

Oracle Site Master Data Management for mastering wells and other PPDM entities in a digital oilfield context

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Oracle Site Master Data Management for mastering wells and other PPDM entities in a digital oilfield context

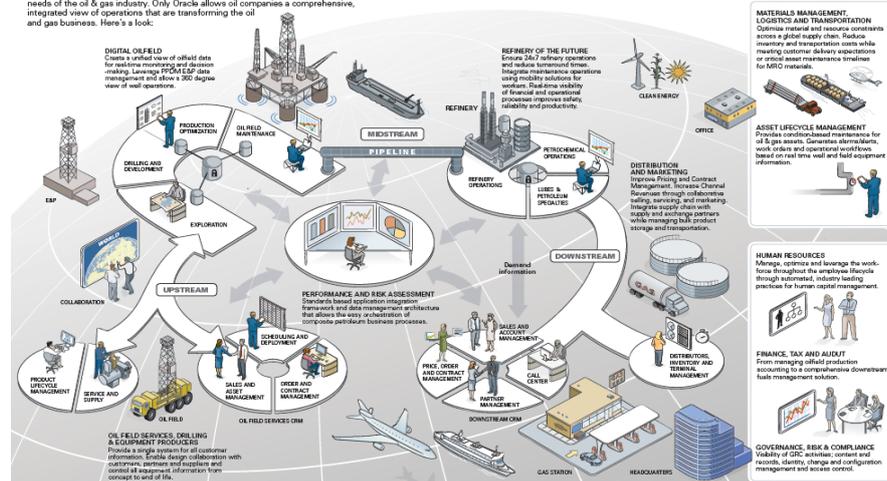
EXECUTIVE SUMMARY

The increasing global demand for oil and gas puts a premium on successful upstream operations. Exploration and production companies (E&P) are looking to optimize and manage upstream operations in a cost effective manner without compromising safety and operational integrity. To do so, they must efficiently manage the complexities of exploration, drilling and production processes and turn vast amounts of data generated by modern search techniques into producing oil wells. After the well is drilled and completed, production must be optimized using production surveillance tools that integrate technical, operational and financial information. Unfortunately, the current state of their information stores, application solutions, and field infrastructure is aligned with traditional functional requirements, but doesn't integrate enough information to provide a comprehensive asset management perspective.

Midstream and downstream companies are experiencing similar issues, affecting agility, efficiency and risk management.

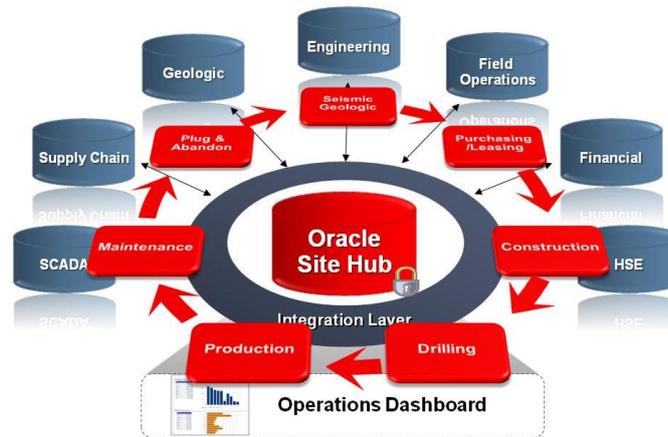
How Oracle Solutions Help Manage the Oil and Gas Lifecycle

Oracle provides a complete, integrated set of solutions to meet the complex needs of the oil & gas industry. Only Oracle allows oil companies a comprehensive, integrated view of operations that are transforming the oil and gas business. Here's a look:



Oracle Solutions for Digital Oil Field are specifically meant to help Oil companies streamlining their exploration and production processes by providing a comprehensive footprint based on the Professional Petroleum Data Model (PPDM™), E&P workflows, Petroleum Business Intelligence and a standards-based flexible SOA compliant infrastructure. Only Oracle provides the technology and applications that power the "digital oil field." Only Oracle allows oil companies a comprehensive, integrated and trusted view of operations, using a best-of-breed master data management and a best-in-class business intelligence solution for the exploration and production business. Coupled with Oracle's world-class solutions for asset management, project management, talent management, financials, supply chain management, and field service offerings, Oracle applications are transforming the upstream oil and gas business.

PPDM Well Master Data & Smart Lifecycle Mgmt Integrate & Consolidate Info in Oilfield Business Processes



- Based on a relational E&P data model developed by PPDM Oil companies
- Enables a single source of truth
- Robust set of integration services based on open standards
- Enables Data Governance Processes

Integrate Information Based on a Industry-Standard Well Data Model

Oracle Site Hub is a fundamental building block of Oracle Digital Oil Field Solution. Oracle Site Hub is a part of Oracle's best-of-breed Master Data Management (MDM) Suite product family, which can master petroleum data, location based PPDM assets and all related structured and non-structured information. Oilfield data can be consolidated across operational and analytical applications, therefore delivering a competitive advantage in making business decisions and running efficient enterprise-wide business processes based on high quality PPDM data. Site Hub provides a complete and highly flexible repository for all site-specific oilfield data (Areas, Basins, Fields, Stratigraphic Layers, Wells, etc.) throughout the entire well lifecycle. Site Hub leverages SOA type web services to provide integration with any ERP system. and out of the box integration with Oracle E-Business Suite applications to provide a data hub that integrates technical, operational and financial data with one of the best ERP systems in the market.

ORACLE SITE HUB: GOLDEN RECORD FOR PPDM DATA

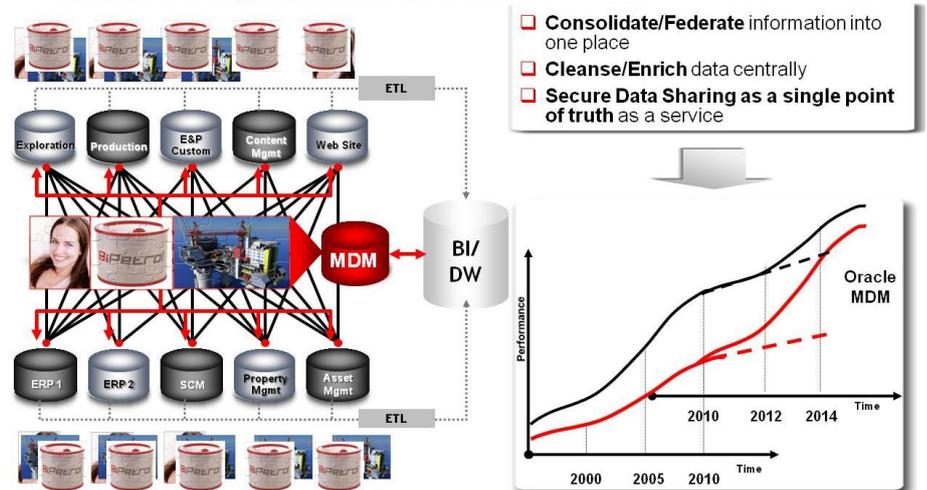
PPDM data is usually distributed and fragmented across operational and analytical systems within the enterprise. In this scenario it is very difficult to control data quality while the information continuously changes across all systems. Therefore low quality or outdated information negatively impacts business processes and analysis.

Incomplete, incorrect or poor quality data is a real business issue affecting all divisions and areas of any Oil Company. Exploration geophysicists and geologists spend too much time with data acquisition and data quality and not enough time on rigorous evaluation of exploration prospects. Drilling engineers also do not have timely access to relevant drilling data, and therefore decisions are made with limited factual data, often leading to more money spent on drilling and completions. Production engineers are looking for a Single Source of Truth for production and reserves data, yet lack the visibility to oilfield KPIs and performance metrics related to operating costs. Oilfield Asset Managers often have limited knowledge of deployed oilfield equipment, maintenance history, and Run-To-Failure maintenance operations. This lack of information causes lost production and lower revenues. Oilfield Operation are unable to share well, land, maintenance and production information. This causes production inefficiencies, resource deployment and higher oilfield operational costs. Finance has duplicate oilfield and ERP records, improper revenue recognition, inaccurate reserves, and credit collection risk. This usually results in painful, labor intensive, long-running monthly financial closes. Bad corporate governance and data management policies can result in poor product visibility and inaccurate data management history results in costly noncompliance to regulatory standards, and fragmented site access and risk-related data. Finally, Information Technology is challenged by maintenance of ever-proliferating data sources, rapidly increasing resource consumption with an exponential growth rate. It is very difficult for all of these entities to support new business initiatives or adapt to rapidly changing business environments.

Oil companies have tried several different approaches to solve the problem, like data integration, data warehouses, and custom built well masters cleansing, but all these initiatives have either not really solved the problem or are inflexible, too costly and take too long to implement.

