



PPDM Association

Work Orders

Reference Guide

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Version 1.0

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About This Document

This reference guide has been prepared to help managers, analysts, database administrators, programmers, data managers, and users understand how to use the Work Order Module in PPDM 3.6. Readers at many levels, from managerial to technical implementers will benefit from reading various sections of this document. General, high-level business information is contained at the beginning of the document, with each section becoming progressively more technical and detailed.

Sometimes the terms we use in this and other PPDM documents need to be defined. We provide definitions in a separate Glossary, which you can obtain from PPDM.

This reference guide contains the following sections:

- **Introduction**
Provides an executive overview of the PPDM Model as it pertains to Work Order management.
- **Business Process Overview**
Summarizes Work Order management and provides examples of related business processes.
- **Integration**
Discusses how Work Order management is integrated with the other PPDM Business Modules and provides information about related references guides.
- **Model Overview**
Includes the entity relationship diagram and discusses the use of Work Order management tables in the Data Model.
- **Tables and Columns**
Identifies the data model tables for the Work Order module, how they should be used, what they contain, and recommends how they should be used. This section should be used in conjunction with the PPDM Table Report available for download from the PPDM Web Site (www.ppdm.org).
- **Implementation Considerations**
Discusses issues related to implementing the PPDM model, architectural methodologies used in design, or special considerations for implementation that are not related to a specific table.
- **Frequently Asked Questions**
Addresses technical and business questions about the Work Order module.

- Appendix A – Sample Queries

Provides example queries with the appropriate SQL scripts that illustrate uses of the model based on the Business Requirements Document.

- Appendix B – Changes to the Model

Identifies the changes in the Work Order module from the latest version to the newest release version of the PPDM model.

Introduction

Work Orders are created to facilitate business relationships between service organizations and customers. Customers describe specific requests for services that are to be fulfilled by the service organization in Work Orders. Other details, such as due dates, billing information and special instructions may also be provided.

This module has been designed for use in conjunction with other business and support modules in PPDM version 3.6. Important relationships with projects, electronic information and product management, seismic, wells etc. are described in this reference guide.

Business Process Overview

Purpose

The Work Order module provides a mechanism for describing work requests from customer to service organization.

Description

Increasing recognition of the value in business specialization has encouraged the creation of a new generation of service organizations. Exploration and Production (E&P) Companies now outsource many functions that for many years were managed internally. For example, brokerage searches, seismic processing, records management, tape copying and help desk support are all functions that today are commonly supported by service companies.

Both customer and service provider require a mechanism for tracking the work that is requested. This allows the customer to ensure that a request is documented and fulfilled correctly, and gives the service provider backup for billing purposes. Although these documents are referenced using many names, **Work Order** is the most common. A Work Order is simply a document that describes work or service to be provided, due dates, shipping information and billing information. In many countries, a Work Order is actually a type of contract and is legally binding.

The requirements of the Work Order for services may be called obligations; in some business practices it is useful to list the obligations that are incurred by the service provider (tasks to be done) or customer (fees to be paid). While most organizations have an accounting package that tracks details of payments, it is useful to provide a pointer from the Work Order into the accounting system (as an AFE or cost center number).

From the service company's point of view, the Work Order is used to initiate a series of activities. In PPDM, these activities are grouped together as a project.

High-level project plans or templates can be designed to support each type of Work Order; these plans are associated with specific projects created for each Work Order.

Inter-relationships between service organizations can make fulfilling a work order complex. For example, a service company handling tape-copying services may not send a copied tape to the client, but to another service company for additional handling. Capturing the relationships between Work Orders both within an organization and with external organizations is consequently an important component of service operations. In fact, many Work Orders are fulfilled without any products ever reaching an employee of the client organization.

In PPDM 3.6, the Work Order support module is not intended for stand-alone implementation; many other components are necessary to provide robust support for work order management.

