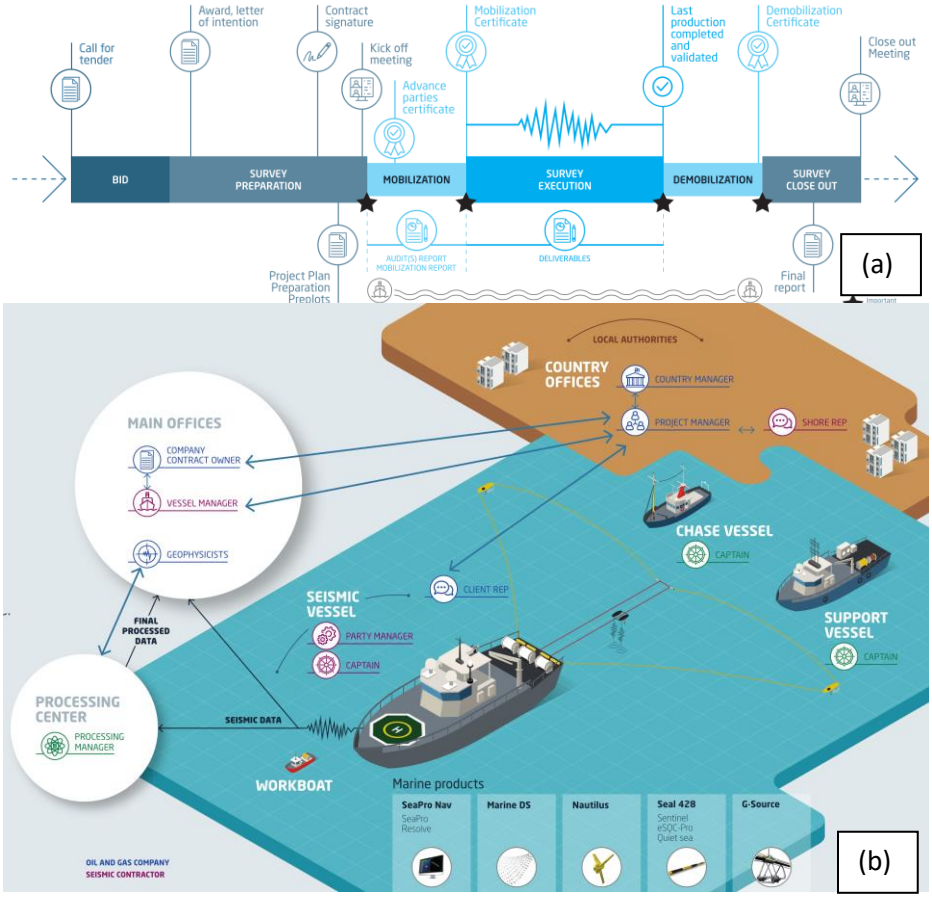

Figure 1: Overall view of a typical streamer seismic acquisition operation (a) listing a typical timeline for the project and (b) the various actors involved in the operation. OBN operations would have a similar but more complex organization since more vessels may be involved.

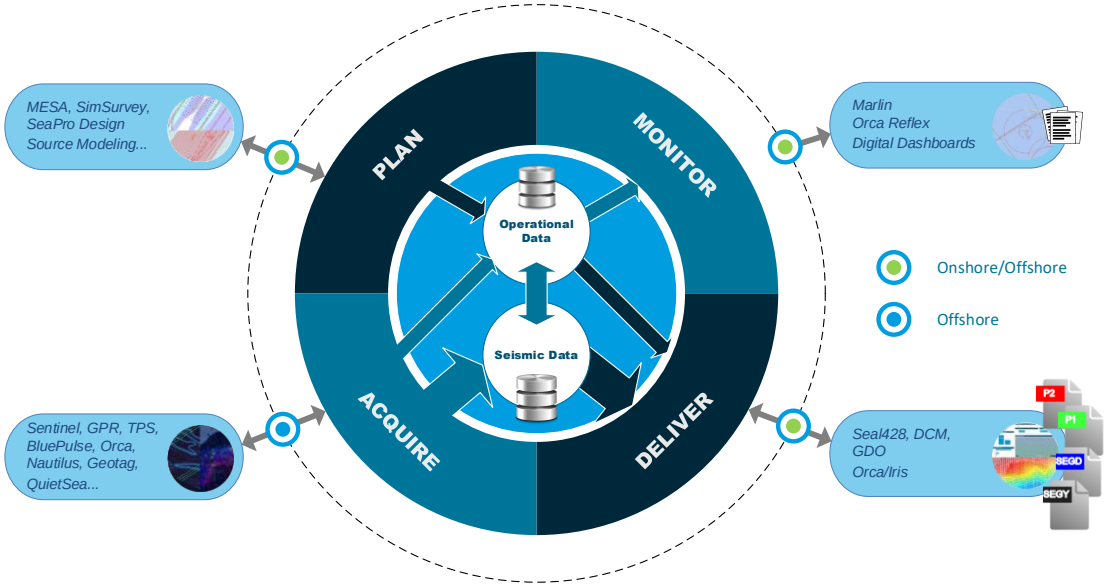

Figure 2: Data as a cornerstone to optimize a seismic acquisition project