MDM: The source of clean data for the Enterprise

Nurture one of your most valuable asset



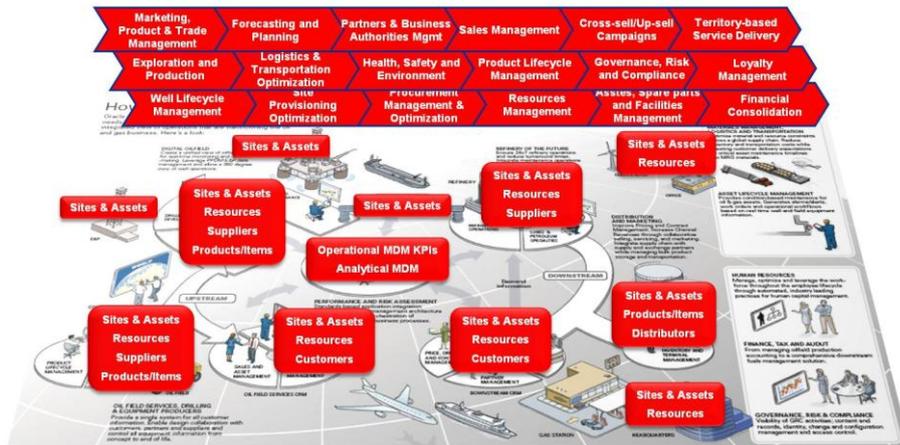
Oracle Solution provides a single source of truth for all the relevant PPDM data rather than disparate data sources across an enterprise. Oracle Site Hub provides a data hub for all site data whether the sites are internal sites or external sites. Internal sites may include corporate locations, offices and related assets, as well as PPDM oilfield entities like wells and related assets, areas/lands, pools/basins, fields, stratigraphic units, facilities, production entities, eco-zones and environments, production facilities (pipelines, batteries, compressor stations, gas plants, meters, separators, and more), support facilities (rigs, roads, transmission or radio towers, airstrips, and more), logistic sites and more. External sites include partners' locations and facilities, suppliers' locations and facilities, etc.

Leveraging the Trading Community Architecture (TCA) from Oracle E-Business Suite to store Party and Address information and the extensible user-defined attributes architecture from Oracle Product Information Management (PIM) Data Hub, Site Hub stores all site-specific attributes, including: site address or geographical coordinates, ownership, geology, lithology, paleontology, contracts, projects, geometry, drilling, logs, cores, tests, completions, reserves, production, risk information, financial metrics and more. An unlimited number of multimedia file attachments can be stored, accommodating a variety of uses including leases and/or contracts, production analysis reports, photos, technical specification documents, and engineering CAD drawings. Alternatively, Site Hub can integrate with any content management repository using WEBDAV protocols, including Oracle Content Management and Documentum. All of these can be easily managed from a single, web interface.

MASTER DATA MANAGEMENT FOR OIL & GAS

As part of the Oracle's MDM offering, Site Hub is a component of Oracle's multi-domain MDM footprint, the Oracle MDM Suite. Oracle MDM Suite is modular MDM solution family which allows oil & gas organizations to master all their upstream, midstream and/or downstream relevant entities.

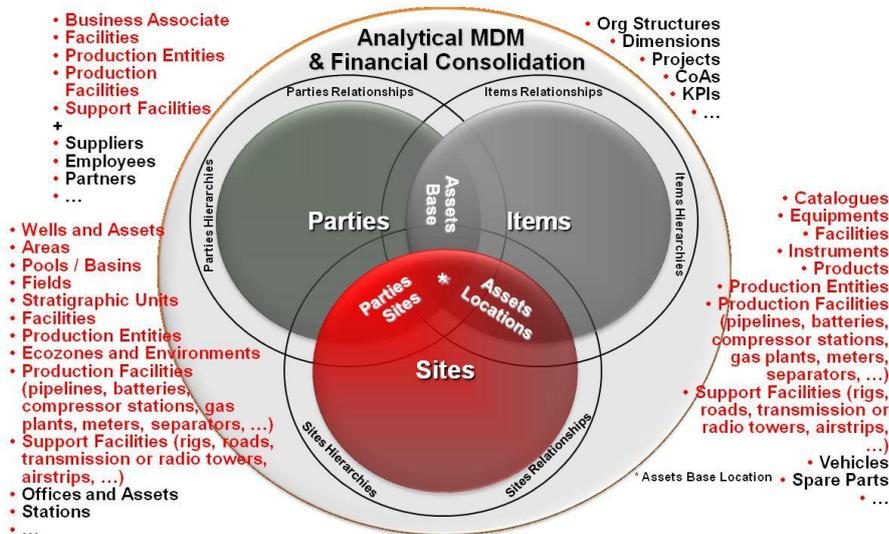
MDM in the Oil & Gas Value Chain



Oracle’s Master Data Management Suite is the only end-to-end packaged solution available today on the market that enables organizations to master key business objects. It allows all users access to accurate and consistent 360-degree view of master data from all systems throughout the organization. Oracle Master Data Management enable organizations to get synchronized, cleansed, consistent, accurate, enriched and high quality data from a Single Source of Truth, delivering both immediate and long term Key Business Benefits, like improved Decision-Making, streamlined Business Processes, reduced costs, better Risk Control and improved Governance and Compliance.

Oracle’s Master Data Management Suite is a set of applications (MDM Data Hubs) designed to consolidate, cleanse, enrich, and synchronize key business entities like assets, customers, suppliers, partners, employees, organizational structures, accounts, products, services, spare parts locations, sites and more across the enterprise and across time. It includes best-of-breed predefined extensible data models and access methods with powerful applications to centrally manage the quality and lifecycle of master business entities, architected to support operational workloads and service oriented architectures (SOA). Oracle MDM can scale with an organization’s needs since it supports fast deployments, a rapid prototype approach, and because each application of the MDM Suite can either be deployed standalone or together with other applications.

Oracle MDM for Oil & Gas (PPDM+)



Oracle MDM Suite is made up of the following modules:

- **Oracle Site Hub:** Oracle Site Hub is an organization-wide Sites and Locations infrastructure that continuously delivers complete up-to-date Sites information to every departmental function. More information about this module is provided through the rest of this paper.
- **Oracle Customer Hub:** Oracle Customer Hub is the most comprehensive party data mastering application available in the market today, allowing organizations to centralize party information from heterogeneous systems, creating a high quality single view of party's information that can be leveraged across all functional departments and analytical systems. Customer Hub is highly specialized on party data, both organizations and people. It provides the best-of-breed flexible party centric data model, party specific data quality capabilities and standard based batch and real time integration services. With Customer Hub Oil companies can master customers, accounts, internal organizations, employees and other parties, their classifications and their mutual relationships across the enterprise.
Oracle Customer Hub can be used to monitor oilfield training and certification for employees and contractors
- **Oracle Supplier Hub:** Oracle Supplier Hub unifies and shares critical information about an organization's supply base. Used standalone or in combination with customer hub, Supplier Hub delivers a pre-built extensible data model for mastering supplier specific information at the organizational and supplier site levels - both for buyers and suppliers, suppliers specific data quality capabilities and Web Services to consolidate and share supplier data across disparate systems and processes. If combined with Oracle Supplier Lifecycle Management it can act as the single point of supplier management and related processes across the enterprise, , like on-boarding, evaluations, and supplier self management.
Oracle Supplier Hub can be used to optimize oilfield warehouse and supply chain management. It can provide visibility to oilfield service company contract performance and can accelerate approval and bill collection cycles.
- **Oracle Product Hub:** Oracle Product Hub is an enterprise master data management solution that enables customers to centralize all product information from heterogeneous systems, creating a single view of product information that can be leveraged across all functional departments. Product Hub helps customers eliminate both buy-side and sell-side product data fragmentation, by centralizing product hierarchies, product relationships, rules, specifications, documents, configurations and BOMs across systems, and by providing best-in-class data quality functionalities highly specialized on products data. With Oracle Product Hub Oil companies can master Products, Services, Equipments, Instruments, Production Entities, Production Facility Equipment (pipelines, batteries, compressor stations, gas plants, meters, separators, ...), Support Facilities (rigs, roads, transmission or radio towers, airstrips, ...), Vehicles, Spare Parts, Catalogues and more.
Oracle Product Hub can create an asset master for all oilfield equipment which allows enterprise-wide oilfield asset management.
- **Oracle Data Relationship Management:** Oracle Data Relationship Management helps organizations to proactively manage changes in master data across operational, analytical and enterprise performance management silos. Business users may make changes in their departmental perspectives while ensuring conformance to enterprise standards. Whether processing financial master data such as cost center, accounts, and legal entities or analytical master data such as business dimensions, reporting structures, or related hierarchies, or reference data, Oracle Data Relationship Management delivers accurate and timely master data to drive ongoing operational execution, enterprise performance management (EPM) and business agility.

