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DATA MANAGEMENT ASSOCIATION

PPDM Data Model Implementation Head Start

PPDM Version 3.8

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LEARNING OBJECTIVES

- How to use the PPDM web site to get information
- Review and identify the key architectural principles of the PPDM Data Model
- Identify and analyze some PPDM implementation Guidelines
- Describe the methods needed to extend the data model (i.e. application-centric)

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Using the PPDM Web Site

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- Roadmaps
- Data model diagrams
- On-line documentation
- Wiki documentation
- Forum support
- Data definition language

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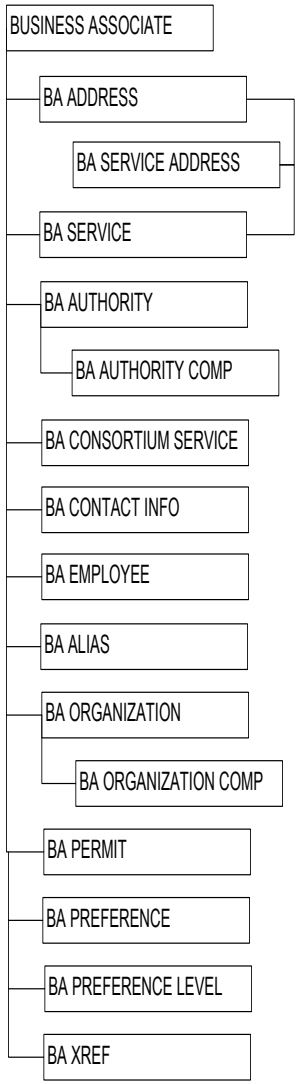
PPDM ROADMAPS

Business Associates

- Each box represents a table in PPDM
- Reference tables are not shown
- Relationships are greatly simplified
- Connections between modules are not shown



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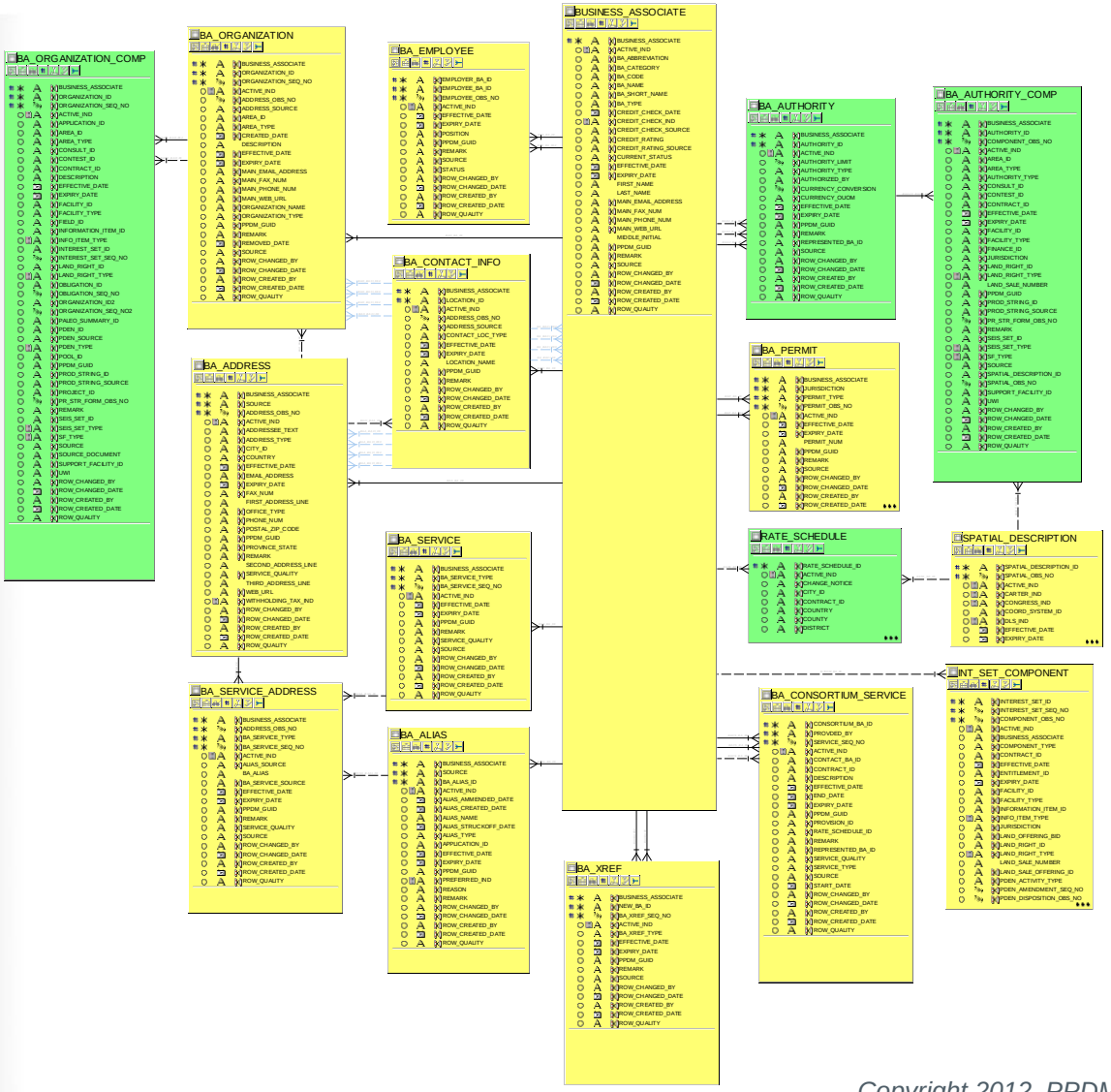
PPDM PHYSICAL MODEL DIAGRAMS



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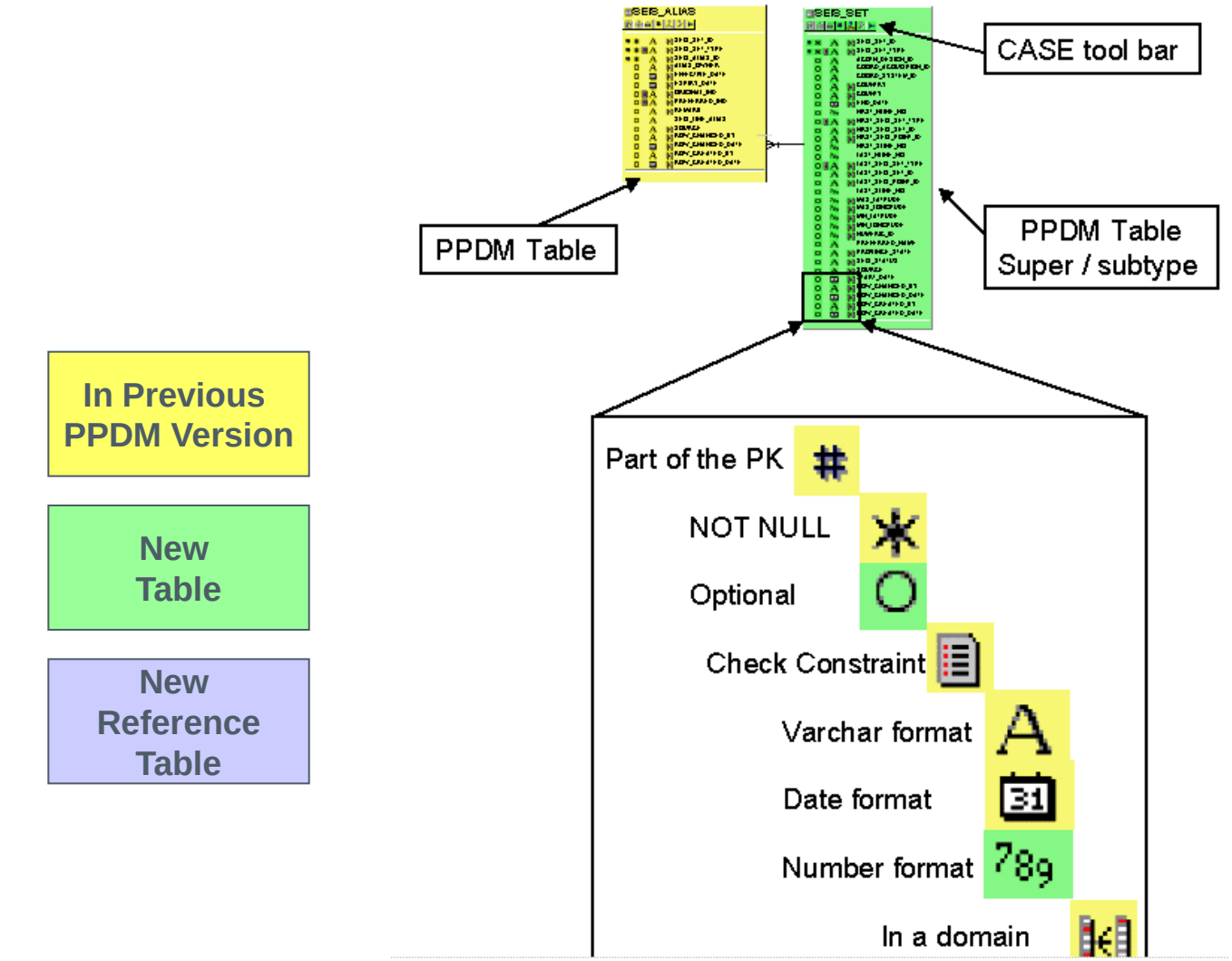
READING THE PPDM DATA DIAGRAMS



In Previous PPDM Version

New Table

New Reference Table

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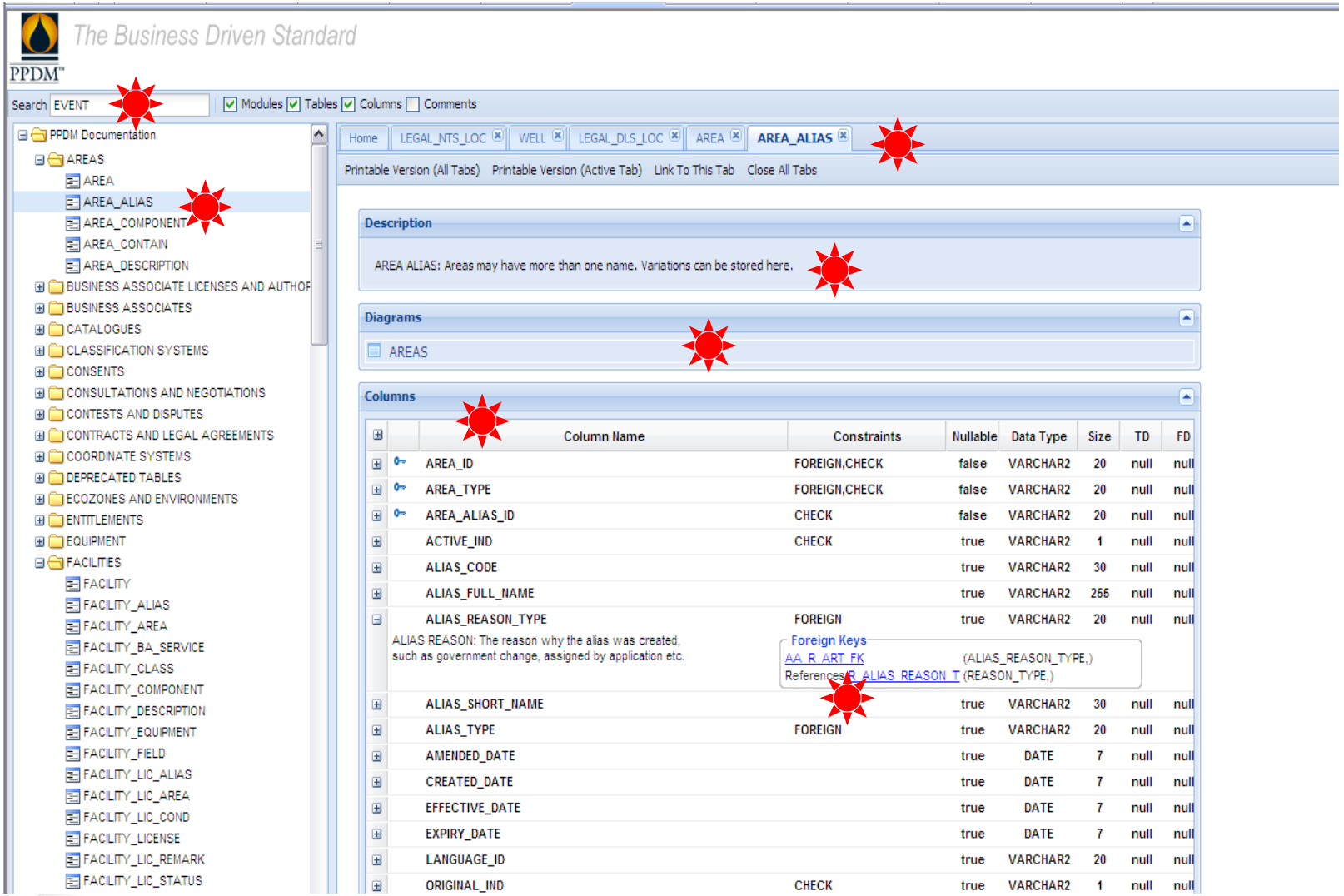
PPDM ON-LINE DOCUMENTATION