Model Overview

Integration

Integration is the key to managing Work Orders properly. Each of these modules provides supporting information for Work Order management.

Support Modules

AFE: Application For Expenditure or Cost Center. Capture information about the cost centers or AFE's used through the life cycle.

Business Associates: track detailed information about partners, service providers and other people, companies and regulatory agencies that you do business with.

Entitlements: information about the rights that you have to any type of data and what you are able to do with it.

Work Order: captures requests for work to be completed with some summary information about what was done and the data affected by the Work Order.

Business Modules

Contracts: Contracts formed to support and govern relationships between business associates.

Facilities: Describe facilities that are involved in the management or transportation of hydrocarbons, such as pipelines and storage or processing facilities. Work Orders may relate to facility management.

Interest Sets: Describe partnership information for the ownership of seismic sets or products of those sets. Partnerships may affect payment of Work Orders.

Land Rights: Land rights describe the rights you have to land, whether obtained through purchase or agreement. Many Work Orders are related to the acquisition or management of land rights.

Lithology: Describe rock characteristics as created by lab analysis, usually performed by service companies who specialize in this type of work.

Obligations: Used to describe requirements to perform work or pay monies, usually as defined by a Work Order, contract or legislation.

Projects: Track work projects of any type. Often used by service companies to track fulfillment of Work Orders.

➤ Records Management: Track the physical location of digital and hard copy products, circulation, retention, etc.

Seismic: Describe seismic acquisition, processing, interpretation and divestiture throughout the life cycle. Service companies complete many key tasks throughout the life cycle of a seismic set.

- Support facility: Describe marine vessels used for marine acquisition.
- Wells: Capture information about wells, including header information, logs, tests, cores, surveys and interpretation. Service companies complete many key tasks throughout the life cycle of a well.

Contact PPDM to inquire about the status and availability of reference guides for these modules.

Data Diagrams

The diagram on this page is the legend for the tables discussed later in this document. Note that some or all of these elements may be present in data diagrams provided by the Association. Some elements are removed from final products to reduce file size:

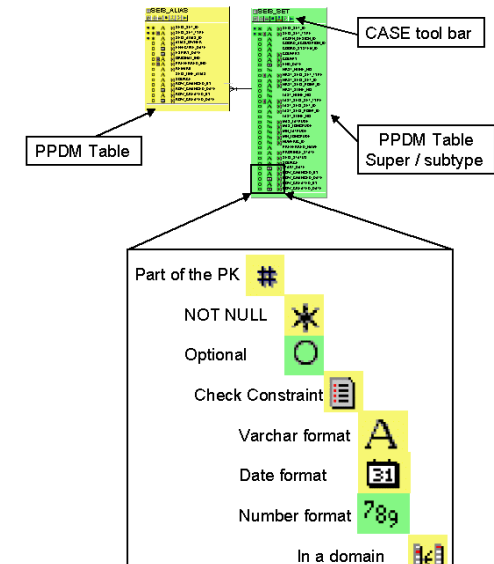


Figure 1: This illustration shows the functions of each icon used in the data diagrams provided with PPDM version 3.6.

The data diagrams for the electronic information and product management module are not provided in this reference guide because of their very large file size. Data diagrams can be obtained from the PPDM Association as part of the final model documentation or as a set of PowerPoint diagrams. The PowerPoint diagrams will provide the best resolution for printed quality.

Tables and Columns

The following tables exist in the Work Order Module of PPDM version 3.6. Each table is described in the following section; you can jump to a table description by clicking on the hyperlinked table name below. Note that for detailed content descriptions for each table, you should refer to the PPDM version 3.6 table documentation.

[WORK_ORDER](#)

[WORK_ORDER_ALIAS](#)

[WORK_ORDER_COMPONENT](#)

[WORK_ORDER_XREF](#)

Associated Tables

[PROJECT_COMPONENT](#)

[AFE_COMPONENT](#)

[OBLIGATION_COMPONENT](#)

Work Order Tables

WORK_ORDER

Use this table to capture high-level information about the Work Order. A text-based summary of the instructions is provided here, along with billing details. The column WORK_ORDER_NUMBER is denormalized from WORK_ORDER_ALIAS for query performance; use it only if you find it provides significant benefit.