The Oracle MDM Suite modules are being used by over 1200 satisfied customers around the world today.

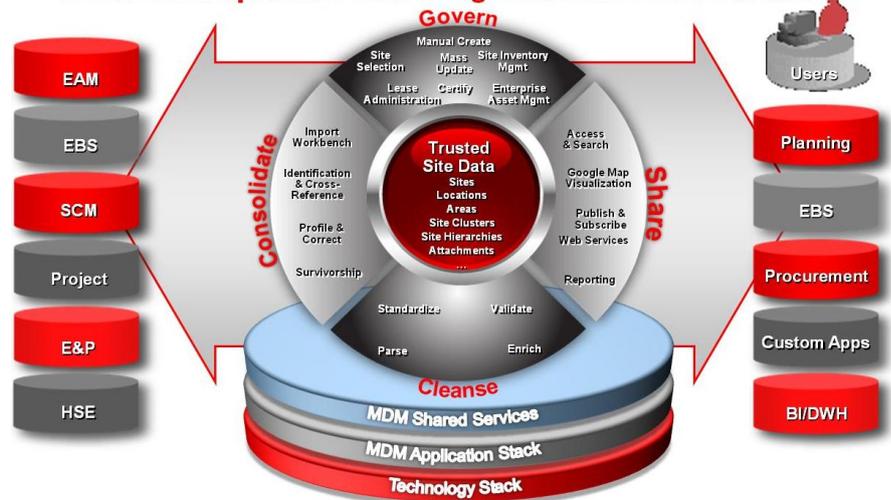
ORACLE SITE HUB OVERVIEW

As a data hub, Site Hub provides the capability to consolidate site information into a master repository, govern the master data providing abilities to manage the site lifecycle and share the master data by providing a 360-degree view of site and related information to all operational and analytical applications. Web services allow the integration of heterogeneous third party data, providing a true hub and spoke model.

Site Hub users can leverage an Integration middleware like the Oracle SOA Suite to provide comprehensive application integration services, such as a framework to build high-speed synchronization, business process management (including data governance processes) across different environments, and a robust messaging and monitoring infrastructure.

Oracle Site Hub Information Mgmt Solution

Oracle's unique Site Mastering solution in the market



Oracle Site Hub has all of the characteristics needed to successfully master the Site and locations data, like:

Data Model

- Flexible data model centered on key site-related entities like Site, Location, Area, Cluster and Hierarchy, highly suitable to model PPDM oilfield entities as well as company specific site entities
- Enhanced Spatial compliant location model allowing spatial visualization of data
- Unlimited data model extensibility via declarative interface

Consolidate

- Capture attributes and relationships for sites, contacts, and assets in a rich and extensible data model
- Import, export and easily maintain bulk data using spreadsheet-based data import with strong data validation during import
- Enrich the site data by associating trade areas to sites, which helps in storing unlimited data of the areas surrounding the site location
- Classify and organize sites by building site hierarchies and site clusters
- Integrate data from E&P applications and oilfield operations.

Cleanse

- Standardize site data by applying industry and organizational standards
- Normalize data via automatic site ID generation
- Automatically validate data using user-defined validation rules
- Prevent duplicates in site data repository
- Customize E&P data cleansing rules

Govern

- Integrated site lifecycle management platform within the product
- Map and visualize sites and site data with prebuilt Google Maps® integration

- Create and maintain site specific property leases via out-of-the-box integration with Oracle Property Manager
- Plan operations on all fixed site assets using integration to Oracle Enterprise Asset Management software
- Track site specific inventory using pre-built integration with Oracle Inventory
- Maintain data certification information for site entities
- Provide audit trails for all E&P site hub activity
- Provide Site, Hierarchy, Attribute Group level View and Edit data access control using a robust Roles Based Access control architecture

Share

- Provide the golden site record and selected attributes to all applications and analytical systems
- View and manage all site data using a single intuitive user interface
- Apply multiple techniques for flexible site searches using parametric search
- Seamlessly share data with other consuming applications via prebuilt web services

ORACLE SITE HUB DATA MODEL

Oracle Site Hub provides a very flexible data model, specialized on areas, sites, hierarchies and locations entities, with the ability to model and to master in one single repository all those sites and all related information and entities, like assets and parties.

Oracle Site Hub can store all oilfield data from cradle to grave, including sites not selected during the site selection process as an internal site, or external sites to the implementing organization. Since Site Hub leverages user-defined attributes, it can store all site-specific attributes, including those required to support key exploration and production processes and those needed for analysis of past/present business decisions, return on investment analysis, targets analysis, and many other oil & gas specific analysis. Unstructured data, such as documents and files of any format are also stored for a site as attachments. Examples include lease contracts, permissions, local tax codes, compliancy certificates and engineering drawings.

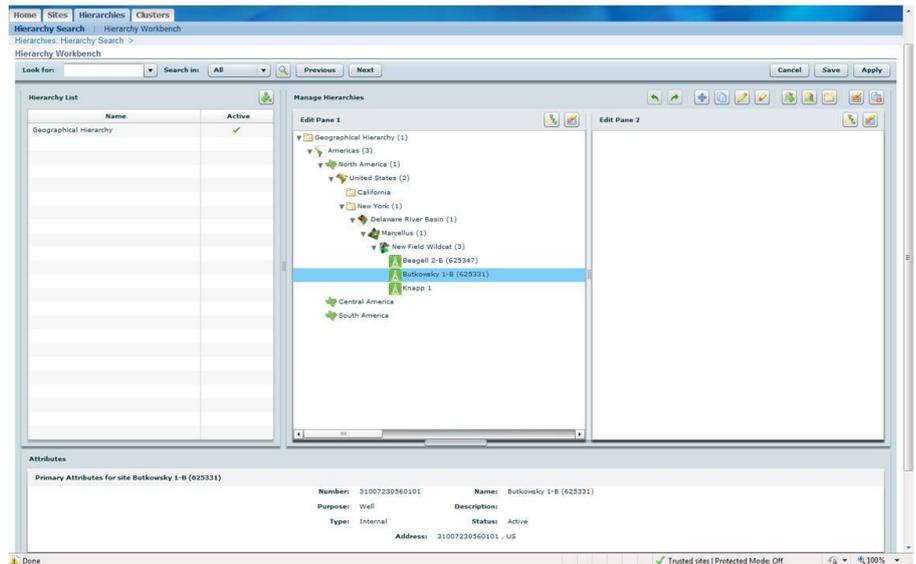
E&P Site Hub Entities Examples

Site Hub Tracks All Oilfield Assets and Resources



Oracle Site Hub can capture all aspects of an oilfield. Examples include the site being an organization, a legal entity, a property, an exploration basin, an oilfield facility, an inventory, an asset and an oil well. Site data consolidation and federation are used to create a trusted site master within the implementing organization.

Site locations (addresses or geographical coordinates) are also managed with out-of-the-box address geo-coding capabilities coupled with Google Maps integration to deliver powerful mapping capabilities and spatial data analysis using Oracle Spatial. Locations can be shared between different sites. Centered on the site location, any site can also have associated surrounding areas. Site Hub can master any site location specific information including cadastral, ownership, jurisdictional, geological, seismic and any site-centric area specific information (economic, political, risk, weather, logistic, traffic information).



Any site can be classified into multiple hierarchies, like organizational hierarchy, operational hierarchy, geographic hierarchy, divisional hierarchies and so on. Any site can also be associated to multiple clusters, i.e. collections of sites, and these can be used as a foundation for driving reporting, analysis, organize daily work, etc.

Hierarchies can also be used to model entities which are structured or non-structured collections of nodes, like for example routes, pipelines and more. Unlimited attributes are supported for Hierarchies as well.

Oracle Site Hub can provide better transparency to past business decisions by storing relevant site data and reports from other applications as attached files if necessary. Site Hub can store user-defined territory and site data for better location planning for sites. Whether it be periodic or extraordinary maintenance activities, repairs or significant overhauls, Site Hub can provide well data during the assessment and execution phases of well maintenance.

Site Hubs fully support a prototyped approach, so the data model can start small and grow as big as needed. Oracle Site Hub data model has been conceived to be extended over time without programming. Unlimited number of attributes (User Defined Attributes, UDAs) can be managed and added over time to provide a customized data model to meet specific business needs. Creation of UDAs is done in the Data Steward User interface and requires no programming or database skills. Each UDA is defined with one of the data types of Character, Number, Date, or Date and Time.