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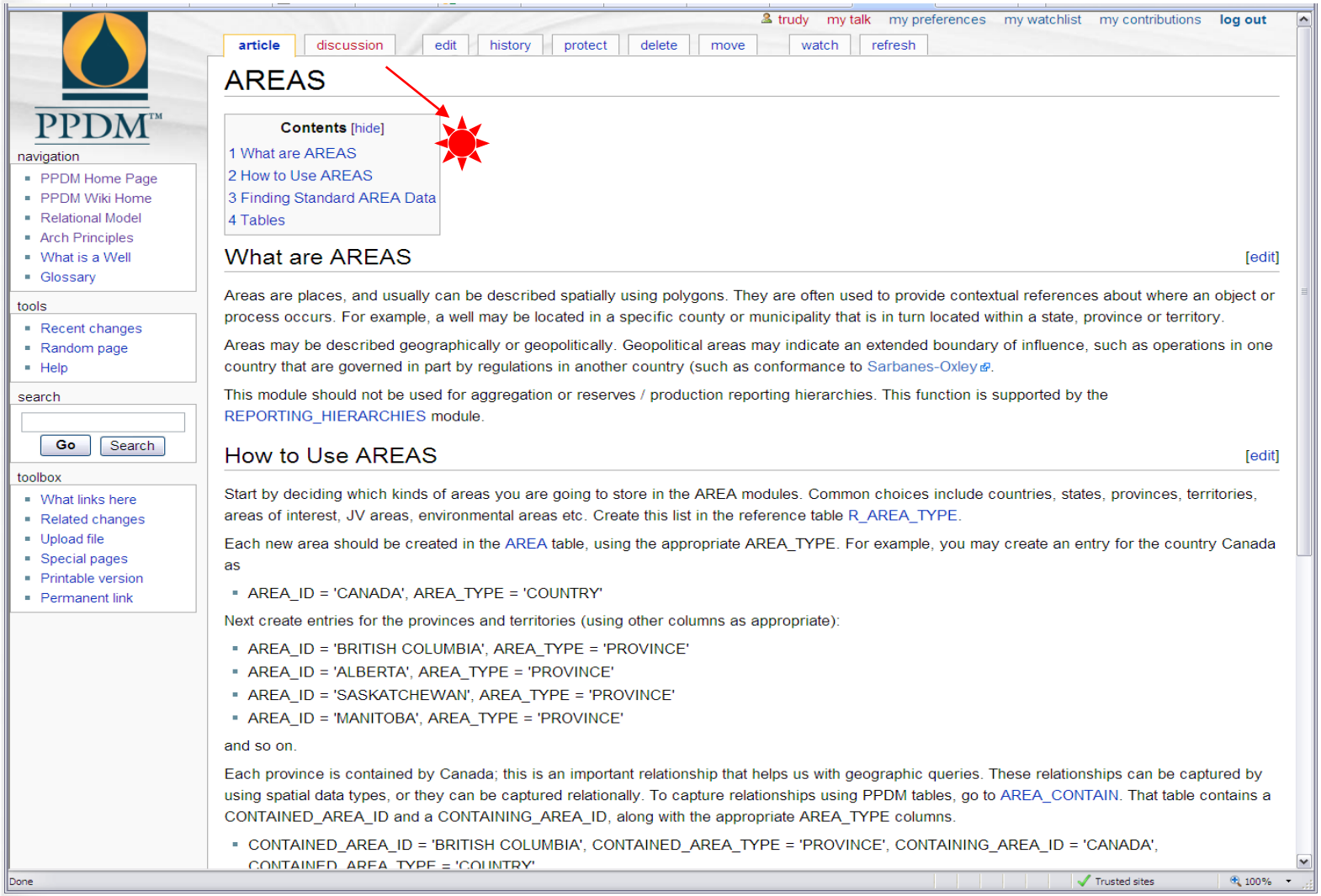
PPDM ON-LINE DOCUMENTATION (WIKI)



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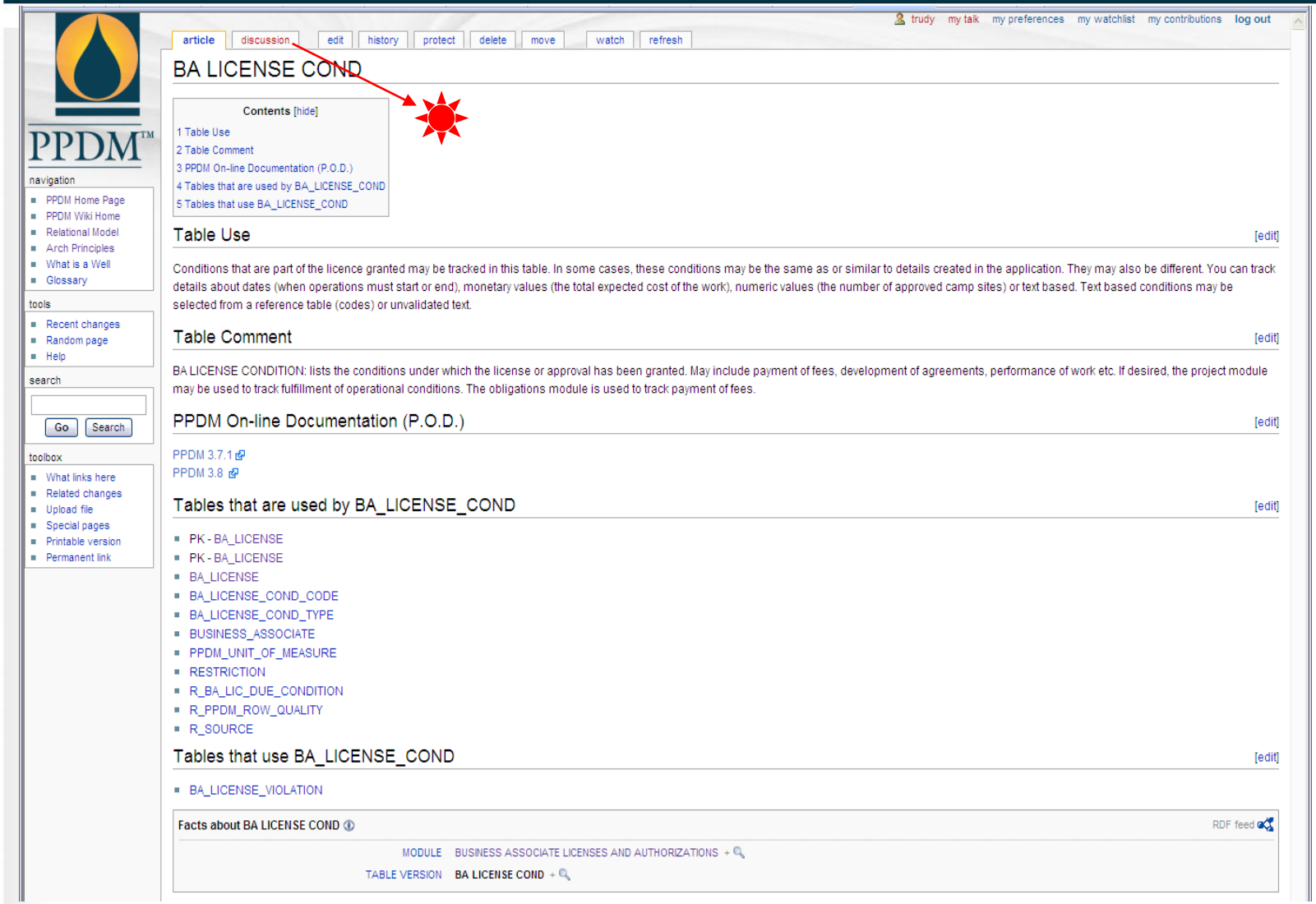
PPDM ON-LINE DOCUMENTATION (WIKI)



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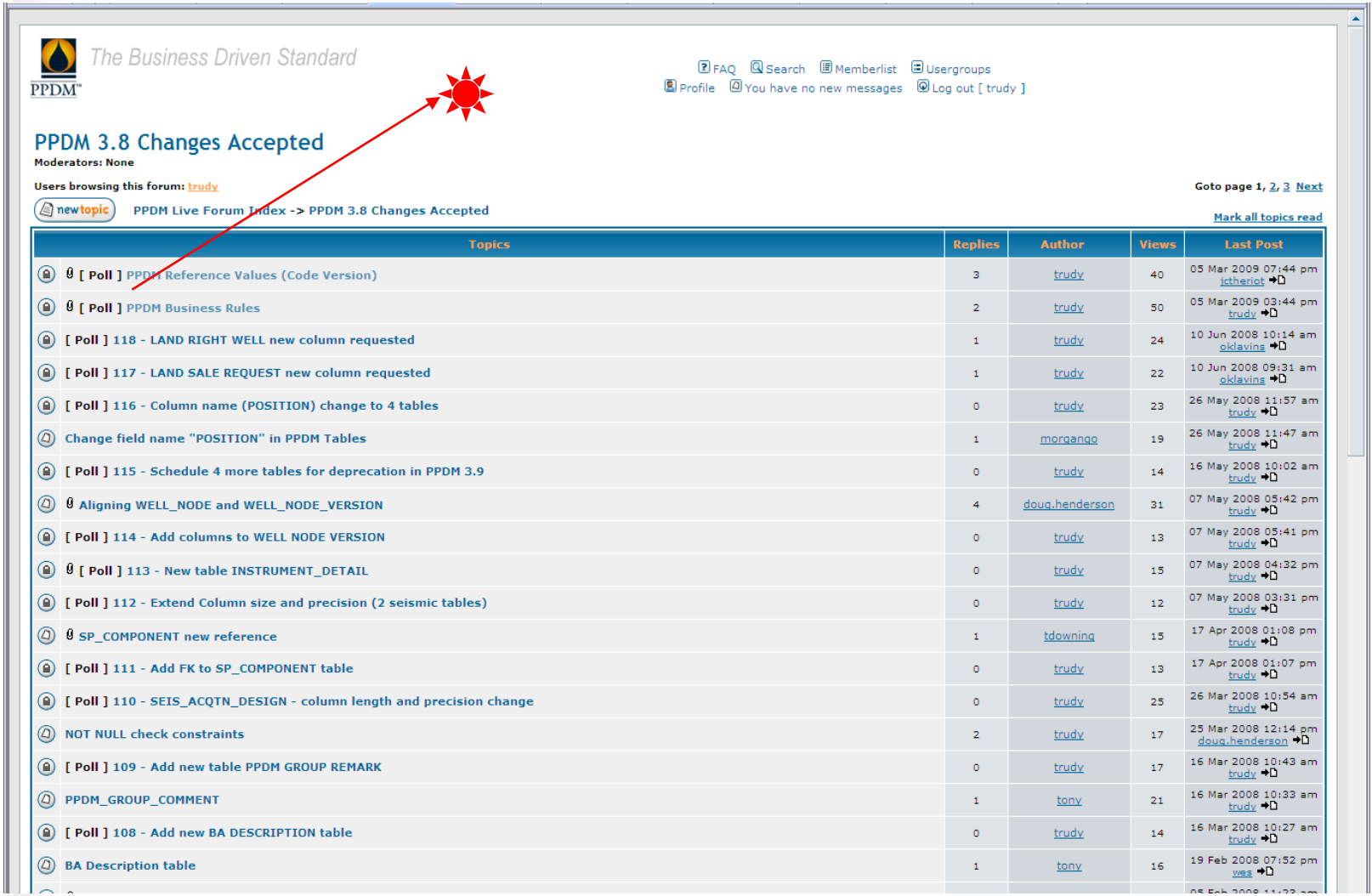
PPDM ON-LINE DOCUMENTATION (FORUMS)



The Business Driven Standard

FAQ Search Memberlist Usergroups
Profile You have no new messages Log out [trudy]

PPDM 3.8 Changes Accepted

Moderators: None

Users browsing this forum: trudy

Goto page 1, 2, 3 Next

newtopic PPDM Live Forum Index -> PPDM 3.8 Changes Accepted

Mark all topics read

Topics	Replies	Author	Views	Last Post
[Poll] PPDM Reference Values (Code Version)	3	trudy	40	05 Mar 2009 07:44 pm ictheriot
[Poll] PPDM Business Rules	2	trudy	50	05 Mar 2009 03:44 pm trudy
[Poll] 118 - LAND RIGHT WELL new column requested	1	trudy	24	10 Jun 2008 10:14 am oklavins
[Poll] 117 - LAND SALE REQUEST new column requested	1	trudy	22	10 Jun 2008 09:31 am oklavins
[Poll] 116 - Column name (POSITION) change to 4 tables	0	trudy	23	26 May 2008 11:57 am trudy
Change field name "POSITION" in PPDM Tables	1	morgango	19	26 May 2008 11:47 am trudy
[Poll] 115 - Schedule 4 more tables for deprecation in PPDM 3.9	0	trudy	14	16 May 2008 10:02 am trudy
Aligning WELL_NODE and WELL_NODE_VERSION	4	doug.henderson	31	07 May 2008 05:42 pm trudy
[Poll] 114 - Add columns to WELL NODE VERSION	0	trudy	13	07 May 2008 05:41 pm trudy
[Poll] 113 - New table INSTRUMENT_DETAIL	0	trudy	15	07 May 2008 04:32 pm trudy
[Poll] 112 - Extend Column size and precision (2 seismic tables)	0	trudy	12	07 May 2008 03:31 pm trudy
SP_COMPONENT new reference	1	tdowning	15	17 Apr 2008 01:08 pm trudy
[Poll] 111 - Add FK to SP_COMPONENT table	0	trudy	13	17 Apr 2008 01:07 pm trudy
[Poll] 110 - SEIS_ACQTN_DESIGN - column length and precision change	0	trudy	25	26 Mar 2008 10:54 am trudy
NOT NULL check constraints	2	trudy	17	25 Mar 2008 12:14 pm doug.henderson
[Poll] 109 - Add new table PPDM GROUP REMARK	0	trudy	17	16 Mar 2008 10:43 am trudy
PPDM_GROUP_COMMENT	1	tony	21	16 Mar 2008 10:33 am trudy
[Poll] 108 - Add new BA DESCRIPTION table	0	trudy	14	16 Mar 2008 10:27 am trudy
BA Description table	1	tony	16	19 Feb 2008 07:52 pm wes

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DATA DEFINITION LANGUAGE COMPONENTS

Mandatory Components

- Table and column definitions – file extension is .tab
- Constraints (primary, foreign, check) – file extension is .con
  - Note that in PPDM 3.7, the use of constraints to the R_PPDM_ROW_QUALITY reference table was not mandatory. This rule has been altered in PPDM 3.8, making the use of the foreign key mandatory.