[Back to the list of table names](#)

WORK_ORDER_ALIAS

Use this table to capture all the names, codes and identifiers assigned to a Work Order by your organization and others. The preferred alias can be flagged for output on reports or denormalization into WORK_ORDER.WORK_ORDER_NUMBER.

[Back to the list of table names](#)

WORK_ORDER_COMPONENT

Use this table to associate the Work Order with other relevant business objects in PPDM. Use this table to associate the Work Order with information items, land rights, business associates, contracts, circulation of physical items, quality inspections of seismic sets or transactions. Three additional working associations are provided through other component tables in PPDM 3.6:

- Associations with projects are provided in PROJECT_COMPONENT
- Associations with AFEs or cost centers are provided in AFE_COMPONENT
- Associations with obligations are provided in OBLIGATION_COMPONENT.

[Back to the list of table names](#)

WORK_ORDER_XREF

Use this table to create relationships between Work Orders. For example, you may create a master Work Order that has a series of subordinate Work Orders, or you may replace an outdated Work Order with a new one. You may also reference a Work Order that is not in your database by using the column REFERENCE_ID – this provides a reference to the Work Order number in another system.

[Back to the list of table names](#)

Associated Tables

PROJECT_COMPONENT

Use this table to associate the Work Order with the project created to fill the required functions.

[Back to the list of table names](#)

AFE_COMPONENT

Use this table to provide pointers to an AFE or cost center in your accounting system.

[Back to the list of table names](#)

OBLIGATION_COMPONENT

Use this table to associate the Work Order with any obligations that may be incurred. These obligations may relate to work you agree to do or to money you agree to pay. The most likely use of the obligation module in the context of Work Order management is for payment of invoices; the obligation module can track details about these payments and payment breakdowns.

In most cases, it is preferable to create a project to track work that must be done; however, the obligation module can track project milestones (such as creating status reports) if you find that helpful.

[Back to the list of table names](#)

Implementation Considerations

Constraints in PPDM

It is essential that anyone who is considering using PPDM version 3.6 review the Constraints Reference Guide first. Improper use or population of constrained columns in PPDM can compromise the quality of your data and the reliability of your queries. This document may be obtained from the PPDM Association or downloaded from the PPDM web site at www.ppdm.org.

Check Constraints

PPDM Version 3.6 makes use of check constraints in cases where the values that may be input for a column are known at design time and will not change over time. Two types of uses are observed in PPDM 3.6.

- Where the column name is %_IND, the column is an indicator field, and the values may only be Y, N, or null.
- Super-sub type implementations use check constraints to enforce the integrity of the super-sub type relationship. Currently these relationships are in use for Seismic, Business Associates, Records Management, Support Facilities, Production Entities and Land Rights.

Let's use Seismic Sets as an example. This structure consists of a parent table (SEIS_SET) and eight sub-type tables (SEIS_3D, SEIS_ACQTN_SURVEY, SEIS_INTERP_SET, SEIS_LINE, SEIS_PROC_SET, SEIS_SEGMENT, SEIS_SET_PLAN and SEIS_WELL). Each of the tables has a two-part primary key: SEIS_SET_ID and SEIS_SET_TYPE.

SEIS_SET_ID is assigned by the user and can have any value as long as it is unique for that type of seismic set. SEIS_SET_TYPE was designed to maintain the integrity of the super-sub type structure and can only have the values assigned to it by check constraints; these values are the table names of the eight valid sub-types. In SEIS_SET, the SEIS_SET_TYPE can have any of the table names, but in each of the sub-types, it can only have the name of the table it is owned by.

