

Generation of a Quality Guideline for the Treatment of Unexploded Ordnance Faced During Offshore Wind Park Construction

Torsten Frey

Institute for Infrastructure and Resources Management - Leipzig University

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ABSTRACT

Old ammunition, commonly referred to as unexploded ordnance (UXO), poses a considerable threat during the construction of offshore wind parks. If activities surrounding the detection and clearance of UXO are executed erroneously, managed poorly or even overall omitted, UXO threaten the lives of construction workers, the construction schedule, marine fauna and the public image of the involved parties. At the same time, preserving comprehensively high quality during UXO operations has turned out to be a challenging endeavour for a number of reasons:

- Low entry barriers into an attractive market, resulting in cost pressure.
- Legal areas are manifold, often weakly regulated or regulations are not enforced diligently.
- No guideline for the validation of the appropriateness of applied technologies or for the qualification of appointed personnel exists.

The increase in knowledge about the potential impacts of the UXO legacy has led to an urge to address the problem on a strategic level. In order to tackle the challenges raised above, a quality guideline for the handling of UXO in the offshore environment was developed. This quality guideline serves as a normative reference framework for all stakeholders involved in UXO operations taking place during offshore wind park development.



Figure 1: Moored mine; Photo by: Heinrich Hirdes EOD Services GmbH

METHODS

Key to the composition of a widely recognized quality guideline was the involvement of stakeholder groups relevant to the procedure of offshore UXO treatment. Figure 2 presents the steps that were performed in order to arrive with a comprehensive quality guideline.

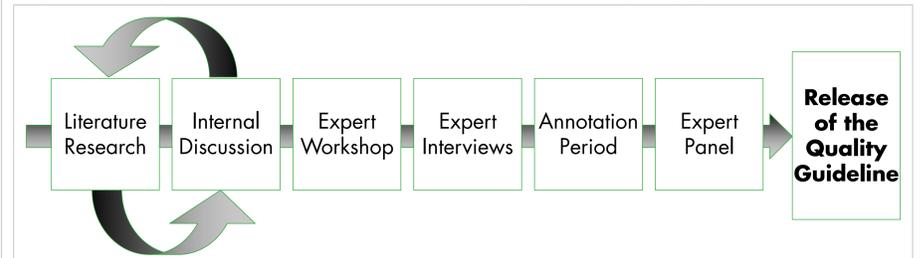


Figure 2: Creating the quality guideline

By executing the process shown in Figure 1, the following matters were discussed and gradually defined:

- Comprehensive UXO detection and clearance process
- Involved actors
- Terminology
- Technologies and their way of application
- Quality influencing factors
- Management procedures