UDAs are created within Attribute Groups. Attribute Groups can either be of type Single or Multi Row. Single Row type Attribute Groups hold only one value for each Attribute. Multi Row Attribute Groups can hold multiple combinations of values for the Attributes, one set of values per row. Multi Row Attribute Groups are frequently referred to as Attribute Grids. An example of use of Multi Row Attribute Groups is for projects summary information associated to a site. In each row there could be a unique combination of project type and start/end dates/times, along with the related status and cost.

Attributes can be validated for control of values entered. Validations types are:

- Data type – Number, Character, Date, or Date and Time
- Min/Max for Numeric
- Simple lookup lists
- Dependent lookup lists
- Rules based on other attributes or changes to attribute
- Functions written in SQL or Java to either assign values automatically based on calculation or external system information
- Functions written in SQL or Java to perform any complex comparison validation between different attributes

- Business Events that can be triggered before and after an update of a Site, or Site attributes in an attribute group, allowing granular control of data changes.

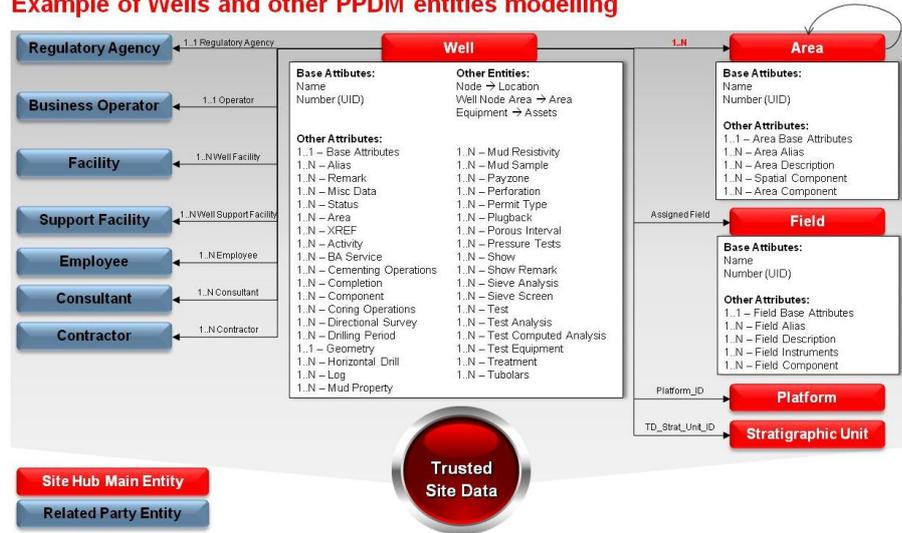
In Site Hub UDAs can be associated to Site (across all sites or filtered by site purpose), Locations, Areas and Hierarchies.

PPDM ENTITIES MODELING IN SITE HUB

Oracle's Site Hub provides the needed data model infrastructure and flexibility to map and master the key relevant entities and all related attributes defined by PPDM.

Oracle Site Hub 4 PPDM+

Example of Wells and other PPDM entities modelling



The most important PPDM entity is the well which can be modeled as a site. The site entity in Oracle Site Hub provides the ability to associate the well with a name, a universal identifier and a location (address or geographical coordinate). The User Defined Attribute Framework provides the needed infrastructure to add single row attributes groups like well base attributes (well IDs, well type, well structure and key characterizing measures, and more) and well geometry, and multi row attribute groups like well applications, permits, production data, activities, operations, logs, treatments, tests, drills, treatments, KPIs, and all the other information defined in PPDM for wells. Site Hub can also capture any other additional information to match the specific needs of an implementing organization.

Select	Display Name	Internal Name	Description	Business Entity	Type	Behavior	Database View	Copy
<input type="checkbox"/>	OG Area Base Attributes	OG_AREA_BASE_ATTRIBUTES	OG Area Base Attributes	Site	Site	Single-Row	RRS_OG_AREA_BASE_ATT_AGV	
<input type="checkbox"/>	OG Field Base Attributes	OG_FIELD_BASE_ATTRIBUTES	OG Field Base Attributes	Site	Site	Single-Row		
<input type="checkbox"/>	OG Pool Base Attributes	OG_POOL_BASE_ATTRIBUTES	OG Pool Base Attributes	Site	Site	Single-Row		
<input type="checkbox"/>	OG Record IDs and Tracking	OG_RECORD_ID_AND_TRACK	OG Record IDs and Tracking	Site	Site	Single-Row		
<input type="checkbox"/>	OG Source System Management	OG_SOURCE_SYSTEM_MGMT	OG Source System Management	Site	Site	Multi-Row		
<input type="checkbox"/>	OG Well Activities	OG_WELL_ACTIVITIES	OG Well Activities	Site	Site	Multi-Row		
<input type="checkbox"/>	OG Well Air Drill	OG_WELL_AIR_DRILL	OG Well Air Drill	Site	Site	Multi-Row		
<input type="checkbox"/>	OG Well Base Attributes	OG_WELL_BASE_ATTRIBUTES	OG Well Base Attributes	Site	Site	Single-Row	RRS_OG_WELL_BASE_ATT_AGV	
<input type="checkbox"/>	OG Well Base Attributes History	OG_WELL_BASE_ATTRIBUTES_H	OG Well Base Attributes History	Site	Site	Multi-Row		
<input type="checkbox"/>	OG Well Base Identification	OG_WELL_BASE_IDENTIFICATION	OG Well Base Identification	Site	Site	Single-Row	RRS_OG_WELL_BASE_IDE_AGV	
<input type="checkbox"/>	OG Well Confidential Attributes	OG_WELL_CONFIDENTIAL_ATTRIBUTE	OG Well Confidential Attributes	Site	Site	Single-Row		
<input type="checkbox"/>	OG Well Custom Production Data	OG_CUSTOM_PRODUCTION_DATA	OG Well Custom Production Data	Site	Site	Multi-Row		
<input type="checkbox"/>	OG Well Lease and Tax	OG_WELL_LEASE_TAX	OG Well Lease and Tax	Site	Site	Single-Row		
<input type="checkbox"/>	OG Well Status History	OG_WELL_STATUS_HISTORY	OG Well Status History	Site	Site	Multi-Row		
<input type="checkbox"/>	OG Well Status and Dates	OG_WELL_STATUS_AND_DATES	OG Well Status and Dates	Site	Site	Single-Row		
<input type="checkbox"/>	OG Well Tests	OG_WELL_TESTS	OG Well Tests	Site	Site	Multi-Row		
<input type="checkbox"/>	OG Well Zone and Links	OG_WELL_ZONE_AND_LINKS	OG Well Zone and Links	Site	Site	Single-Row	RRS_OG_WELL_ZONE_AND_AGV	

Site Hub can also model areas, lands, fields, basins, pools, platforms, eco-zones, and stratigraphic layers as specific sites, tracking their base attributes, aliases, descriptions, subcomponents and more.

Midstream entities (pipelines, logistic sites, pump stations) and downstream entities (cylinders, tanks, inventories, meters, partner’s sites, routes, facilities, gas stations, competitor sites) can also be easily modeled, together with their specific attributes and relationships.

The screenshot shows the Oracle Site Management interface for well 31003103170000. The 'Attributes' tab is selected, displaying various well attributes organized into sections:

- OG Record IDs and Tracking:** Includes fields for Remark, PPDM Global UID, Expiry Date, Primary Source, Raw Data Quality, and Effective Date.
- OG Well Base Identification:** Includes Unique Well ID (1), Well Government ID, Well Numeric ID, and Well Type (Oil Development).
- OG Well Base Attributes:** A detailed list of attributes such as Bottom Hole Latitude (42.20565), Bottom Hole Longitude (-77.86471), and various depths (e.g., 901 Meters).
- OG Well Confidential Attributes:** Includes Confidential Stratigraphic Name Set ID, Confidential Date, Confidential Type, Confidential Stratigraphic Unit ID, and Confidential Depth.
- OG Well Lease and Tax:** Includes Lease Name, Legal Survey Type, Lease Number, and Tax Credit Code.

Any relevant Data Quality and Data Governance information is either stored (and managed) natively behind the scene (like audit trail data and cross references) or can be easily modeled using the UDA infrastructure. Data history can be maintained leveraging the underlying Oracle RDBMS features, or can be stored in specific multi-row UDA groups and fed using the Site Hub native business events infrastructure.

The screenshot shows the Oracle Site Management interface for well 31003103170000, displaying the 'Production' tab. It shows a table of production data with columns for Date, Oil Rate (BO/D), Gas Rate (MCF/D), Water Rate (BW/D), and Injected Water (BW/D). The data is organized into rows for different dates, with expandable details for each row.