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DATA DEFINITION LANGUAGE COMPONENTS

Optional Components

- Table comments – file extension is .tcm
- Column comments – file extension is .ccm
- Table synonyms – file extension is .syn
- UOM and OUOM constraints – file extension is .uom
  - Note that in PPDM 3.7, the use of constraints to the UNIT OF MEASURE support module was not mandatory. This rule has been carried forward
- GUID extensions – file extension is .guid
- Spatial extensions – created during implementation of the spatial enabling methods

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PPDM MODEL DESIGN OBJECTIVES

Main design focus is on business driven requirements

- How does the data represent the business?
  - Based on business requirements collected by workgroups
  - Not IT requirements!
- PPDM is not designed for a specific application

Key objectives

- Keep the model as easy to understand as possible
  - Some business knowledge is critical!
- Allow users to implement a subset of the data model
  - Control the spaghetti effect
- Allow users to manage data as the business requires through the life cycle (all the detail)
- Support a few important business variations (not everyone has the same business requirements)

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ARCHITECTURAL PRINCIPLES

1.1 Architectural Principles Overview
1.2 Architectural Principles Change Summary
1.3 Architectural Principles PPDM DDL Components
1.4 Architectural Principles Naming and Design Conventions
1.5 Architectural Principles Constraints in PPDM
1.6 Architectural Principles Design Issues
1.7 Architectural Principles Reference Tables
1.8 Architectural Principles Domains
1.9 Architectural Principles Units of Measure
1.10 Architectural Principles Coordinates
1.11 Architectural Principles Extensibility and Subsetting
1.12 Architectural Principles Meta Tables and Meta Data
1.13 Architectural Principles Discussion
1.14 Architectural Principles Target Deliverables
1.15 Additional Architectural Guidelines and Conventions

For full details, refer to the Architectural Principles document on the PPDM Web site – on the wiki

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Exercise

Create an International, Multi-disciplinary, Cross Functional, Multi-purpose Data Model

You have 2 years to do it

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Some Key Issues

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PRIMARY KEYS

Natural vs surrogate

Integer vs character

GUID vs random vs concatenated vs license plate…

Should they cascade or not?

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IMPLEMENT WIAW CONCEPTS

1. Avoid highly destructive changes

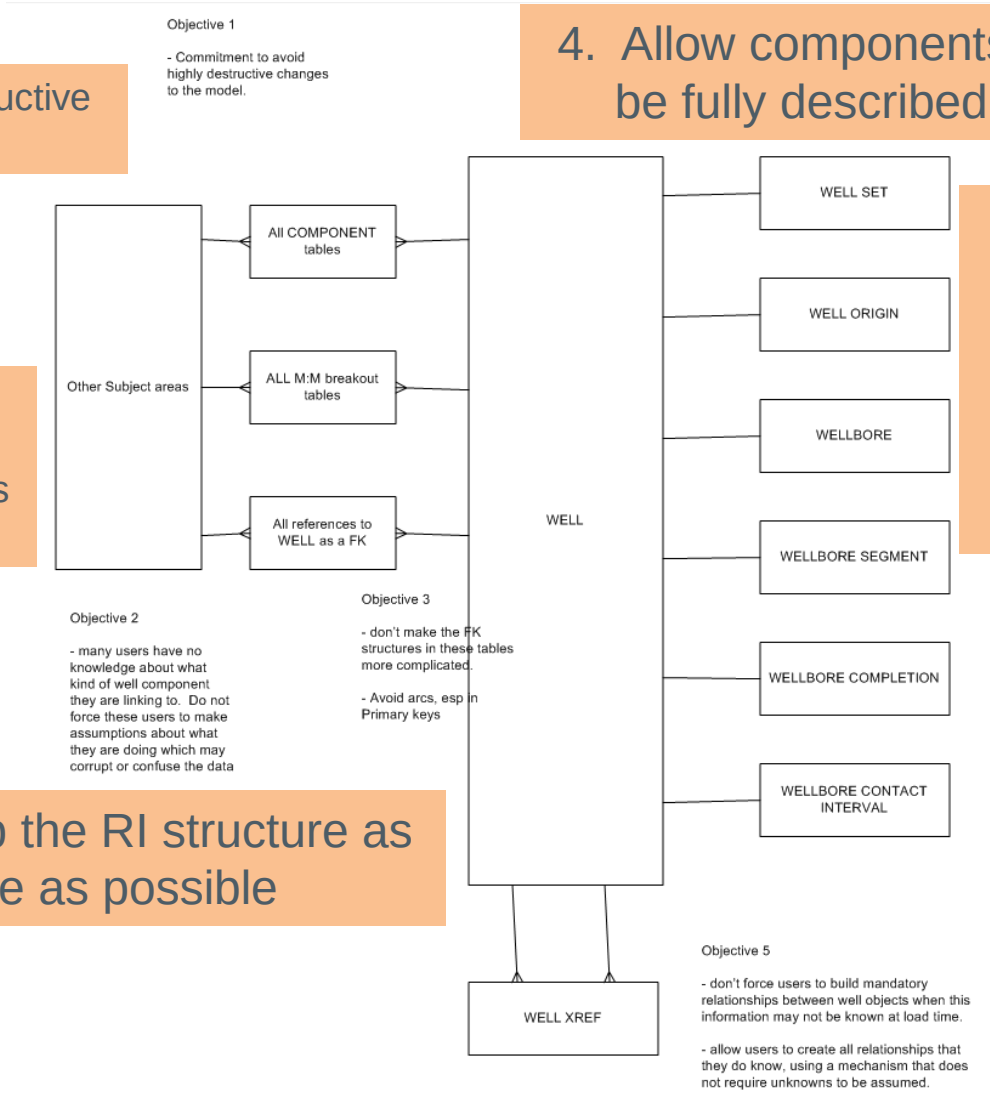
2. Don't assume the user knows which component type is created

3. Keep the RI structure as simple as possible

4. Allow components to be fully described

5. Distinguish between completions (n) and completions (v)

6. Don't require a mandatory hierarchy to be built. Create and relate only the components you know about for sure.



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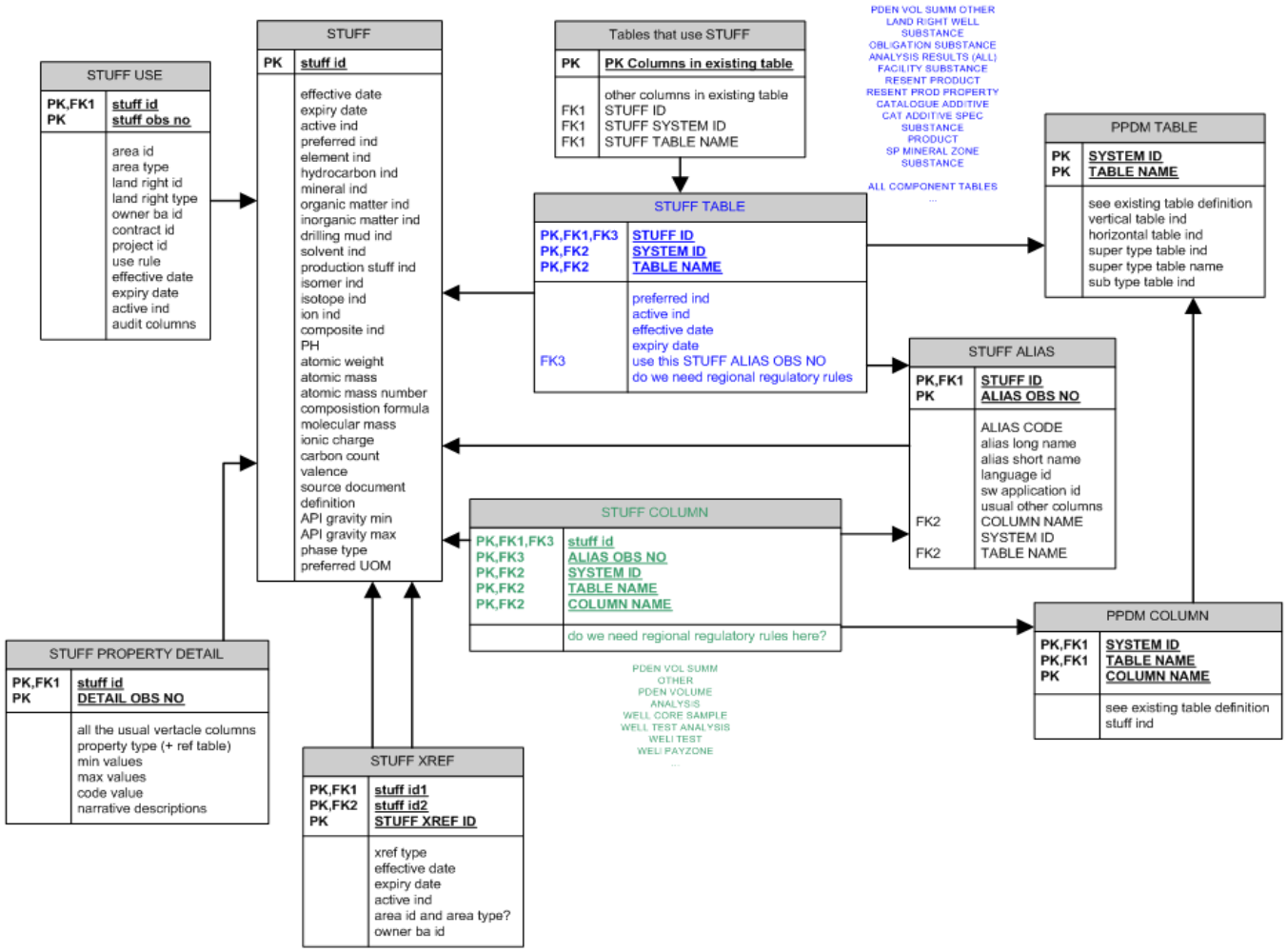
PRODUCTS AND SUBSTANCES



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DEVIATION FROM SQL*92 RI

- PPDM GUID has been very well accepted.
- Use of the PPDM Data Management module is very strong.
- Can we carry these concepts into some of the heavy RI / complicated tables, such as the COMPONENT tables?

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IMPLEMENTATION SUPPORT

Consistency

- Terminology
- Method of implementation
- Normalization vs denormalization

Implementation assists

- API?
- More documentation?
- More rigor in compliance?

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System / Data Mapping

Any system / data brought in should be documented in the Meta Model

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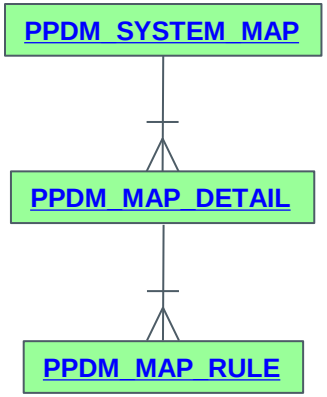
MAPPINGS AND MAPPING RULES

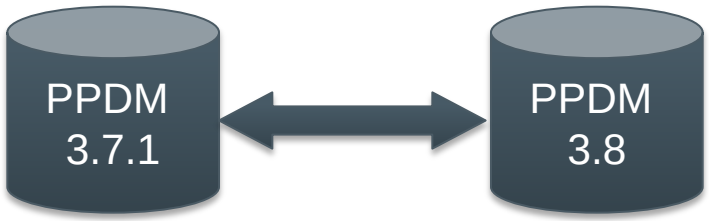
Persist mappings in PPDM

- Not in a spreadsheet

Mappings

- Database to database or schema
- Schema to database or schema
- Rule driven
- PPDM mappings will be released in the sample data





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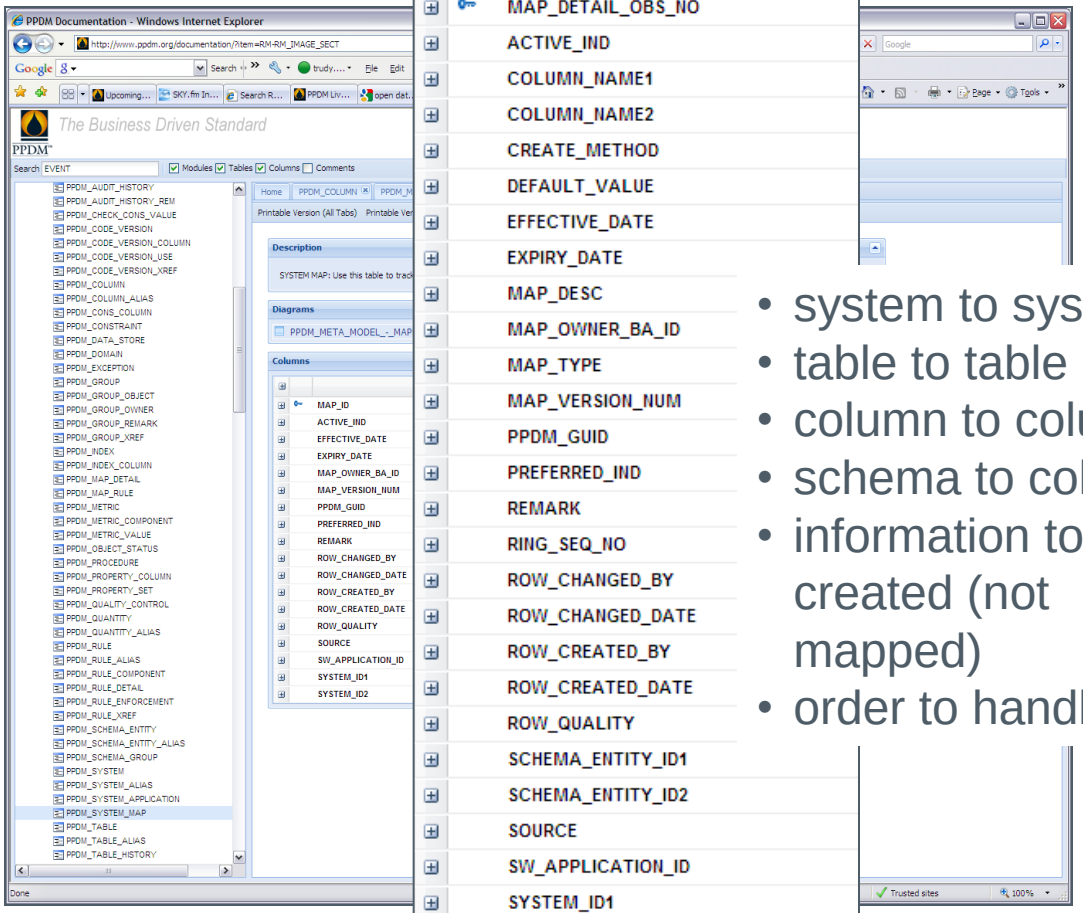
MAPPING LEVELS

PPDM_SYSTEM_MAP

PPDM_MAP_DETAIL



Which systems are you mapping?