RESULTS

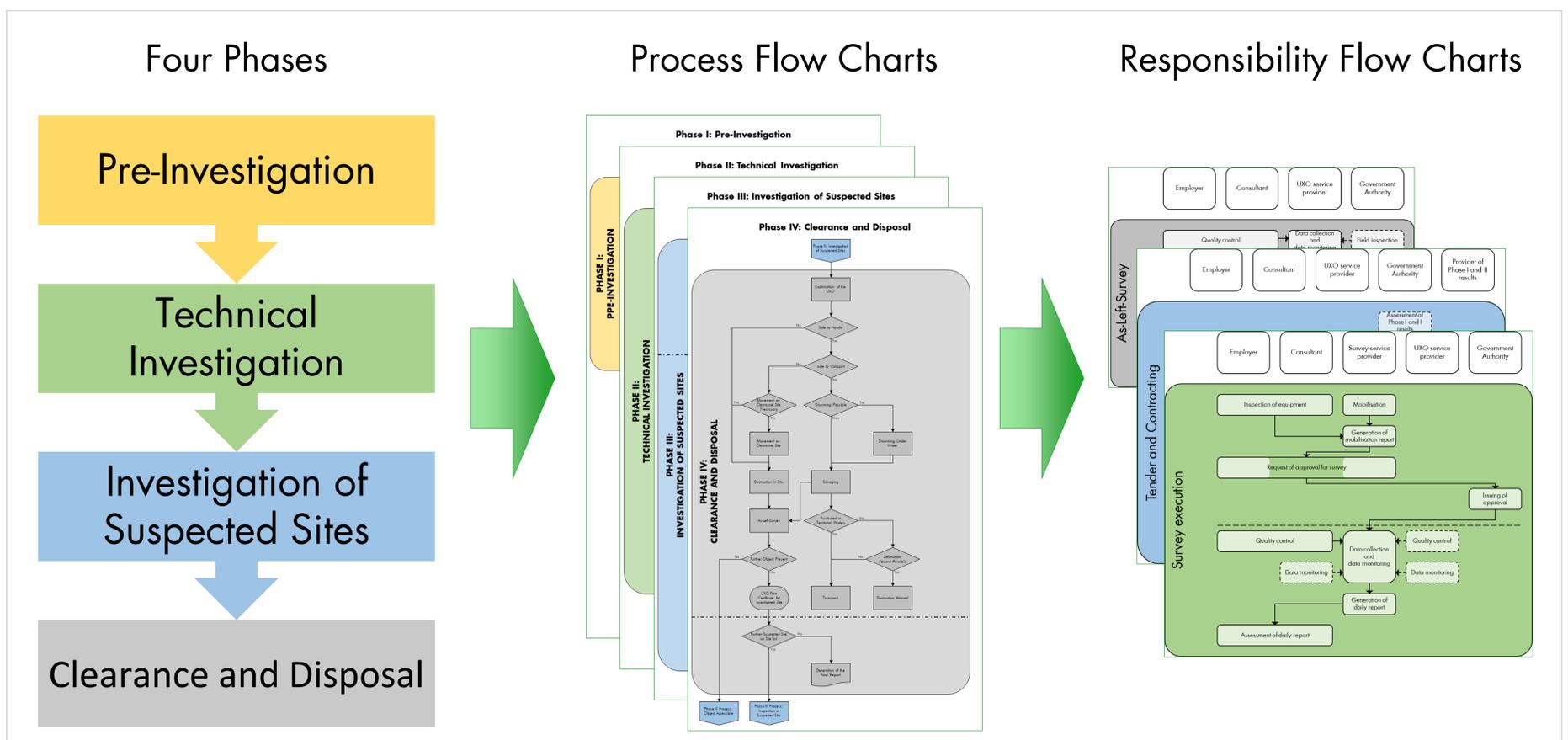


Figure 3: Content of the quality guideline

Figure 3 displays the structure of the quality guideline. It is divided into five sections – one section concerning all phases and four sections covering one specific phase each. Every phase is subdivided into individual processes. The quality guideline addresses each of these processes and provides guidance by giving the following information:

- Relevant legal and normative documents
- Involved actors, their requirements, responsibilities and competences, illustrated as responsibility flow charts (exemplified in Figure 2)
- Requirements for employed personnel and applied technologies
- Threshold values and cut-off criteria for environmental and technological conditions
- Requirements regarding documentation, reporting and information flow

RECOMMENDATIONS

During the process of generating the quality guideline, it became apparent that a continuous effort is desirable. This continuation serves to maintain stakeholder dialogue and to update the quality guideline as regards technological, legal and other changes.

A European quality initiative, resting on four pillars, is therefore proposed as a framework for future research efforts and action items (Figure 4). Central to all these ways of quality endorsement is the internationalization of all upcoming efforts.

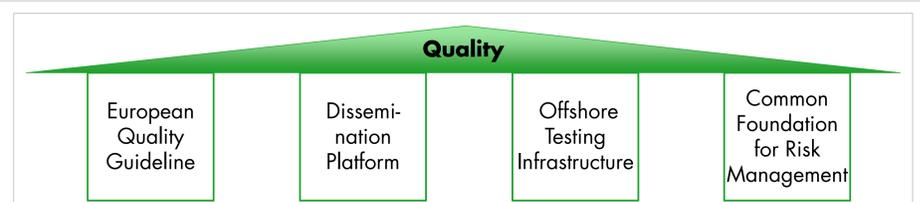


Figure 4: Towards a European Quality Initiative for UXO Treatment