Currencies in PPDM

Costs in PPDM may originate in any valid Unit of Measure (UOM), such as USD, \$CDN, YEN, etc. However, to ensure that queries for retrieval and reporting are efficient, it is desirable to convert all original currencies to a standard unit of measure for storage in the database. PPDM supports the requirement to restore the original value in the following way:

- Convert all stored currencies to a single currency type, such as US dollars.

- CURRENCY_OUOM stores the currency in which the funds were initially received. When the stored currency is multiplied by the CURRENCY_CONVERSION, the value of the transaction in the original currency is obtained.
- CURRENCY_CONVERSION stores the rate applied to convert the currency to its original monetary UOM from the stored UOM. This value is valid for this row in this table at the time of conversion only. When this value is multiplied by the stored currency value, the original value of the transaction in the original currency is restored.

Units of Measure

Relational databases, powerful as they are, are not good at certain types of query and retrieval. Any query that requires the database to retrieve all the rows in a large table and perform some calculations on the data before returning results to a user is likely to perform very poorly. This assumes, of course, that the person constructing the query is aware that a calculation is necessary when writing the query. Data management strategies for such tables recommend that requirements for on-line conversions such as this be eliminated if at all possible. The PPDM strategy for handling units of measure falls into this category.

Every column in the data model that references a Unit of Measure (such as a currency, depth, temperature, length etc.) should be stored using a single, common unit of measure. For example, in one PPDM instance, all the total well depths should be stored as meters or as feet. Storing some depths as meters and the rest as feet creates problems for the database and adds confusion to the user (who may not be aware that the log depths and core depths are not all meters).

The original unit of measure (the unit in which the data was originally received) can be stored in the data table. For example, the WELL table captures FINAL_TD and FINAL_TD_OUOM. These columns capture the value of the final total depth of the well and the units that the depth was originally captured in.

The *stored unit of measure* is captured in the PPDM meta model, PPDM_COLUMN. This table captures the default unit of measure for a column and the name of the column where the original unit of measure is stored. The following illustration provides an example:

WELL

UWI	DRILL_TD	DRILL_TD_OUOM
SMITH12F	1250	FEET
JONES44	1560	METERS
12345	1400	FEET

PPDM_COLUMN

TABLE_NAME	COLUMN_NAME	UOM_COLUMN	OUOM_COLUMN	DEFAULT_OUM_SYMBOL
WELL	UWI			
WELL	DRILL_TD		DRILL_TD_OUOM	M
WELL	DRILL_TD_OUOM			
WELL_CEMENT	CEMENT_AMOUNT	CEMENT_AMOUNT_UOM	CEMENT_AMOUNT_OUOM	

Figure 9: The method for storing and tracking units of measure is illustrated here..

Note that in the example, the Drilling TD is stored in meters, but was originally received as feet. In some cases, it is not possible to ensure that all the rows in a column are stored as a single unit of measure – this is common in cases where the unit of measure is dependent on some other factor. For example, substance measurements may depend on the substance being measured; gases are stored as MCF, liquids as BBL etc. In these cases, the unit of measure is stored directly in the business table.

Audit Columns

Each table contains five columns: SOURCE, ROW_CHANGED_BY, ROW_CHANGED_DATE, ROW_CREATED_BY, and ROW_CREATED_DATE. These columns satisfy a data-auditing requirement to identify the user and date of database transactions.

Use the “CREATED” columns when you are inserting new data rows and the “CHANGED” columns when you are updating a data row. The ROW_CHANGED / CREATED_BY columns are usually populated using the system login id in use. ROW_CHANGED / CREATED_DATE is usually set to the system date of the insert or update operation.

To populate the SOURCE column, specify where you obtained the data. If you receive the data from Vendor A, and Vendor A received the data from Regulatory B, you should set the SOURCE to Vendor A. In some cases (such as for interpreted picks), data is created by an application. In this case, the source may be set to identify the application that created the data.