- system to system
- table to table
- column to column
- schema to column
- information to be created (not mapped)
- order to handle

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MAPPING RULES

- How is this mapping connected with mappings to other columns?
- If a value is created, how is it created?
- What are the min and max values that are acceptable?
- If the condition is expressed procedurally, where is the code that validates?
- If the condition is dependent on the value of another column, which one.
- How are dates formatted?
- What order to I process the rules in?
- What version of the rule is this?
- Is this the preferred rule?
- What rule did I used last time I did a conversion?

PPDM_MAP_RULE

Column Name
MAP_ID
MAP_DETAIL_OBS_NO
RULE_SEQ_NO
ACTIVE_IND
CREATE_METHOD
DATE_FORMAT_DESC
DEP_COLUMN_NAME
DEP_SCHEMA_ENTITY_ID
DEP_SYSTEM_ID
DEP_TABLE_NAME
EFFECTIVE_DATE
EXPIRY_DATE
MAP_RULE_TYPE
MAX_VALUE
MAX_VALUE_OUOM
MAX_VALUE_UOM
MIN_VALUE
MIN_VALUE_OUOM
MIN_VALUE_UOM
PPDM_GUID
PREFERRED_IND
PROCEDURE_ID
PROCEDURE_SYSTEM_ID
REMARK
RING_SEQ_NO
ROW_CHANGED_BY
ROW_CHANGED_DATE
ROW_CREATED_BY
ROW_CREATED_DATE
ROW_QUALITY
RULE_DESC
RULE_OWNER_BA_ID
RULE_VERSION_NUM
SOURCE
SW_APPLICATION_ID

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USE MAPPING TO GENERATE CODE

Create temporary tables to mirror data sets to be loaded

Decide on “delete and insert” or “update”

Create sample statements.

Use code and the mapping tables to generate the actual code.

Test and refine the code.

Now if a format changes then just update the mapping and rerun.

May require a couple of sets of code due to issues.

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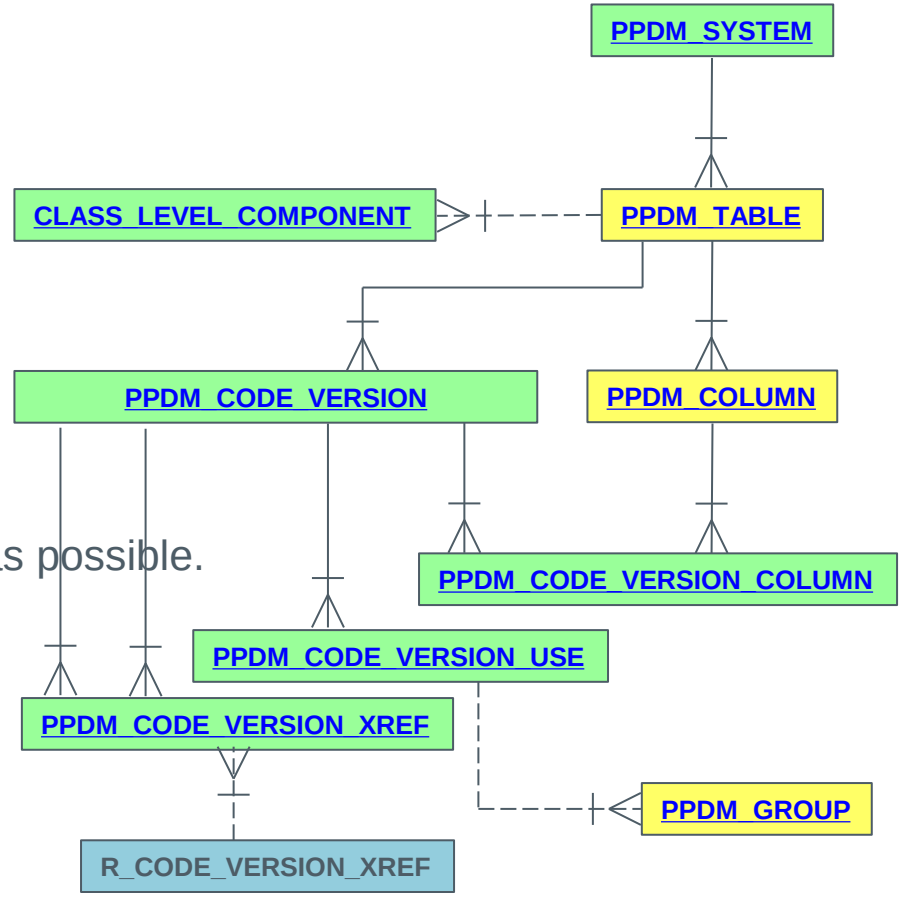
REFERENCE VALUES PPDM_CODE_VERSION

Support for sophisticated reference behaviour

- Multiple sources
- Hierarchy and granularity
- Equivalences
- Cross Referencing

Sandbox to prepare reference values for use – PPDM Code Version

- Use reference tables as much as possible.
- To find reference table use the PPDM_CONSTRAINT tables



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HORIZONTAL AND VERTICAL TABLES

Horizontal Table

UWI	KB Elev	Rig Release …
UWI1	100	01/10/87
UWI2	99	09/08/67
UWI3	102	02/04/92
UWI4	87	11/23/87
UWI5	136	09/09/67

Vertical Table

UWI	Value Type	Value
UWI1	KB Elev	100
UWI1	Rig Release	01/10/87
UWI1	Name …	ABC
UWI2	KB Elev	87
UWI2	Rig Release	09/08/67

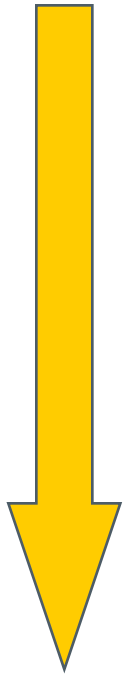

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TABLE DESIGN - HORIZONTAL

Behavior pre-designed for all values in the database by modelers

- Units of measure
- Data type
- Precision
- Reference validation

Benefits

- Higher consistency
- More interoperability

Costs

- Harder to program
- Longer learning curve
- May need extensions

Column Name	Constraints *(Referenced Table)*	Nullable	Datatype	Size	TD	FD
#BUSINESS_ASSOCIATE	FOREIGN *(BA_CONTACT_INFO)* FOREIGN *(BA_CONTACT_INFO)* FOREIGN *(BA_CONTACT_INFO)* FOREIGN *(BA_CONTACT_INFO)*	N	VARCHAR2	20		
ACTIVE_IND	CHECK	Y	VARCHAR2	1		
BA_ABBREVIATION		Y	VARCHAR2	12		
BA_CATEGORY	FOREIGN *(R_BA_CATEGORY)*	Y	VARCHAR2	20		
BA_CODE		Y	VARCHAR2	20		
BA_NAME		Y	VARCHAR2	240		
BA_SHORT_NAME		Y	VARCHAR2	30		
BA_TYPE	FOREIGN *(R_BA_TYPE)*	Y	VARCHAR2	20		
CREDIT_CHECK_DATE		Y	DATE	7		
CREDIT_CHECK_IND	CHECK	Y	VARCHAR2	1		
CREDIT_CHECK_SOURCE	FOREIGN *(R_SOURCE)*	Y	VARCHAR2	20		
CREDIT_RATING		Y	VARCHAR2	20		
CREDIT_RATING_SOURCE		Y	VARCHAR2	20		
CURRENT_STATUS	FOREIGN *(R_BA_STATUS)*	Y	VARCHAR2	20		
EFFECTIVE_DATE		Y	DATE	7		
EXPIRY_DATE		Y	DATE	7		
FIRST_NAME		Y	VARCHAR2	30		
LAST_NAME		Y	VARCHAR2	40		
MAIN_EMAIL_ADDRESS	FOREIGN *(BA_CONTACT_INFO)*	Y	VARCHAR2	20		

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TABLE DESIGN - VERTICAL

Behavior must be decided for every kind of value possible, usually by users.

-Units of measure

-Data type

-Precision

-Reference validation

Benefits

-Works when value types are unknown

-Easier to code

Costs

-Less Interoperable

-Lower data quality

Column Name	Constraints *(Referenced Table)*	Nullable	Datatype	Size	TD	FD
#FACILITY_ID	FOREIGN *(FACILITY_LICENSE)*	N	VARCHAR2	20		
#FACILITY_TYPE	FOREIGN *(FACILITY_LICENSE)*	N	VARCHAR2	20		
#LICENSE_ID	FOREIGN *(FACILITY_LICENSE)*	N	VARCHAR2	20		
#CONDITION_ID		N	VARCHAR2	20		
ACTIVE_IND		Y	VARCHAR2	1		
CONDITION_CODE	*(R_FAC_LIC_COND_CODE)*	Y	VARCHAR2	20		
CONDITION_TYPE	FOREIGN *(R_FAC_LIC_COND)* FOREIGN *(R_FAC_LIC_COND_CODE)*	Y	VARCHAR2	20		
CONDITION_VALUE		Y	NUMBER	22	12	2
CONDITION_VALUE_UOM	FOREIGN *(PPDM_UNIT_OF_MEASURE)*	Y	VARCHAR2	20		
CONTACT_BA_ID	FOREIGN *(BUSINESS_ASSOCIATE)*	Y	VARCHAR2	20		
DESCRIPTION		Y	VARCHAR2	240		
DUE_DATE		Y	DATE	7		
DUE_FREQUENCY		Y	VARCHAR2	20		
DUE_TERM		Y	NUMBER	22	3	0
DUE_TERM_UOM	FOREIGN *(PPDM_UNIT_OF_MEASURE)*	Y	VARCHAR2	20		
EFFECTIVE_DATE		Y	DATE	7		
EXEMPT_IND	CHECK	Y	VARCHAR2	1		
EXPIRY_DATE		Y	DATE	7		
FULFILLED_BY_BA_ID	FOREIGN *(BUSINESS_ASSOCIATE)*	Y	VARCHAR2	20		
FULFILLED_DATE		Y	DATE	7		

Controlling Column

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THE COST OF (VERTICAL) ABSTRACTION

Much more difficult to standardize

- Content becomes much more variable

Semantics become a problem

- What happens when our definitions don't agree?

Reference tables drive model design

- Reference tables usually highest time and cost for model population projects

You can't avoid the work of modeling completely

- Abstraction drives final modeling down to implementation and users
- PPDM 3.8 adds functionality that can help, but it must be supported with code
  - SQL constraints don't support these tools
  - See the PPDM Vertical table control

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HORIZONTAL – VERTICAL PAIR

Horizontal Volumes

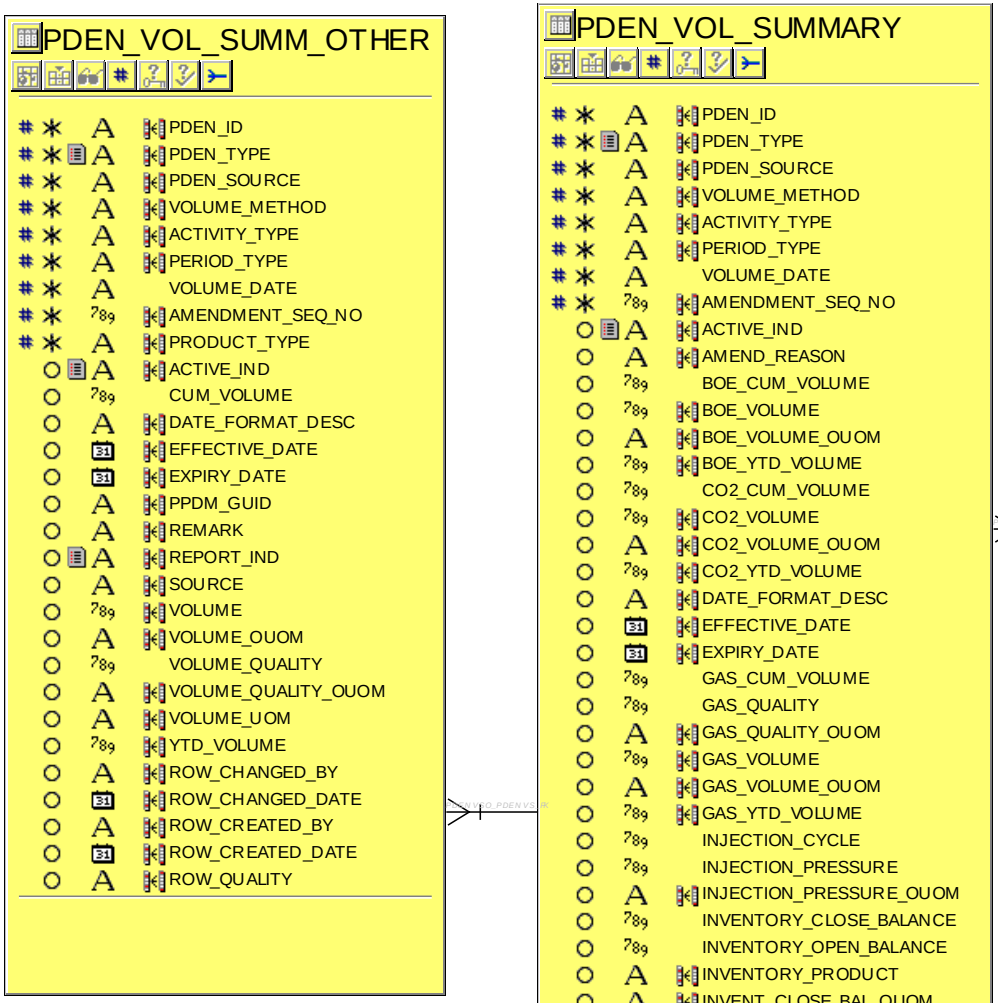
- BOE
- CO2
- Gas
- NGL
- Nitrogen
- Oil
- Sulphur
- Water

Vertical Volumes

- By-products
- Specific hydrocarbons

Why?

- Units of measure standardization down a column



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MODEL DESIGN OUTCOMES

Things that add value

- The model is well positioned to support expansion
  - Start with a small part, and grow as you need to
- Business users can understand the model (with help)
  - It's their data; they should understand it!
- The model is very flexible and powerful
  - $100 M of Business input!

There are some legacy inconsistencies, often to support regional variations, but sometimes to support commonly agreed performance issues (denormalizations).

- Members are committed to working through these over time

Things that may be challenges for implementation

- More horizontal tables, fewer vertical tables
- More tables are needed to store information than in most historical systems
  - This is a consequence of business modeling
- Queries can be complicated
  - Community sharing
- It can be difficult to figure out where information should be stored
  - Use the forums and the wiki

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Tips and Hints

Use vertical tables with care. The flexibility of the structure can also create problems with data quality and consistency, data retrieval and performance.