Details	Date	Oil Rate (BO/D)	Gas Rate (MCF/D)	Water Rate (BW/D)	Injected Water (BW/D)
Hide	01-Oct-2009	2500	1300	0	0
		Gas Lift Gas (MCF/D)	1621.08026298791		Forecasted Oil Rate (BO/D) 0
		Forecasted Gas Rate (MCF/D)	0		Wellhead Pressure (psia)
		Bottom Hole Pressure (psia)			Comments
Hide	01-Nov-2009	2300	1200	0	0
		Gas Lift Gas (MCF/D)	1540.02624983851		Forecasted Oil Rate (BO/D) 0
		Forecasted Gas Rate (MCF/D)	0		Wellhead Pressure (psia)
		Bottom Hole Pressure (psia)			Comments
Hide	01-Dec-2009	2100	1200	0	0
		Gas Lift Gas (MCF/D)	1463.02493734659		Forecasted Oil Rate (BO/D) 0
		Forecasted Gas Rate (MCF/D)	0		Wellhead Pressure (psia)
		Bottom Hole Pressure (psia)			Comments
Hide	01-Jan-2010	1900	1000	0	0
		Gas Lift Gas (MCF/D)	1389.87369047926		Forecasted Oil Rate (BO/D) 0
		Forecasted Gas Rate (MCF/D)	0		Wellhead Pressure (psia)
		Bottom Hole Pressure (psia)			Comments
Hide	01-Feb-2010	2200	1200	0	0
		Gas Lift Gas (MCF/D)	1320.3800059553		Forecasted Oil Rate (BO/D) 0
		Forecasted Gas Rate (MCF/D)	0		Wellhead Pressure (psia)
		Bottom Hole Pressure (psia)			Comments

For any site entity, Site Hub can associate all the related assets and equipments at the site, as well as all relationships between sites, between a site and multiple parties, and between a site and any purchasable or sellable item, over time.

Items can be equipments, instruments, facilities, services, products, production entities, production facilities (pipelines, batteries, compressor stations, gas plants, meters, separators, etc.), support facilities (rigs, roads, transmission or radio towers, airstrips, etc.), supplier products and services, catalogs, and more. Items can just be associated to sites using standard site hub features, or they can be fully mastered by implementing product hub.

Item Description	Item	Item Instance	Serial Number	Status	Quantity	Start Date
Pump Assy	MRO-BL4000-102	4686852		CREATED	1	02-Dec-2010
Engine Assembly	MRO-GF-180	4686847		CREATED	1	02-Dec-2010
Engine Assembly	MRO-GF-180	4686846		CREATED	1	02-Dec-2010
HP Compressor Assembly	MRO-45556-1	4686856		CREATED	1	02-Dec-2010
HP Compressor Assembly	MRO-45856-2	4686859		CREATED	1	02-Dec-2010
HP Compressor Rotor Disc STG 2	MRO-353905-4	4686877		CREATED	1	02-Dec-2010
HP Compressor Rotor Disc STG 4	MRO-353905-5	4686867		CREATED	1	02-Dec-2010
HP Compressor Rotor FWD Shaft	MRO-3786483	4686869		CREATED	1	02-Dec-2010
HP Compressor Rotor FWD Shaft	MRO-3786471	4686879		CREATED	1	02-Dec-2010
HP Compressor Rotor Spool STG 1	MRO-365823-3	4686878		CREATED	1	02-Dec-2010
HP Compressor Rotor Spool STG 1	MRO-365823-2	4686868		CREATED	1	02-Dec-2010
HP Front Air Seal	MRO-5294-36-6	4686875		CREATED	1	02-Dec-2010
HP Front Air Seal	MRO-5294-36-6	4686880		CREATED	1	02-Dec-2010
HP Front Air Seal	MRO-5294-36-6	4686885		CREATED	1	02-Dec-2010
HP Rotor Shaft	MRO-56945-8	4686861		CREATED	1	02-Dec-2010
HP Rotor Shaft	MRO-56945-7	4686880		CREATED	1	02-Dec-2010
HP Rotor Disc	MRO-55930-1	4686874		CREATED	1	02-Dec-2010
HP Rotor Disc	MRO-55930-2	4686864		CREATED	1	02-Dec-2010
HP Rotor Front Shaft	MRO-4277373-3	4686876		CREATED	1	02-Dec-2010
HP Rotor Front Shaft	MRO-4277373-4	4686866		CREATED	1	02-Dec-2010
HP Rotor Front Shaft	MRO-4277373-4	4686853		CREATED	1	02-Dec-2010
HP Rotor Front Shaft	MRO-4277373-4	4686854		CREATED	1	02-Dec-2010
HP Rotor Disc STG 1	MRO-721-461-805	4686872		CREATED	1	02-Dec-2010
HP Rotor Disc STG 1	MRO-721-461-806	4686862		CREATED	1	02-Dec-2010
HP Rotor Disc STG 2	MRO-721-461-904	4686863		CREATED	1	02-Dec-2010
HP Rotor Disc STG 2	MRO-721-461-905	4686871		CREATED	1	02-Dec-2010

Parties can be regulatory agencies, authorities, business operators, suppliers, facilities, support facilities, consultants, contractors, employees, and others. Party groups like company groups, organizational structures, teams, crews, can be associated as well. Party can just be stored and associated to sites using standard site hub features, or they can be fully mastered by implementing customer hub and/or supplier hub.

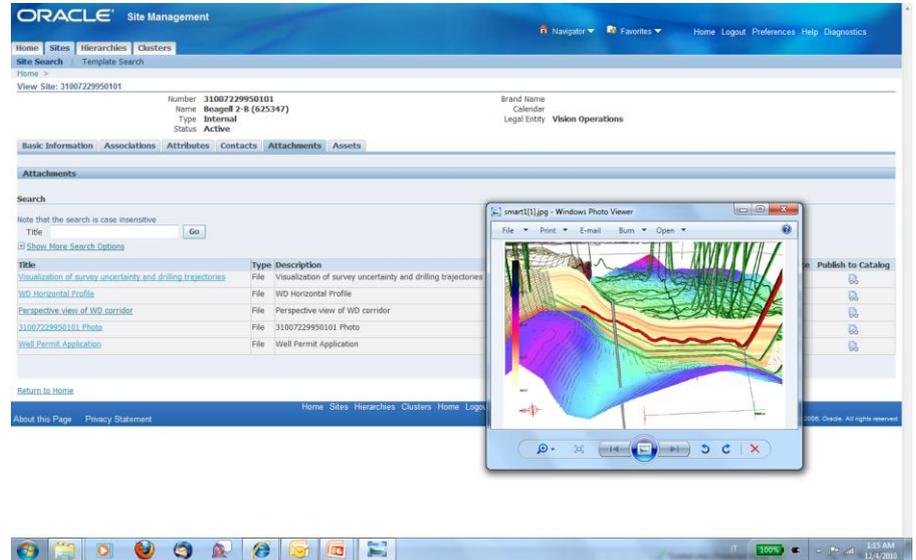
Relationships between sites can be modeled in many different ways:

- Direct link through multi-row attributes groups
- Clusters
- Hierarchies

Using relationships between sites it is also possible to model complex structures where some sites are subcomponents of another site.

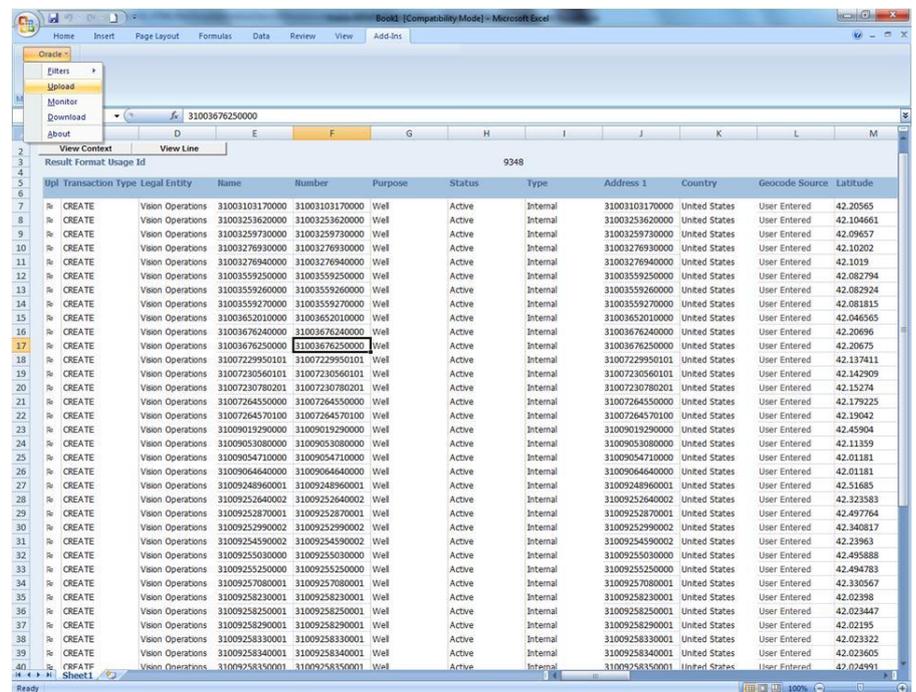
Party	Relationship Role	Start Date	End Date	Comments	Remove
Contractors Supply	Supplier for Organization	03-Dec-2010			
Private Industrial Supply	Supplier for Organization	03-Dec-2010			
Winters Supply Company	Supplier for Organization	03-Dec-2010			
Lab Safety Supply Inc	Supplier for Organization	03-Dec-2010			
W. Balance Associates	Supplier for Organization	03-Dec-2010			
Chesapeake Appalachia, L.L.C.	Well Operator	26-Nov-2010			