Identifying Rows Of Data That Are Active

Maintaining information about how a business object has changed over time is an important business requirement for all these modules. To support this, mechanisms for allowing versioning have been added to many tables.

Many tables in PPDM version 3.6 contain a column called ACTIVE_IND. The values for this column may be one of Y, N, or null. When more than one row of data (such as a spatial description or a status) has been created for a business object, use the ACTIVE_IND to indicate which row is currently active (note that in some cases, more than one row may be active simultaneously).

This provides implementers with two benefits. First, when populating EFFECTIVE_DATE and EXPIRY_DATE it will not be necessary to populate EXPIRY_DATE with a false future date to indicate that the row of data has not expired yet. Second, queries can explicitly search only for rows that are active.

If this column is used for queries, as recommended (such as “find me the currently active status for this land right”), you should implement procedures to ensure that this column is always populated as either Y or N and maintained appropriately. If the column is left blank (NULL), the query will not be consistent or reliable.

For example, you could default the value to N if the expiry date is filled in and has already happened. Make it Y if the expiry date is empty *or* if the expiry date contains a future date.

Modifying the Work Order Module

Subsetting PPDM

The PPDM data model is designed to allow users to implement portions that support their business without needing to manage modules that are not required. Good data management practices are also supported; this means that data redundancy is reduced in the Model whenever possible.

All information about Seismic will be found in the seismic module; information about contracts is stored in the Contracts module, details about objects that are retained for long term use are stored in the Records Management module and so on. Depending on your business requirements, you can implement all or some of the modules.

In general, it is usually simplest to install the entire PPDM data model and simply restrict usage to the portions that are useful to you. Additional tables can be implemented as your business requirements expand, or as your data and processes are able to support capture in a data model. Architectural guidelines for subsetting PPDM are contained in the PPDM Architectural Principles Document. This document can be obtained from the PPDM Association or downloaded from the PPDM web site at www.ppdm.org.

Expanding PPDM

As a consequence of the PPDM Design process, which actively solicits and incorporates business requirements from Industry, many users find that the model is quite complete. However, individual implementations may find that additional columns are needed, or that some denormalization will help their performance.

The Association provides documentation about how to expand the data model to accommodate your specific requirements. This document can be obtained from the PPDM Association or downloaded from the PPDM web site at www.ppdm.org.

Feedback to PPDM

Much of the growth of the PPDM model can be attributed to Industry feedback. All implementers are requested and encouraged to provide feedback to the Association about changes they have made for implementation. Feedback can be submitted to changes@ppdm.org.

Frequently Asked Questions (FAQ)

How do you recommend I implement the Work Order module for my service business?

The work group intended that several modules work in concert to provide good Work Order management. Here are a series of very high level steps that may get you started:

- 1) Create a supporting infrastructure
 - a) List the types of Work Orders that you will normally support
 - b) Create a project plan for each type of Work Order you will normally support
- 2) Create Work Orders
 - a) Populate the WORK ORDER and WORK ORDER ALIAS tables
 - b) Populate WORK ORDER XREF if necessary
 - c) Use WORK ORDER COMPONENT to associate the Work Order with business objects in PPDM
- 3) Initiate a PROJECT in PPDM
 - a) Associate the project with the relevant PROJECT PLAN
 - b) Create the necessary STEPS in the Project using the Plan as a template
 - c) Track project completion using the PROJECT module
- 4) Associate the Work Order with costs
 - a) Create associations with AFE
 - b) Create associations with OBLIGATION if desired for tracking invoice payment or work obligations
- 5) Close the Work Order

I will need to pull 5 tapes from storage and copy them for this Work Order. How do I track this in PPDM?

The steps necessary to complete the project are enumerated in the Project Module. Pulling specific tapes is tracked in the RM_CIRCULATION table. As this table contains a foreign key from PROJECT_STEP, you will be able to track exactly which tapes were pulled for the project, when that was done and who did the work.