- ✓ *The TYPE controlling columns govern the behavior of vertical tables in PPDM 3.8*
- ✓ *Populate the TYPE column with great care - this is the key for success*
- ✓ *Use the Vertical support tables in PPDM to help manage the contents*
- ✓ *Add views based on TYPE*

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Tables and Columns

Naming conventions

Class words

Domains

Column Types

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NAMING CONVENTIONS 1

Name Length and Characters

- Tables 30 characters
- Columns 30 characters
- The total row length may not exceed 8060 bytes (SQL Server)
- UPPER_CASE, numbers and '_' only
- Separate components with "_"

Synonyms

- Each table assigned a SYNONYM
- Used to name constraints
  - (i.e. SYNONYM_PK)
- Intended to reduce query collisions

WELL_PRESSURE_AOF

#UWI
#SOURCE
#PRESSURE_OBS_NO
#AOF_OBS_NO
...
RESERVOIR_PRESSURE
RESERVOIR_PRESSURE_OUOM

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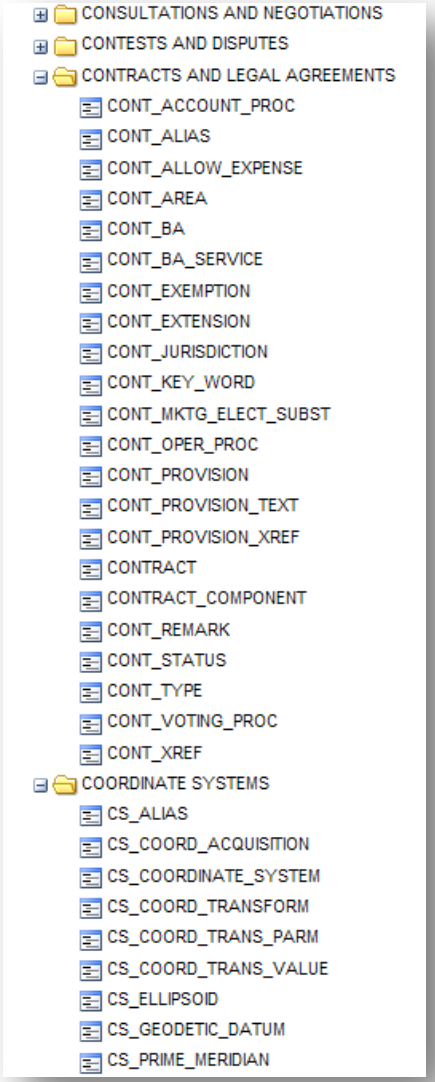
NAMING CONVENTIONS 2

Components

- Subject area context
- General to specific
- Intuitive
- Single parent cross reference
  - %_XREF
  - Multiple relationships between subjects

Usage consistency

- Domains
- Class words



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NAMING CONVENTIONS 3

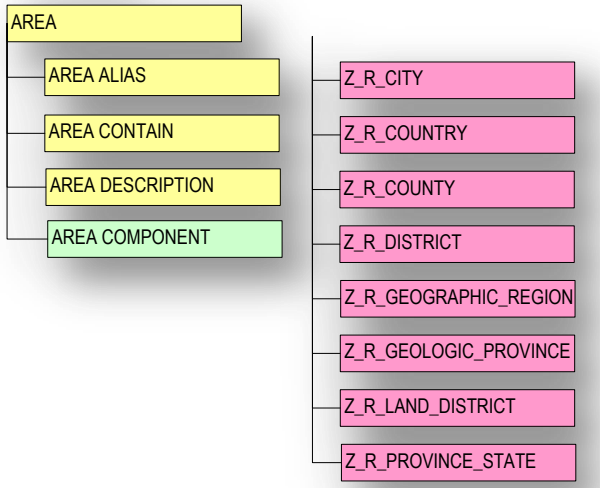
Spelling

- Singular
- Present tense
- Consistent abbreviations and terms
- Unambiguous
  - COMP, REC
  - Multiple uses of a FK column (such as business Associate)
- Avoid connectors 'A', 'AN', 'AND', 'OF', 'OR', 'THE'
- Avoid using terms in reserved words lists (use multi component terms)
- Do not take vowels out of names in order to abbreviate
  - This is a new rule; some older tables violate it

Deprecation

- Tables to be deprecated are prefixed with Z_ for one release
- Do not use these tables for new implementations
- Convert old applications (have about 2 years notice)

Areas



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COLUMN TYPES

Simple content

- Each column contains one type of information
- Information is not usually concatenated

Identifiers

- Could be implemented as natural or surrogate
- Cost / benefit of both approaches

Column data types

- Char (Oracle = varchar2)
- Number (includes precision)
- Numeric (no precision)
- Date
- Blob (used twice only)

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STANDARD PPDM COLUMNS

ACTIVE IND

EFFECTIVE DATE

EXPIRY DATE

PPDM GUID

SOURCE

REMARK

ROW QUALITY

ROW CREATED BY

ROW CREATED DATE

ROW CHANGED BY

ROW CHANGED DATE

Use of a trigger to populate?

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SAMPLE TRIGGERS

```
CREATE or REPLACE TRIGGER
      INS_AREA
BEFORE INSERT ON AREA
for each row

BEGIN
  if (:new.ppdm_guid is null) then
    :new.ppdm_guid := sys_guid();
  end if;

  :new.row_created_date := sysdate;

  if (:new.row_created_by is null) then
    :new.row_created_by := user;
  end if;
END;
/
```

```
CREATE or REPLACE TRIGGER
      UPD_AREA
BEFORE UPDATE ON AREA
for each row

BEGIN
  if (:new.ppdm_guid is null) then
    :new.ppdm_guid := sys_guid();
  end if;

  :new.row_changed_date := sysdate;
  :new.row_changed_by := user;
END;
/
```


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PPDM DOMAIN CONSISTENCY

Manage consistency for common kinds of information across model

There are many

Depth	number	10,5
Identifier	varchar2	20
Type	varchar2	20
Short name	varchar2	30
Indicator (Y or N)	varchar2	1
Seq_no	number	8
Obs_no	number	8
Latitude / Longitude	number	14,9
Remark	varchar2	2000

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CLASS WORD CONSISTENCY

Used to classify the type of information

Usually the last component of the name

ALIAS	Alternate name
DATE	Date
TEMP	Temperature
IND	Y / N flag
LAT	Latitude
LONG	Longitude
LONG_NAME	Long names
NUM	Character string
NO	Number

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Constraints

Primary Keys

Foreign Keys

Check Constraints

Arcs

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CONSTRAINT GUIDELINES

Platform independent solutions

- SQL 92 entry level

Enforceable using native DDL only

Limit need for triggers

Facilitate good data management

Facilitate query / retrieval

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PRIMARY KEY

An ordered group of columns in a table which defines uniqueness for every new row of data in the table

- May consist of one or more columns
- All values must be known at insert time

Every table in PPDM has a primary key

- Primary Key for *WELL* is *UWI*.
- Columns in the PK are mandatory
- Columns from Parent PK cascade down

Use natural keys unless

- No natural identifier exists
- Concatenated key is unwieldy

Use surrogate components when necessary

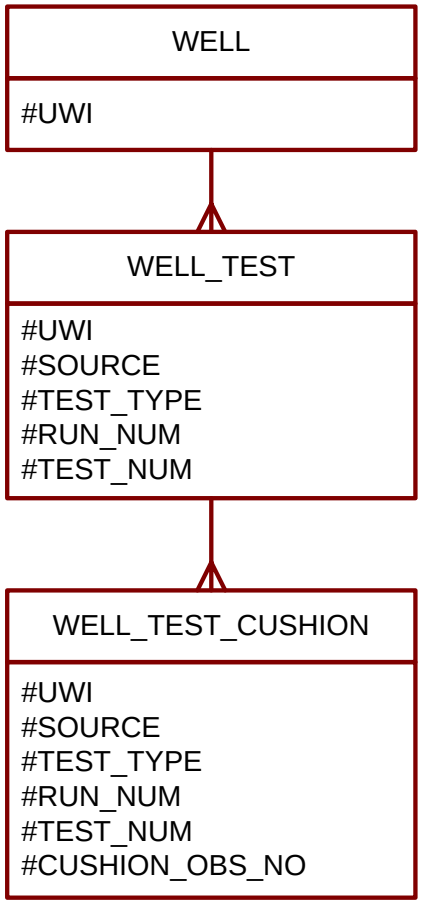
- In addition to natural key components

PK may not include

- Dates
- Measured Values

Primary key name

- SYNONYM_PK



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FOREIGN KEY

Foreign keys create relationships between tables

- value in child table must be matched to the parent table before new data may be inserted or updated

Columns

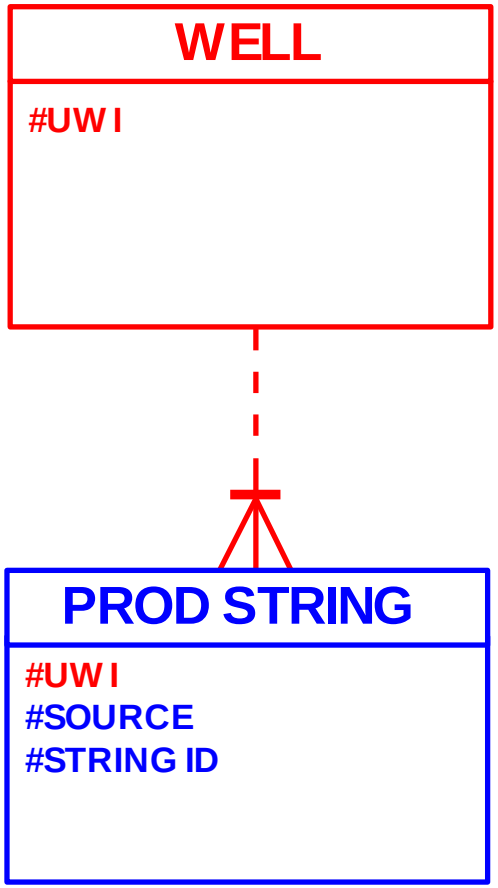
- one or more
- mandatory or optional

Examples

- subject hierarchy
- reference tables (R_%)

Foreign key name

- SYN(CHILD)_SYN(PARENT)_FK
- If more than 1 FK exists
  - SYN(CHILD)_SYN(PARENT)_FK1
  - SYN(CHILD)_SYN(PARENT)_FK2 etc



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SPECIAL FOREIGN KEYS

PPDM 3.2

Recursive

- A table contains a reference to itself
- Create problems for the “load of the rings”
- Query with “connect by” procedure
- Many have been eliminated from PPDM 3.8

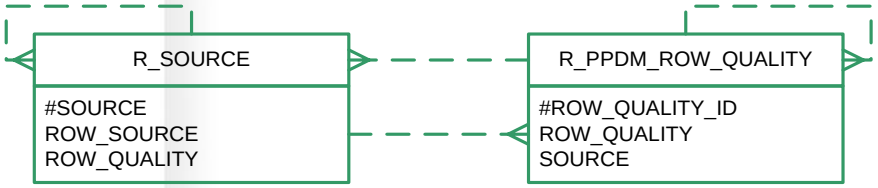
Reciprocating

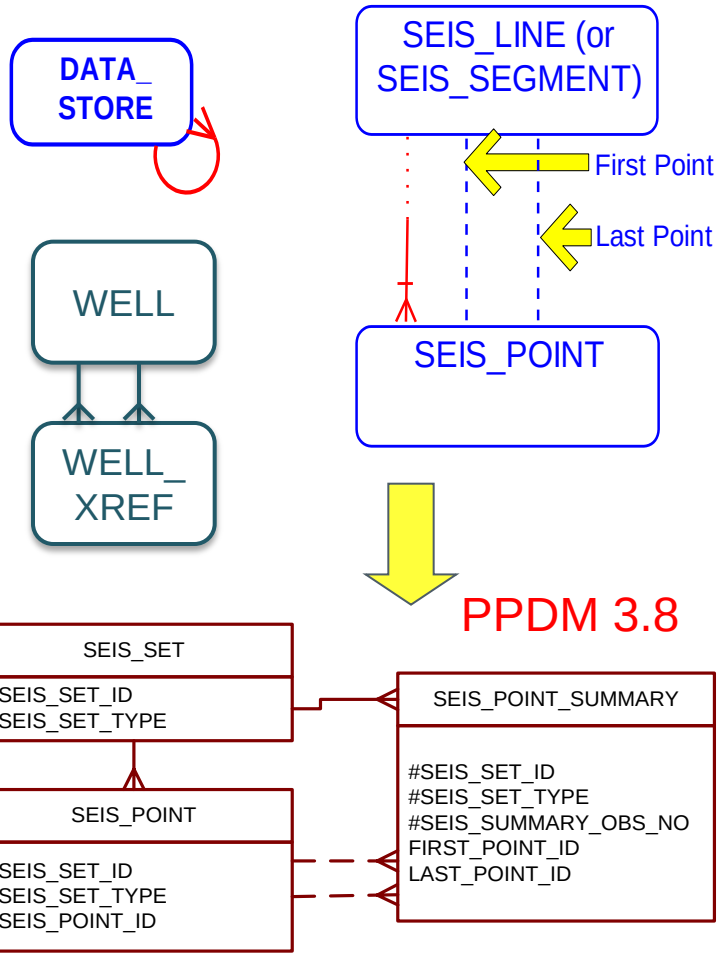
- Denormalized constraints
- Removing these as supported by members

SOURCE and ROW QUALITY

- Require special load handling
- Insert followed by update

Many created for performance





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COMPLEX FOREIGN KEYS

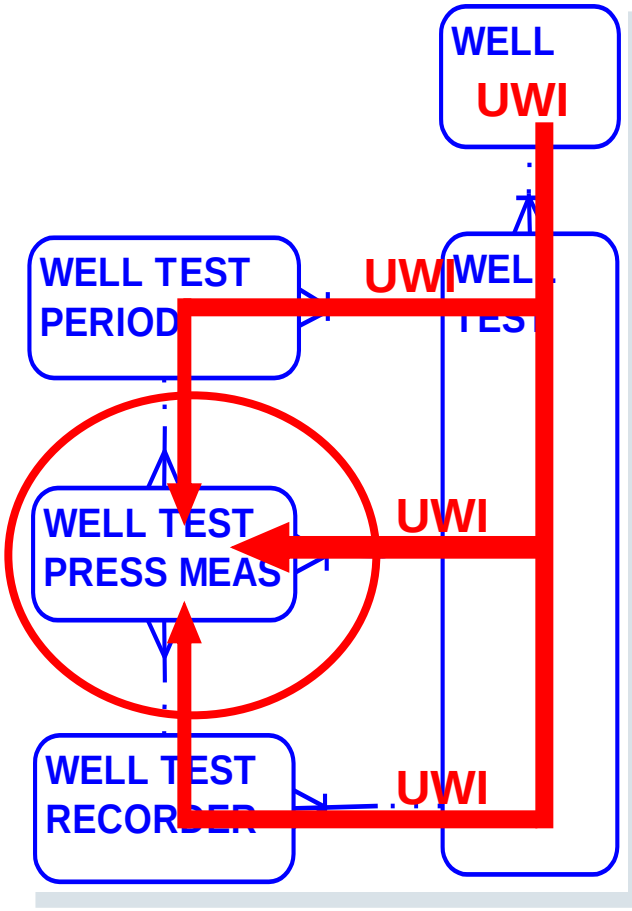
Rules that define how data is handled by a database or application

Defined by work groups

- in the BRD
- some can be enforced by the database
- others require intervention

Group discussion

- How many UWI Columns should exist in WELL_TEST_PRESS_MEAS?
- Data Rule: Each well test pressure measurement is created during a test on a well, and the recorder must be installed on the same well, during the same test and in the same recording period.