Site Hub can store any type of unstructured data associated to a site. This could be stored directly or using an external content management solution based on WEBDAV protocol; like Oracle Universal Content Management. Considering a well, for example, site hub can store any relevant associated multimedia file such as: CAD drawings of the well profile, structure and/or parts, engineering documents, contracts, applications, permits, logs, pictures, photos, videos and more.



DATA CONSOLIDATION AND LINK

Oracle Site Hub is able to import bulk data via bulk import features. Spreadsheet data import with strong excel integration is provided out-of-the box. Data validation is enforced during the data loading process. Error handling is contextually provided as well. This includes both seeded and user defined attributes.

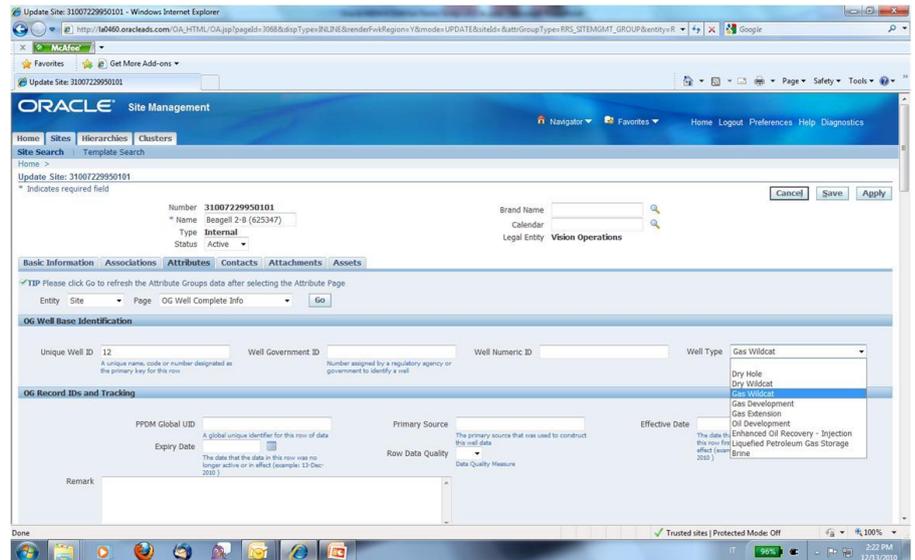


Import interfaces are available to upload site data using SQL loaders or ETL tools. Once again, all data validations, access controls and error handling options are provided. Web Services are also available for real time consolidation and synchronization of data from connected systems.

CENTRALIZED SITE INFORMATION QUALITY MANAGEMENT

Site Hub provides the usual MDM capabilities for Mastering data, highly specialized on sites and locations. Data Cleansing and Enrichment features are used to improve site data quality over time.

First of all, Site Hub provides a strong attributes validation based upon attributes validation rules set up during attributes definition. This is leveraged during data imports/mass updates, while synchronizing the information from external sources (using APIs or Web Services), and when end users or data stewards create or update site information. Specifically on addresses, Site Hub can validate user inputs against a geography hierarchy, which can be defined on a country bases according to each implementing organization specific needs.



Oracle Site Hub provides an embedded Address Validation Framework for normalizing, validating and enriching addresses in batch mode. Furthermore, Automatic Geo-coding for any Address using Best of Breed technologies is also provided out-of-the-box.

Oracle Site Hub also provides a powerful and configurable Search feature, by means of which it is possible to search on Site unique identifier, description, or any combination of seeded and user defined attributes, by means of Search Criteria's, with possibility to specify parametric searches, including defaults, ranges, operators, wild characters, etc. These criteria's are automatically rendered on user screens by the GUI framework.

Site Hub can fully leverage Oracle ETL tools for data standardization and cleansing and for duplicate identification and resolution. Site Hub is also open for integration with leading 3rd party data quality tools.

SITE DATA GOVERNANCE AND LIFECYCLE MANAGEMENT

Oracle Site Hub delivers an end-to-end data governance foundation which:

- eliminates the site data fragmentation and inconsistency
- improves the quality of every interaction point no matter what application and/or channel is used
- enables the alignment of the IT organization with the overall organization's business goals and policies
- accelerates the Return On Investments (ROI) from existing business applications
- helps reducing risk

Oracle Site Hub provides a powerful set of features supporting the central management of site Data Governance tasks and processes.

Data Profiling and Data Analysis can be delivered leveraging Oracle Fusion middleware components, like Oracle Warehouse Builder, Oracle Data Integrator, Oracle BI Publisher or Oracle BI Enterprise Edition.

The screenshot displays the Oracle Site Hub interface. At the top, there are navigation tabs for Home, Sites, Hierarchies, and Clusters. Below this is a search bar with 'Site Search' and 'Template Search' options. The main area is titled 'Site Map' and includes a search radius selector set to 5 miles, with 'Go', 'Map All', and 'Remove All' buttons. On the left, a 'Select Additional Sites' panel lists various site types, with 'Well' checked. The central map shows a satellite view of a landscape with several site markers. A callout box for a specific site provides details: Number 31009277060000, Name Young 153, OG Well Base Identification, Unique Well ID, Well Government ID, and Well Numeric ID. Below the map is a 'Mapped Sites' table with columns for Name, Number, Type, Primary Purpose, Key Site, Show Trade Areas, and Trade Area Group. The table lists five internal wells. At the bottom, there is a 'Return to View Site: 31009258230001' link and a 'Done' button.

Select	Details	Name	Number	Type	Primary Purpose	Key Site	Show Trade Areas	Trade Area Group
<input type="checkbox"/>	Show	Young 8	31009258230001	Internal Well		<input checked="" type="checkbox"/>		
<input type="checkbox"/>	Show	Weston U 53	31009559090000	Internal Well				
<input type="checkbox"/>	Show	James 107	31009277360000	Internal Well				
<input type="checkbox"/>	Show	James 102	31009277350000	Internal Well				
<input type="checkbox"/>	Show	Burlingame 6	31009277220000	Internal Well				

Oracle Site Hub delivers a full Google Map integration, which enables interactive graphical search and navigation of both internal and external sites, location and areas, multiple sites management, and side-by-side comparison of site information. Configurable enterprise Site data is presented along with geographical information.

Oracle Site Hub is able to maintain the full data change history and audit trail tracking leveraging the underlying database services.

A comprehensive set of Business Events and policies are available to be consumed by the internal workflow engine or by external Data Governance processes. This may include Change Management processes with related validations and approvals.

Finally Data Certification at entity or attribute group level is available to support end user confidence in data and specific reports.

Oracle Site Hub is integrated with E-Business Suite through Oracle Property Manager, Oracle Inventory and Oracle Install Base, hence Oracle Enterprise Asset Management.

This allows deploying site hub as the foundation for site lifecycle management, in order to:

- Reduce deal cycle time through collaborative decision facilitation
- Open sites faster by monitoring critical projects dates and expediting problem resolution
- Reduce administrative costs and comply with accounting regulations by automating lease administration
- Maintain site appearance and extend site asset life with efficient work order and preventative maintenance execution
- Provide data transparency through a single repository of real estate activity data.

SECURITY

Oracle Site Hub allows for a strong and fine grained security control. The administrator can create users, user groups, user roles (profiles), and their authorization

to access information and pages, interfaces, reports, etc. Security profiles can be setup to associate Create, Update and View privileges to users/roles. The View and Edit access controls can be granted at individual Site, Hierarchy or even at a more granular attribute group level.