If you only want to track the ID's of the tapes that were pulled, you can use the foreign key relationship from PHYSICAL_ITEM in WORK_ORDER_COMPONENT.

How do I know who the owner of this data is?

Define an "ownership" interest set in the INTEREST SET module of PPDM 3.6. Once you have created this interest set, you can associate it with various information items in the BA_INT_SET_COMPONENT table. Owners are listed, with their relative interests, in the BA_INT_SET_PARTNER table.

Appendix A: Sample Queries

These sample queries have been developed using a subset of the requirements defined in the Business Requirements Document. Note that there are many ways to address the questions posed here, but we have tried to provide useful examples that illustrate the use of the data model. The PPDM Association does not provide any guarantee that these queries will satisfy your business requirements; they are for illustration only.

- **Spatial or GIS queries:** Spatial queries are not thoroughly addressed in this section of the reference guide; how you deal with these queries depends on the spatial engine you are using. In many cases, we have avoided using spatial queries because the number of query lines needed obscures the rest of the query and makes it more difficult to read. Sometimes, we have provided a connection to a NAMED AREA, rather than a lat/long box.
- **Versioning over time:** Many aspects of the oil and gas business have a strong time component. Users require information about how a business object was configured in the past, what it looks like now, and what it is expected to look like in the future (i.e., if a project is not active now, when was it in the past). If your queries need to address the situation as it is now, use the ACTIVE_IND you will find in many versioned tables. Using this flag helps ensure that you do not return data that is out of date.
- **Units of Measure:** Several examples have been provided to show how units of measure should be queried in PPDM. As these queries are nearly always handled the same way, this guide does not show the method every time it is needed; the authors felt that this would create confusion and obscure the main intent of the query.

Who requested this Work Order?

```
Select    REQUESTOR_BA
  From    WORK_ORDER
  Where    WORK_ORDER_ID = '12345432'
```

Who am I billing for the work done?

```
Select    BILLING_BA
  From    WORK_ORDER
  Where    WORK_ORDER_ID = '12345432'
```

What products are associated with the Work Order?

```
Select      WOC.COMPONENT_TYPE, WOC.CONTRACT_ID,  
            WOC.INFORMATION_ITEM_ID, WOC.INFO_ITEM_TYPE,  
            WOC.INSPECTION_ID, WOC.PHYSICAL_ITEM_ID,  
            WOC.SEIS_SET_ID, WOC.SEIS_SET_TYPE,  
            WOC.SEIS_TRANSACTION_ID, WOC.TRANSACTION_TYPE  
From        WORK_ORDER WO, WORK_ORDER_COMPONENT WOC  
Where       WO.WORK_ORDER_ID = '12345432'  
And         WOC.WORK_ORDER_ID = WO.WORK_ORDER_ID
```

What project did I start to track completion of this Work Order?

```
Select      P.PROJECT_NAME, P.PROJECT_ID  
From        PROJECT P, PROJECT_COMPONENT PC  
Where       PC.WORK_ORDER_ID = '1234565432'  
And         PC.PROJECT_ID = P.PROJECT_ID
```

Appendix B: Changes to the Model

The PPDM Association has made a concerted effort to reduce the impact of new model development on members who are using other versions of PPDM. However, any new development is accompanied by some changes. Arriving at a model that is sufficiently detailed to meet the business needs of every member and yet flexible or abstract enough to be shielded from corporate or regulatory variations is complex, but achievable. Every attempt is made to ensure the model complies with, but is relatively independent of, specific jurisdictional requirements, changes in government policy, regulations or structure that may at times invalidate portions of the model. Internal re-engineering of business processes in industry companies may affect business requirements, which in turn drive the data model. Rapid technological changes may also affect the model structure.

This section identifies all applicable changes from the latest version to the newest release version, to help members implement the latest version of the PPDM model.

Changes Between Versions 3.5 and 3.6

This module is new in PPDM 3.6