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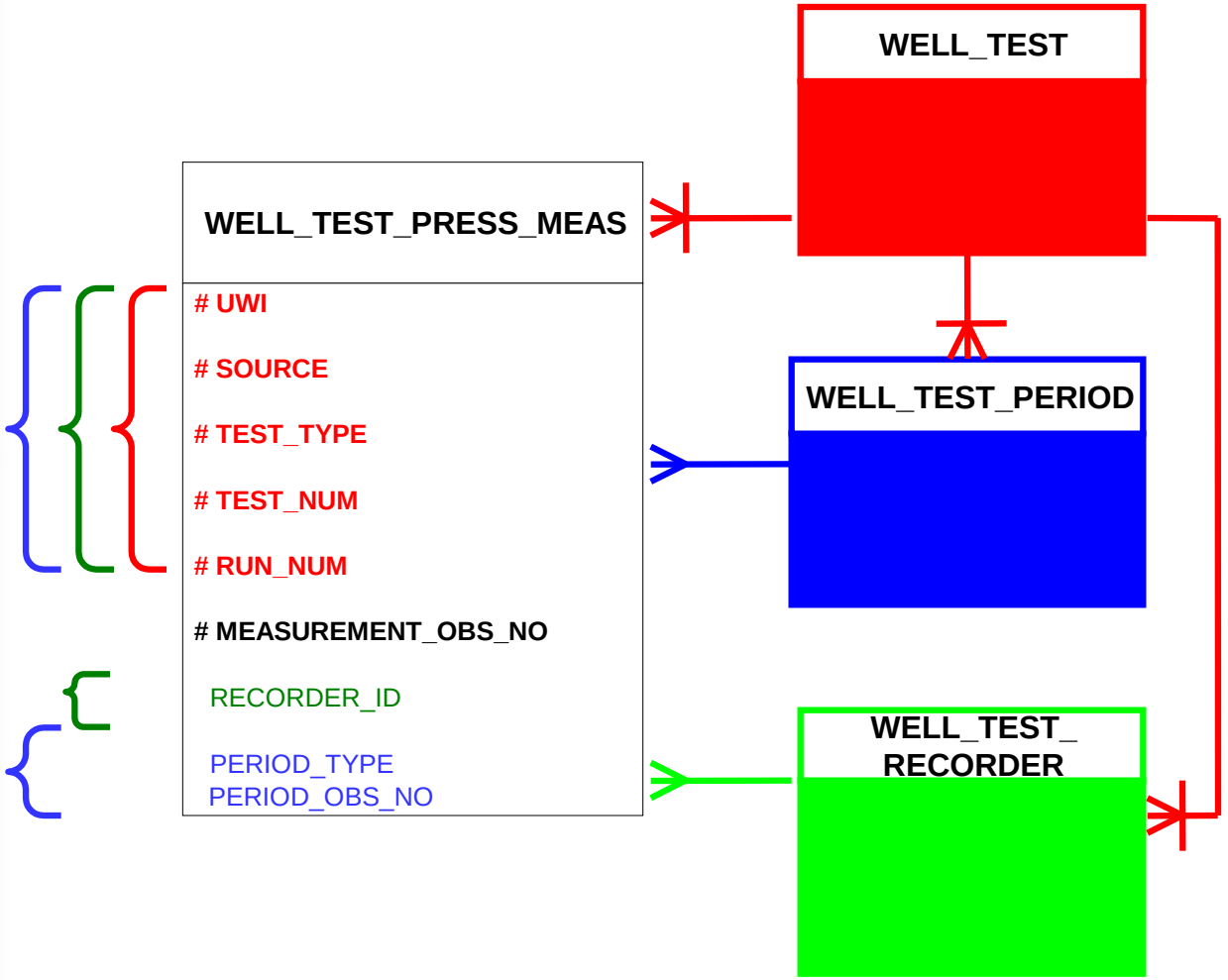
EXAMPLE - *WELL_TEST_PRESS_MEAS*



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MULTIPLE CONSTRAINTS / COLUMN

Columns are referenced in more than one constraint

- Unusual from pure data modeling aspect
- Compliant with Architectural Principles
- Protect the user from data corruption by preventing more than one UWI from being referenced

```
UWI   NOT NULL   WELL_TEST_PERIOD
                 WELL_TEST_RECORDER
                 WELL_TEST
```


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MULTIPLE COLUMNS / CONSTRAINT

Components NULL, NOT NULL

- Part of the constraint is included in the Primary Key, therefore mandatory
- The rest of the constraint reflects the optionality of the relationship

UWI	**NOT NULL**	**WELL_TEST_PERIOD**
SOURCE	**NOT NULL**	**WELL_TEST_PERIOD**
TEST_TYPE	**NOT NULL**	**WELL_TEST_PERIOD**
TEST_NUM	**NOT NULL**	**WELL_TEST_PERIOD**
RUN_NUM	**NOT NULL**	**WELL_TEST_PERIOD**
PERIOD_TYPE		WELL_TEST_PERIOD
PERIOD_OBS_NO		WELL_TEST_PERIOD

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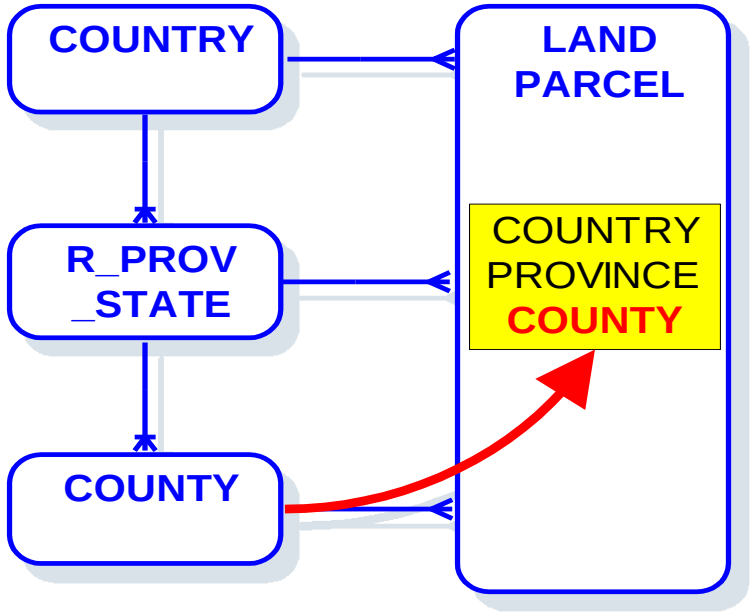
MULTIPLE COLUMNS / CONSTRAINT - 2

User input (using PPDM 3.7)

- ü COUNTRY
- ü COUNTY
- û PROVINCE

- COUNTY_FK

  does not fire



Corrupted data can enter the database

- for an optional multi-column constraint
- be careful how you present this to the users!

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COMPONENT TABLES

Handle multiple FK relationships with a business object

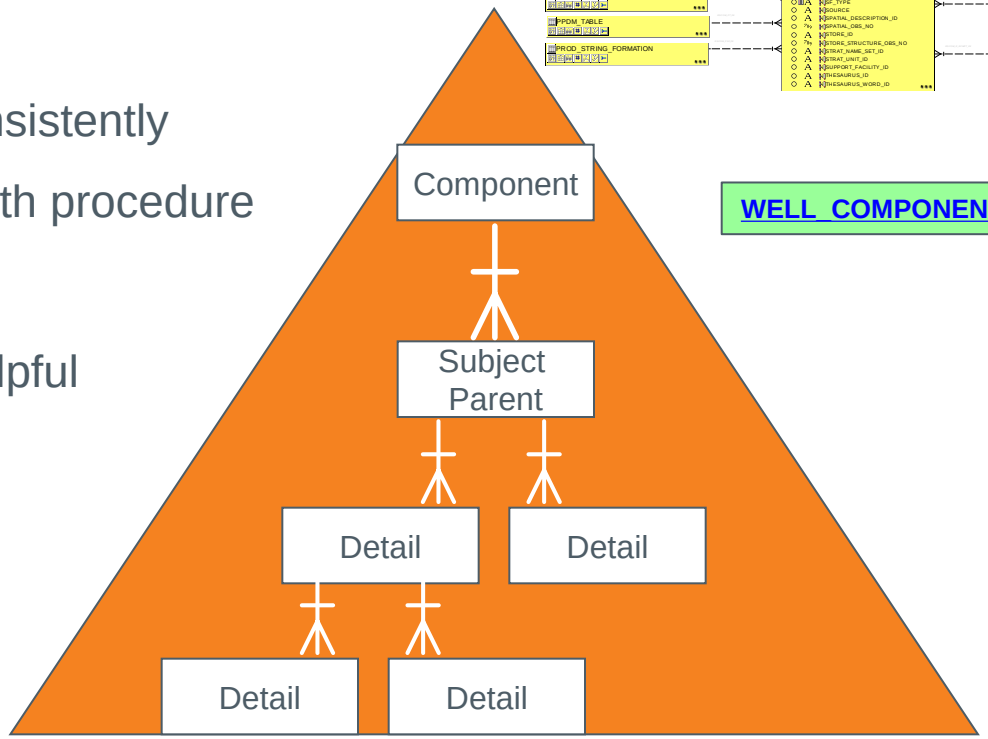
Easier to query than many separate tables

Component tables exist in both directions

- Populate one consistently
- Load the other with procedure

Index with care!

- Views may be helpful



WELL_COMPONENT

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CHECK CONSTRAINTS

Similar function to reference tables

- more restrictive
- control the allowed values

Static values that are known at design time

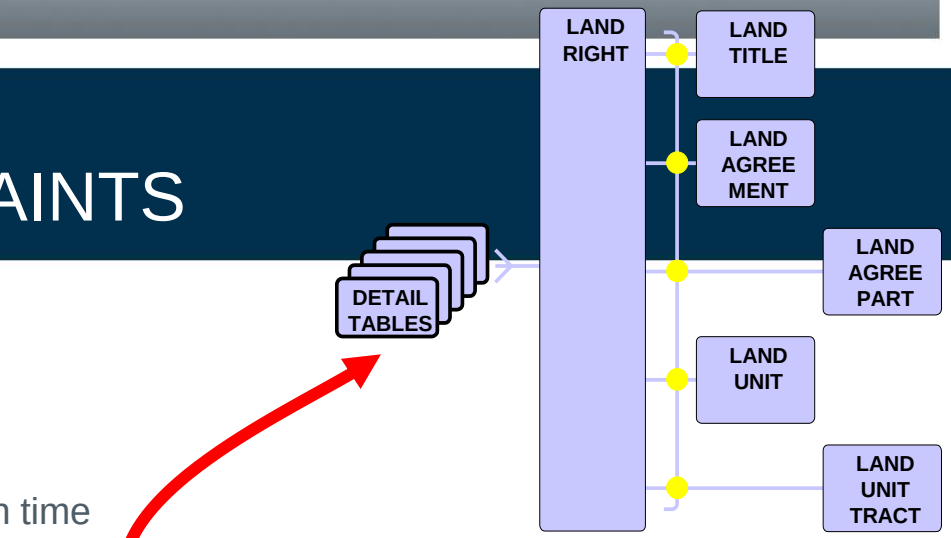
- limited use in PPDM

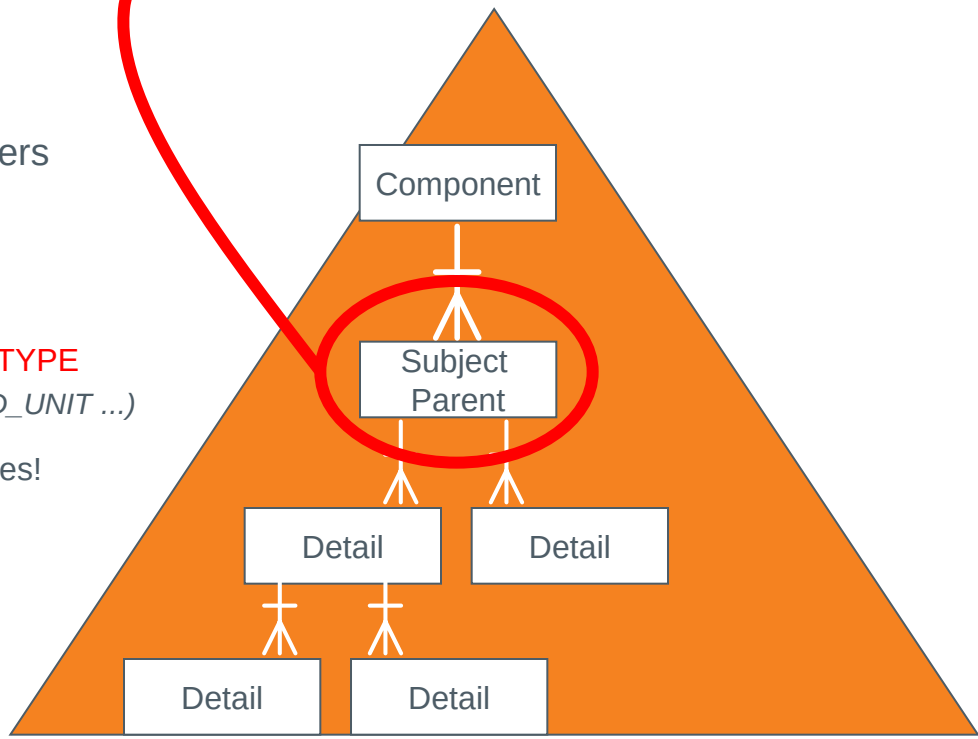
Embedded in the Oracle DDL

Managed by table owner - not end users

Validate input data

- yes / no flags - %_IND *(Y, N, NULL)*
- refer to a PPDM table – LAND_RIGHT_TYPE *(LAND_TITLE, LAND_AGREEMENT, LAND_UNIT ...)*
- Do not change the check constraint values!