It is possible to disallow access to users to Wells or other sites and their specific attributes based upon the security controls within Site Hub. For example, it may be alright for a Well Engineer to view the operational and safety information of a well, but the management may want to disallow access to the legal information related to the well. Security privileges for viewing and updating attribute groups of a Site or Hierarchy provide a granular unit of control that can be selectively granted to users.

DATA SHARING

The dual trends of increasing cross-company collaboration and standards for corporate IT governance raise concerns about protecting proprietary information while sharing it with trading partners. Enabling secure high-speed searches across huge volumes of data for all internal and external users heightens issues around protecting intellectual capital without compromising speed. Oracle Site Hub provides advanced data-level security and search capabilities to address these dilemmas, whilst providing users a 360-degree view of the site data through:

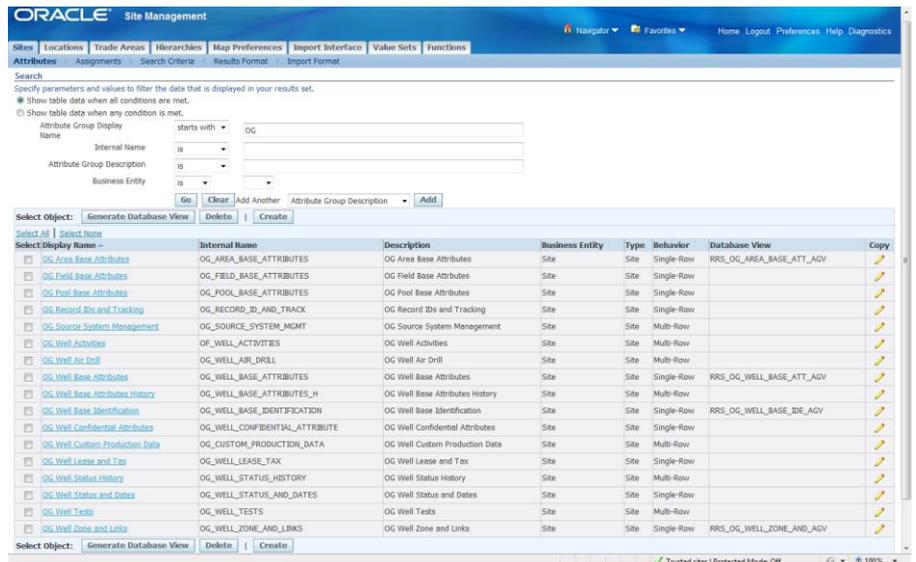
- Role-based access via browser, based on job function, responsibility and type of data
- Parametric search to instantly locate sites and hierarchies
- Rapid site search and granular security achieved through scalable optimized database indexes and queries
- Rapidly apply changes across multiple sites and hierarchies using mass maintenance tools
- View and manage all information for a site from a single user interface
- Export to excel or other formats
- SOA type web services to exchange information with spoke systems

Oracle Site Hub supports attribute based searching criteria's (i.e. templates) for all data within the master. Search criteria's can be created to define which parameters can be used in searches. These are created in a declarative way by means of a GUI wizard. All attributes can be used in these criteria's, thereby allowing users to search for sites using a complex search criteria. Search results can be exported to Excel "on the fly". Using Oracle BI Publisher, report templates can be created to export search results into predefined PDF, Word, Excel or XML formats.

The screenshot displays the Oracle Site Management Advanced Search interface. At the top, there are navigation tabs for 'Home', 'Sites', 'Hierarchies', and 'Clusters'. Below this, there are search options for 'Site Search' and 'Template Search'. The main search area includes a 'Context' section with dropdowns for 'Purpose' (Well) and 'Country' (Trade Area), and a 'Go' button. Below the context section is the 'Search Criteria' section, which shows a dropdown for 'Search Criteria' (OG Well Activities Search) and a 'Personalize' button. The search criteria are displayed in a table with columns for 'Attribute', 'Operator', and 'Value'. The table lists various attributes such as 'Downtime Type', 'Base Depth', 'Start MUD Density', 'Start MUD Viscosity', 'Final MUD Density', 'Final MUD Viscosity', 'Blowout Fluid', 'Lost Circulation Severity', 'Lost Material Amount', and 'Lost Material Type'. The 'Operator' column contains 'IS' for all entries. The 'Value' column is currently empty. At the bottom of the table, there are buttons for 'Clear', 'Delete', 'Duplicate', and 'Add Criteria'. A 'Search Criteria' button is also present at the bottom right of the table. The interface includes a 'Filter by' section at the bottom and a status bar at the very bottom.

Select Attribute Group	Attribute	Operator	Value
<input type="checkbox"/>	Downtime Type	IS	
<input type="checkbox"/>	Base Depth	IS	Meters
<input type="checkbox"/>	Start MUD Density	IS	Kilograms per cubic meter
<input type="checkbox"/>	Start MUD Viscosity	IS	Pascal / Seconds
<input type="checkbox"/>	Final MUD Density	IS	Kilograms per cubic meter
<input type="checkbox"/>	Final MUD Viscosity	IS	Pascal / Seconds
<input type="checkbox"/>	Blowout Fluid	IS	
<input type="checkbox"/>	Lost Circulation Severity	IS	
<input type="checkbox"/>	Lost Material Amount	IS	
<input type="checkbox"/>	Lost Material Type	IS	

Display Formats enable you to predefine search display views. You can use these views to look at different sets of attributes of the items, documents, or change objects that are returned by the search.



Oracle Site Hub can be used along with Oracle BI Publisher, an enterprise reporting solution to author, manage, and deliver all types of highly formatted documents eliminating the need for costly point solutions. End users can easily design report layouts using familiar desktop tools, dramatically reducing the time and cost needed to develop and maintain reports. BI publisher supports open standards, and can be used to extract any data from Oracle Site Hub and deliver it in any format required by an external rating system.

Secure data sharing web services are also provided to align site data through all systems and application within the organization.

Standard based integration can be coupled with Oracle Fusion middleware or any 3rd party middleware's or ETL tools to deliver real-time or batch integration on site data.

E&P END USERS AND DATA STEWARDS GUI

Oracle Site Hub comes with a predefined, specialized and flexible user interface delivering easy to use web based forms to E&P End Users, Data Stewards and Administrators.

E&P End users are enabled to (if granted by their security profile):

- Create single or multiple wells online from scratch, using templates and copying existing sites
- Mass create/update wells, locations and areas using bulk import or file import capabilities
- Generate a party from a well
- Search and update wells, locations, areas
- Create, search and maintain hierarchies, clusters
- Add/remove wells to/from a hierarchy or a cluster
- Use Google Map integration, to map and view wells, locations, areas details, perform range searches and site comparisons
- Export data
- Associate parties and contacts to any well
- Maintain well contact points
- Create assets via integration to Oracle Enterprise Asset Management
- Create properties via integration to Oracle Property Manager
- Create inventory organizations via integration Oracle Inventory

A typical Data Steward and Functional Administrators will have the ability to access the same set of features as the end users, plus (if granted by their security profile):

- Create and maintain user defined attributes for wells, locations and areas
- Create and maintain Import Templates for wells, locations and areas

- Create and maintain Search Criteria's and Results Formats for sites, locations and areas
- Configure Google Maps preferences, including which attributes will be shown on Google Maps for wells, locations and areas
- Configure Geo-coder preferences
- Run massive automatic geo-coding for all or a subset of locations
- Define users, roles and access rights
- Access ad hoc Data Profiling Reports and Data Analysis Dashboards

FLEXIBLE DEPLOYMENT ARCHITECTURAL STYLES

In any Master Data Management solution deployment, one of the key decisions to be made is the choice of the MDM architecture. Gartner and other analysts describe some different Hub deployment styles, which must be supported by a best of breed MDM solution in order to guarantee the success of the deployment project.

Oracle MDM Solutions can be deployed according to any of the MDM architectural styles. Oracle MDM Solutions provide strong data integration capabilities which are key to enabling the use of Confederated Hub as a possible architectural style approach.

In this architectural style, several Hubs are maintained at departmental and/or agency and/or territorial level, and each of them is connected to the other Hubs either directly or via a central Super-Hub. Each Domain level Hub can be implemented using any of the other architectural styles.

With its support or any type of deployment architecture and ability to leverage the outstanding capabilities of the Oracle technology stack, Oracle's MDM Solution provides a low TCO and a quick ROI by allowing a phased implementation strategy.

SYNERGIES WITH OTHER ORACLE MDM SUITE MODULES

Site hub can be implemented standalone, delivering a very specialized site master data lifecycle management solution, and faster implementation through predefined extensible data model and data quality features, or can be implemented with other Master Data Management modules. In this second option, Site Hub can be part of a real multi-entity master.