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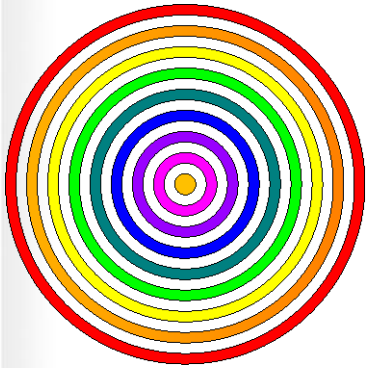
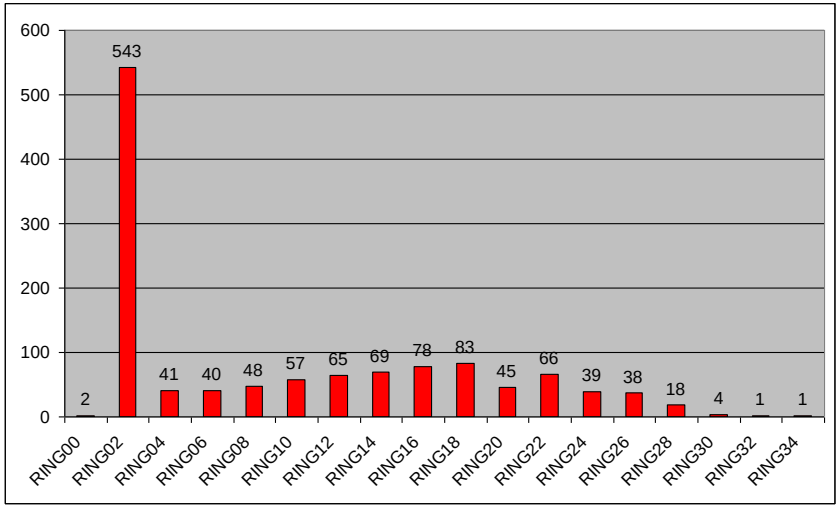
PPDM LOAD OF THE RINGS

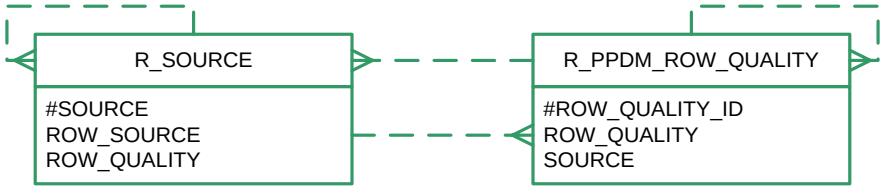
Maintain Data Integrity

- Objective: Load data into PPDM with all foreign and not null constraints enabled
- Benefit: Improved data validation and verification

LOAD OF THE RINGS







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FROM THE LOTR SPREADSHEET

TABLE_NAME	TABLE_RING_LEVEL
APPLICATION	RING18
APPLICATION_COMPONENT	RING24
APPLIC_ALIAS	RING20
APPLIC_AREA	RING20
APPLIC_ATTACH	RING20
APPLIC_BA	RING20
APPLIC_DESC	RING20
APPLIC_REMARK	RING20
AREA	RING06
AREA_ALIAS	RING10
AREA_COMPONENT	RING24
AREA_CONTAIN	RING08
AREA_DESCRIPTION	RING18
BA_ADDRESS	RING08
BA_ALIAS	RING10
BA_AUTHORITY	RING10
BA_AUTHORITY_COMP	RING24
BA_COMPONENT	RING24
BA_CONSORTIUM_SERVICE	RING16
BA_CONTACT_INFO	RING12
BA_CREW	RING10
BA_CREW_MEMBER	RING12
BA_DESCRIPTION	RING18
BA_EMPLOYEE	RING06

TABLE_NAME	COLUMN_NAME	RING_LEVEL	GROUP
APPLICATION	ACTIVE_IND	RING00	INSERT
APPLICATION	APPLICATION_ID	RING00	INSERT
APPLICATION	APPLICATION_TYPE	RING04	INSERT
APPLICATION	CONTRACT_ID	RING18	INSERT
APPLICATION	CURRENT_STATUS	RING04	INSERT
APPLICATION	DECISION	RING04	INSERT
APPLICATION	DECISION_DATE	RING00	INSERT
APPLICATION	EFFECTIVE_DATE	RING00	INSERT
APPLICATION	EXPIRY_DATE	RING00	INSERT
APPLICATION	EXTENSION_ID	RING18	INSERT
APPLICATION	FEES_DESC	RING00	INSERT
APPLICATION	FEES_PAID_IND	RING00	INSERT
APPLICATION	PPDM_GUID	RING00	INSERT
APPLICATION	PREVIOUS_APPLICATION_ID	RING19	UPDATE
APPLICATION	RATE_SCHEDULE_ID	RING16	INSERT
APPLICATION	RECEIVED_DATE	RING00	INSERT
APPLICATION	REFERENCE_NUM	RING00	INSERT

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Tips and Hints

Best practice is to NEVER disable constraints. Loading data with constraints enabled can be tricky. Use the Load of the Rings to load data.

Don't alter check constraints.

Use reciprocating values and denormalized columns ONLY if you need to improve performance! Populate them by procedure from their "home" location.

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Indexes

Deliverables

Guidelines

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INDEX DELIVERABLES

PPDM provides a starter set of indexes

- Primary Keys
- Foreign Keys

Many indexes for some tables

- Some are redundant at high levels

PPDM does not provide:

- Tuning indexes
- Indexes on non-Foreign Key columns

Performance and implementation workgroup might change that!

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INDEX RECOMMENDATIONS

Understand the business needs:

- Typical queries
- Concurrent online updates
- Nightly batch updates

Add tuning indexes

- To non-FK columns
- Use bit map indexes for reference tables or small tables

Don’t index everything!

Reference tables benefit from use of Bitmap indexes (save space, faster)

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Multiple Occurrences

Version Control

Sequence Control

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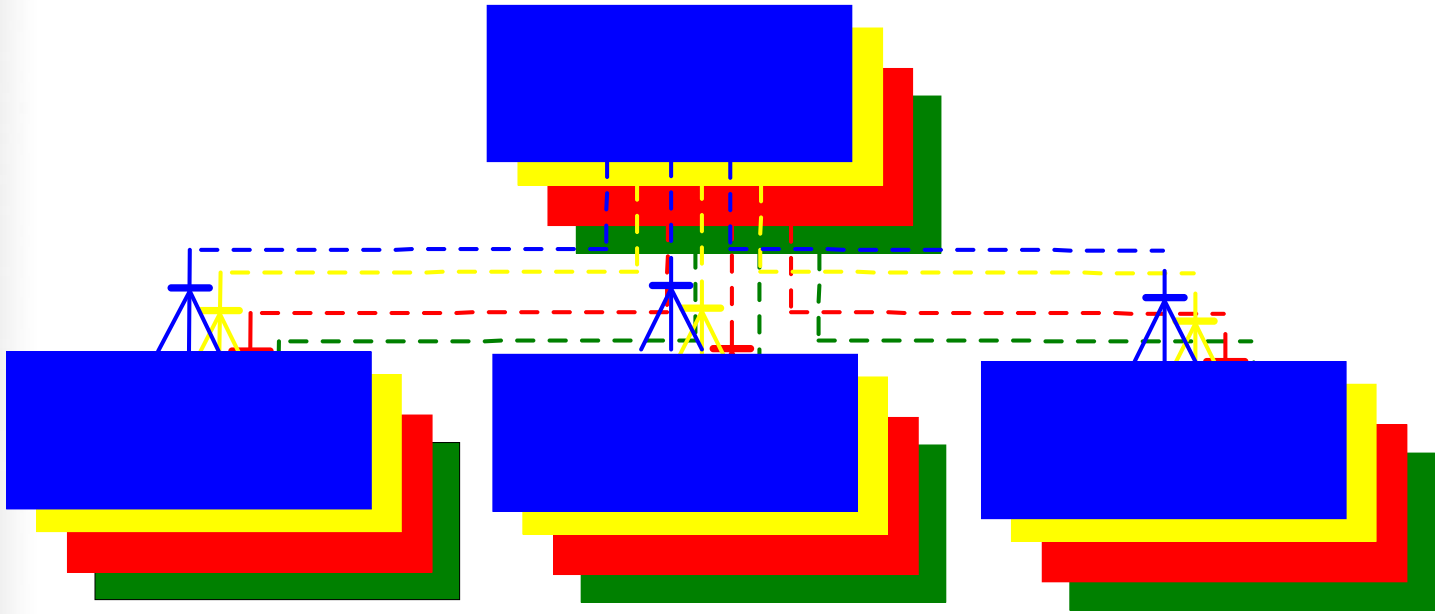
VERSION CONTROL

Source version

Inherited version

Alias version



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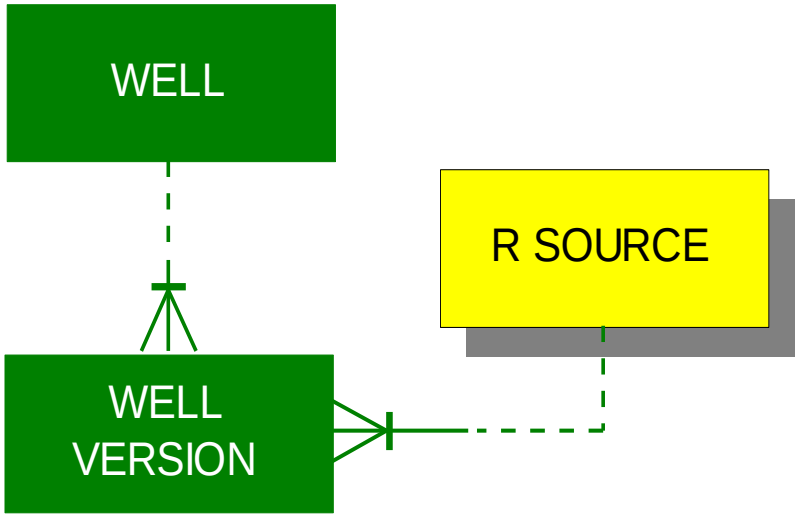
SOURCE VERSION

Different versions of data may be received from different vendors

- Preferred data kept in main business table
- Vendor specific data kept in VERSION table

Source part of the primary key



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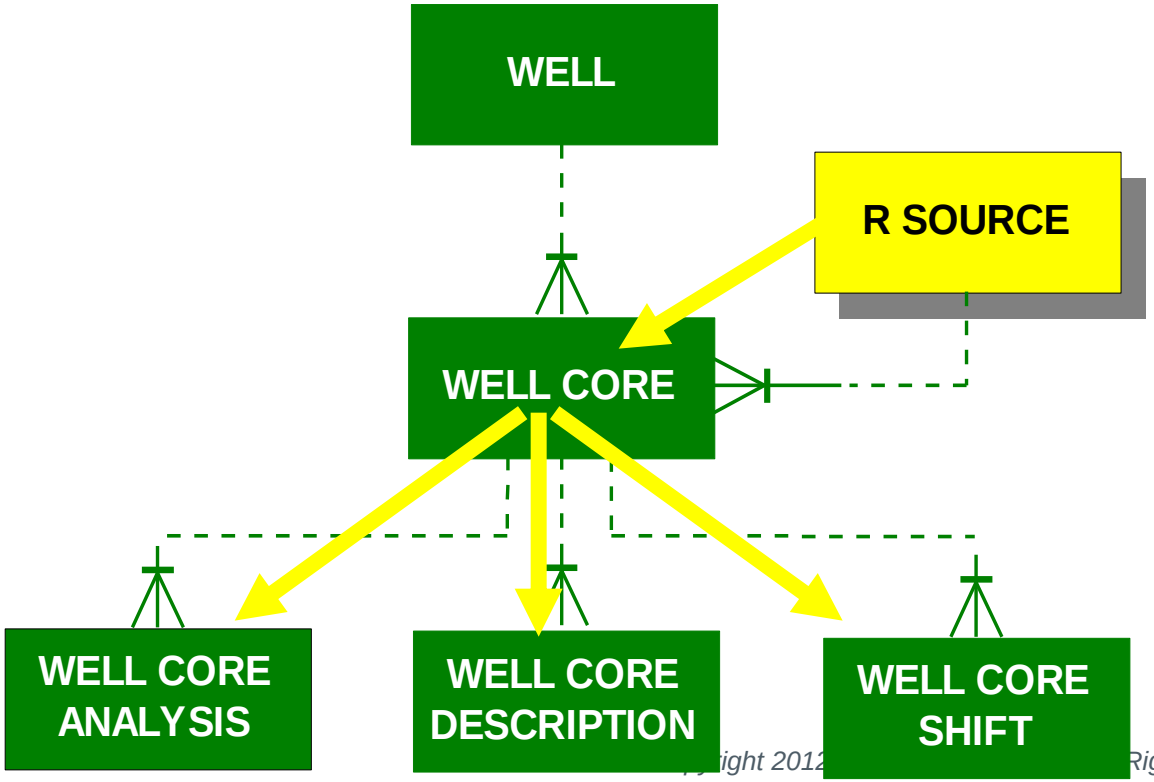
INHERITED VERSION

Source of parent is inherited by the children

- All of the technical data for a core or log MUST come from the SAME source.