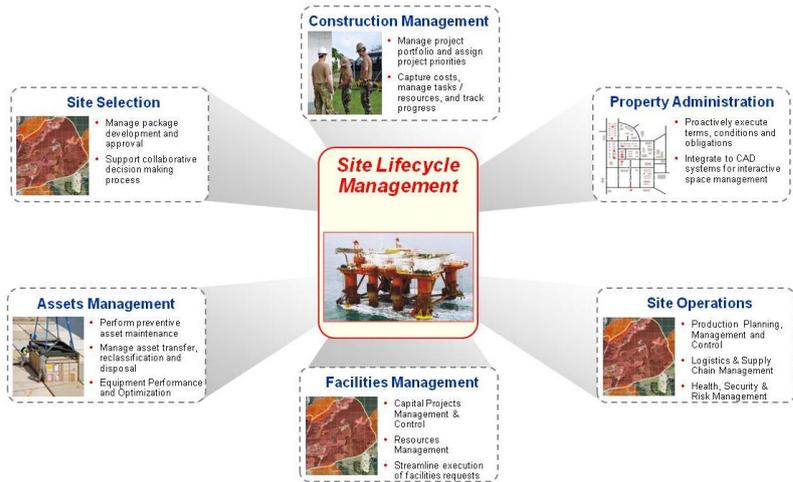
Site Hub allows to define and to maintain over time any relationship between sites defined in site hub and parties defined in Customer Hub or in Supplier Hub. Consistency is guaranteed when parties are merged in those other MDM modules.

Cross linking to Oracle Product Hub allows to associate Items, Services and Spare Parts to sites, locations and areas. In this way it is possible to support both site procurement and logistic processes.

As there could be many other examples of synergic deployments of Oracle Site Hub with other Oracle MDM Suite modules, please consider the above set of examples as just a starting point.

INTEGRATION WITH ORACLE E-BUSINESS SUITE AND OTHER ERP SYSTEMS

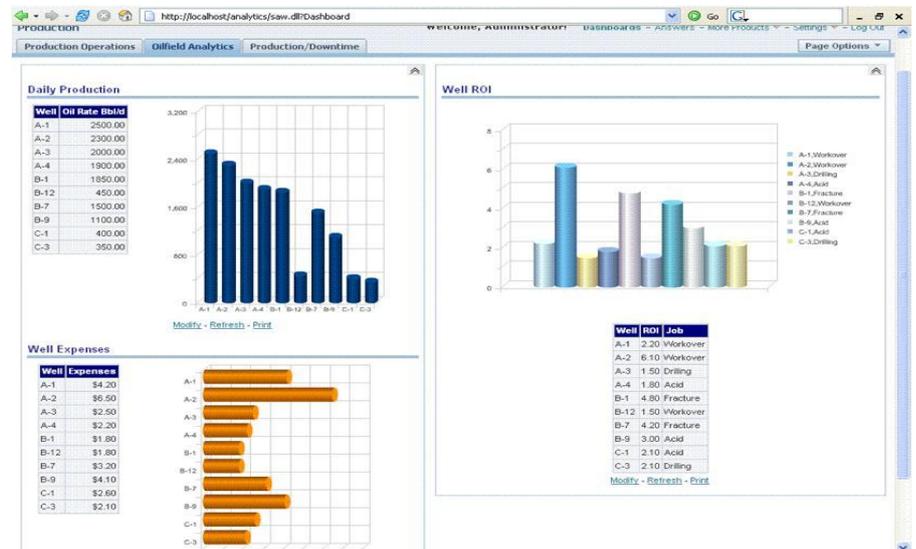
Site Hub leverages the Trading Community Architecture (TCA), also referred to as the Oracle Data Model, which underlies the Oracle E-Business Suite, as its foundation, and has extended the Data Model to support non-Oracle heterogeneous application environments such as SAP ERP. Use of this extensible data model provides further integration points into the 14 other E-Business Suite applications that directly leverage TCA. Out of the box, Oracle Site Hub comes also integrated with Oracle Property Manager, Oracle Inventory and Oracle Enterprise Asset Management. This gives the ability to create and manage site-specific properties in Property Manager, site-specific inventory in Oracle Inventory and site-specific assets and equipments in Enterprise Asset Management. This ERP data model can be extended to include SAP Business Warehouse and other ERP applications.



Site Hub can be installed either as part of an Oracle E-Business Suite application environment, providing a strong foundation for Site lifecycle management, or standalone, as a pure hub (either by itself or along with other Oracle hubs).

EFFECTIVE SITE ANALYSIS THAT DRIVES BETTER DECISION MAKING

Oracle Site Hub drives enterprises to make better site business decisions by providing a single definition of key business objects in the E&P space. It stores well data for analysis throughout the entire well lifecycle, beginning with the exploration process and ending with plugging and abandoning the well. The Site Hub stores all data for analyzed wells and remembers the selection process, thereby improving the well selection process in the future. Users can also store well data for both internal and external sites including competitor, supplier, and partner sites.



This information can be leveraged for analysis of past business decisions, return on investment analysis, risk & compliance analysis, production analysis and many other oil & gas specific analyses. It provides better transparency to past business decisions by storing relevant well data and reports from other external applications. Comparison of different attributes can be made on prospective wells for efficient location planning. Enhanced well data, including geological and seismic data, can provide more inputs for comparison of well attributes as well as to support discovery, appraisal and production optimization.

The Site Hub provides the relevant data during the assessment and execution phases of maintaining a well including workovers, recompletions, frac jobs and periodic facilities maintenance activities. For better asset management, wells can be organized into multiple hierarchies that are relevant to the organization's business processes. Wells with similar attributes can be aggregated into clusters, which is a flat grouping of well.

Examples include clustering oil wells, gas wells, unconventional wells and injection wells. Using the integrated best of breed mapping software, all wells can be mapped to their corresponding location on the map, with custom icons for each type of well.

Further, Area Groups can be defined and user defined attributes associated to each area group. This drives comparison of multiple wells within an area group based on the user-defined attributes such as completion interval, proven reserves or profitability. These superior analytical capabilities drive better well-related business decisions.

INCREASED ROI

Oracle Site Hub provides increased ROI and lower TCO and project costs. Oracle Site Hub eliminates the need to maintain heterogeneous systems across the enterprise to master PPDM data and replaces them with one Site Hub application. It leverages web services and integration to E-Business Suite to reduce integration and maintenance costs, hence reducing the total cost of ownership for site management application. Consolidated and clean well data enables faster introduction of new IT applications and higher productivity of employees. Furthermore, Site Hub provides enhanced well data management, well comparison capabilities, asset and inventory management, and well mapping which enables better decision making and improved profitability.

WHY ORACLE

Many oil companies today do not have the insight they need to optimize the exploration and production process, as well as other mid-stream or down-stream processes. It is not surprising that those organizations are frustrated by the inability to use the information that they have captured.

Oracle believes that a better approach for oil companies is to manage data quality at the organizational level and then share common, consistent and enriched data among all departments that require it. To do this, they need a strategy that ensures data quality through deliberate PPDM E&P data management based on a solid and flexible foundation.

The traditional build-it-yourself approach to PPDM data management is complex, risky and costly. Diverse technologies and multiple vendors may be needed to implement an inconsistent architecture that is difficult to support and upgrade.

Oracle's Solution for Digital Oilfield offers a comprehensive, flexible, industry-specific and cost-effective alternative that consists of the PPDM E&P Site Hub and – optionally – Customer Hub, Supplier Hub, Product Hub, SOA Suite and Petroleum Business Intelligence. Oracle MDM solution is built on Oracle technologies like the market leading Oracle Database, Oracle Fusion Middleware and its components, which not only provide a strong footprint for a much needed multi MDM architecture, they can also be leveraged across a customer's IT organization for many other different needs, thereby further reducing long term costs.

Oracle's Solution helps oil companies build a solid, flexible and sound foundation and a trusted and holistic Well Profile, including all needed E&P attributes, party and items relationships. All E&P and ERP data can be mastered and leveraged in key business processes and analysis in order to achieve:

- A trusted consolidated Well Master Data Management solution
- A improved level of well analysis based on comprehensive oilfield asset information
- More efficient and effective Exploration and Production processes
- Low cost and rapid E&P information access based on open standards
- Improved agility and efficiency throughout the organization
- Better Compliance and Risk information framework
- A complementary Access Authorization data foundation

Only Oracle provides this unique Site Hub solution in the market, which provides a competitive differentiation for an upstream E&P company. We hope this document has given you a good idea of how the PPDM E&P Site Hub can help your organization. Contact Oracle today to find out more about how you could benefit from Oracle's Solution for mastering wells and other PPDM entities.



Oracle Site Master Data Management for mastering wells and other PPDM entities in a digital oilfield context
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