Widely used in the well model



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ALIAS VERSION

A business entity may be known by many names, codes or identifiers

- *AREA_ALIAS*
- *SEIS_ALIAS*
- *BA_ALIAS*
- *WELL_ALIAS*
- *LAND_ALIAS*

Names may change over time

Different applications may use different identifiers

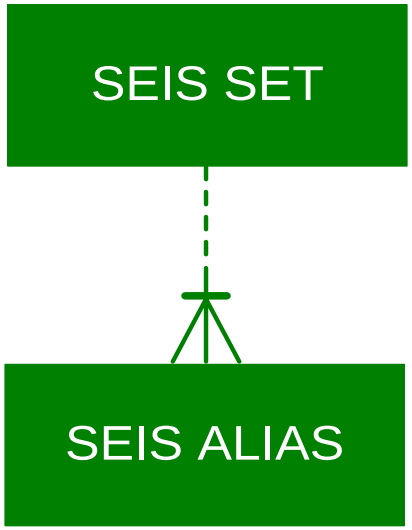
- SAP
- Openworks, Geoframe …

Different BA's may use different identifiers

Alias tables have been harmonized for PPDM 3.8

Can indicate the owner (BA) or application that uses an alias.

Very useful for integrating many applications with PPDM



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SEQUENCE CONTROL

- Chronological sequences
- Ordered sequences
- Observation sequences

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CHRONOLOGICAL EVENT SEQUENCES

Need to track both current and history

The version of the data is based on date

- Data Circulation
- Status

Surrogate PK component

Date attribute

- optional
- not part of PK
- date, date/time

Physical Item	Circ ID	Date	Who
ABC	1	94-03-08	J Doe
ABC	2	94-06-29	B Lind
ABC	3	95-04-19	J Clarke
BCD	1	94-03-13	J Doe
CDE	1	94-03-29	J Doe

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ORDERED SEQUENCES

Defines an ordered sequence of events, things or processes:

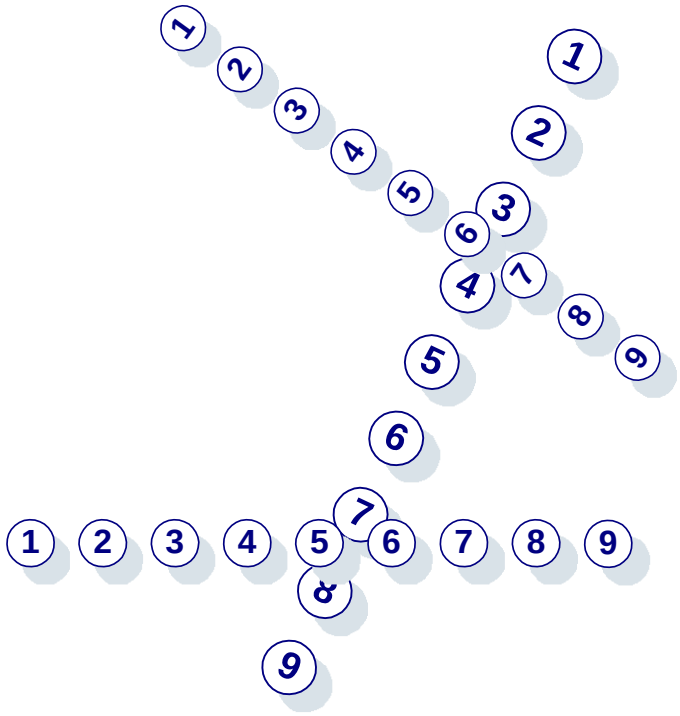
- Shot point acquisition (tape recorded order)
- shot point spatial sequence

Format

- number 8

Class Word

- xxx_seq_no



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OBSERVATION SEQUENCE

Each instance of the data is determined through a separate observation

- Well Core Analysis

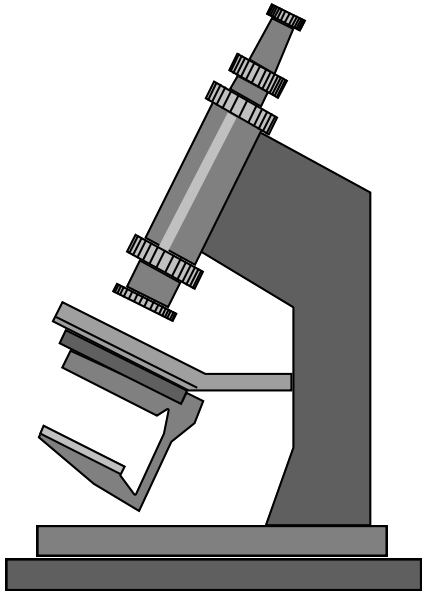
Order is not significant, or can be calculated

Format

- Number 8

Class Word

- xxx_obs_no



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Tips and Hints

Columns named %_SEQ_NO imply that data order is important.

- *Re-start numbering at 1 for every new parent*
- *Sort the data into the correct order before loading*

Columns named %_OBS_NO are simply surrogate identifiers.

- *Re-start numbering at 1 for every new parent*
- *Use a trigger or procedure to increment the OBS_NO for every new row*

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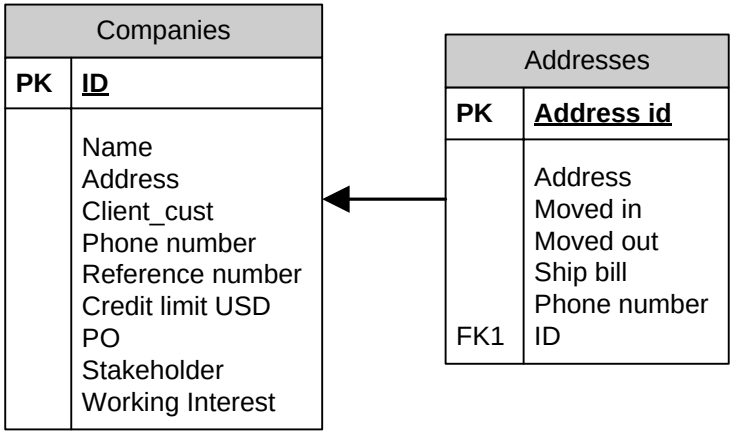
EXERCISE

A sample set of tables has been provided.

Use the PPDM Architectural Principles

- Rename the tables and columns.
- If you need to create a new table or relationship, do so

What problems might you find when these tables are integrated with other systems?



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PPDM
Vertical Tables

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VERTICAL TABLES FUNCTIONS

Vertical tables store information in the form **Property Type + Property Value.**

Vertical tables are useful when

- A complete list of data attributes needed cannot be determined at design time
- The list of data attributes may change often, and rapid change response is needed

A vertical table must allow a wide variety of descriptive information (property values) to be stored.

- Dates
- Currencies
- Measured values (with units of measure)
- Values selected from code lists
- Open text
- Value ranges (min and max)
- Combinations of values (a value and a narrative statement)

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VERTICAL TABLES IN PPDM 3.8

In each vertical table

- number values are stored in columns with NUMBER format
- date values are stored in columns with DATE format
- text values are stored in columns with VARCHAR(2) format.

Each vertical table is controlled by a reference table (property type table).

The property type table can be used to define rules about how each property type should behave

- If the value to be entered is a date, which column should I use?
- How much precision for these measures?
- What unit of measure should a measured value be stored in?
- What reference table should be used to validate a reference code?

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INTRODUCTION TO VERTICAL TABLES

EQUIPMENT_SPEC

EQUIPMENT_ID	VARCHAR2	20	
SPEC_ID	VARCHAR2	20	
SPEC_TYPE	VARCHAR2	20	
ACTIVE_IND	VARCHAR2	1	
AVERAGE_VALUE	NUMBER		
AVERAGE_VALUE_OUOM	VARCHAR2	20	
AVERAGE_VALUE_UOM	VARCHAR2	20	
COST	NUMBER	12	2
CURRE_CONVERSION	NUMBER	10	5
CUR_Y_OUOM	VARCHAR2	20	
C_CY_UOM	VARCHAR2	20	
_TIVE_DATE	DATE		
_TE	DATE		
	DATE		
	NUMBER		
_OUOM	VARCHAR2	20	
_UOM	VARCHAR2	20	
MIN_DATE	DATE		
MIN_VALUE	NUMBER		
MIN_VALUE_OUOM	VARCHAR2	20	
MIN_VALUE_UOM	VARCHAR2	20	
PPDM_GUID	VARCHAR2	38	
REFERENCE_VALUE	NUMBER		
REFERENCE_VALUE_OUOM	VARCHAR2	20	
REFERENCE_VALUE_TYPE	VARCHAR2	20	
REFERENCE_VALUE_UOM	VARCHAR2	20	
REMARK	VARCHAR2	2000	
SOURCE	VARCHAR2	20	
SPEC_CODE	VARCHAR2	20	
SPEC_DESC	VARCHAR2	1024	
ROW_CHANGED_BY	VARCHAR2	30	
ROW_CHANGED_DATE	DATE		
ROW_CREATED_BY	VARCHAR2	30	
ROW_CREATED_DATE	DATE		
ROW_QUALITY	VARCHAR2	20	

R_EQUIP_SPEC

SPEC_TYPE
ABBREVIATION
ACTIVE_IND
EFFECTIVE_DATE
EXPIRY_DATE
LONG_NAME
PPDM_GUID
PROPERTY_SET_ID
REMARK
SHORT_NAME
SOURCE
ROW_CHANGED_BY
ROW_CHANGED_DATE
ROW_CREATED_BY
ROW_CREATED_DATE
ROW_QUALITY

- This is a **vertical table**.

This table contains valid property types. It controls the behavior in the vertical table.

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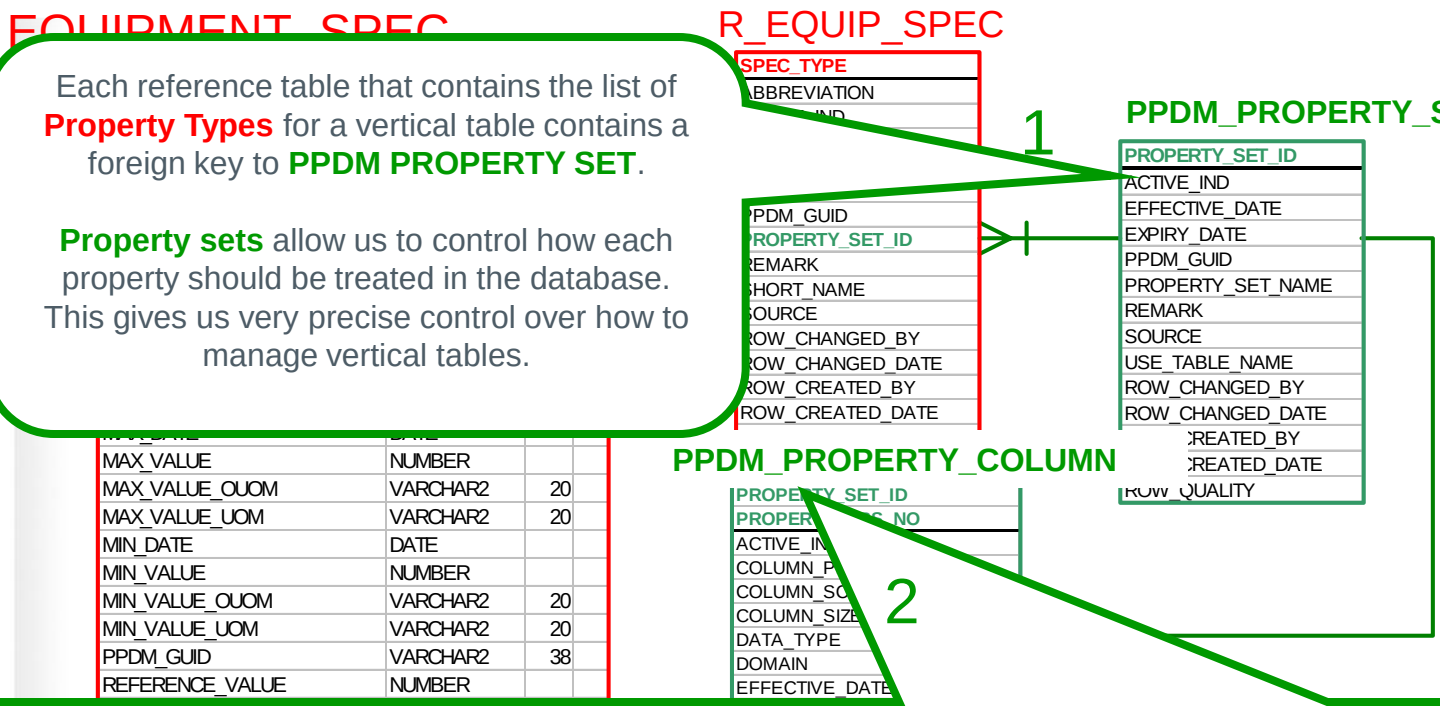
INTRODUCTION TO VERTICAL TABLE CONTROL

Each reference table that contains the list of **Property Types** for a vertical table contains a foreign key to **PPDM PROPERTY SET**.

Property sets allow us to control how each property should be treated in the database. This gives us very precise control over how to manage vertical tables.



This table allows us to control exactly how the vertical table will behave for every column that is used when a particular **Property Type** is used.

Some properties are described with NUMBERIC values – use this table to list which columns in the vertical table should be used, what precision you want to use (how many decimal places), what units of measure to use and so on.

For code values that are derived from a reference table, you can say which reference table to validate the entered value against.

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PPDM PROPERTY COLUMN

USE COLUMN NAME and **USE TABLE NAME** identify the name of the vertical table and the column of the vertical table that should be used to store the value for a property.

For some kinds of property types, more than one column may be needed to describe the properties. You can list as many columns as you need to, using one row in this table for each property value you will store in the vertical table.

PROPERTY_SET_ID
PROPERTY_OBS_NO
ACTIVE_IND
COLUMN_PRECISION
COLUMN_SCALE
COLUMN_SIZE
DATA_TYPE
DOMAIN
EFFECTIVE_DATE
EXPIRY_DATE
PPDM_GUID
PREFERRED_CURRENCY_UOM
PREFERRED_UOM
REF_TABLE_NAME
REMARK
SOURCE
USE_COLUMN_NAME
USE_TABLE_NAME
ROW_CHANGED_BY
ROW_CHANGED_DATE
ROW_CREATED_BY
ROW_CREATED_DATE
ROW_QUALITY

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PPDM PROPERTY COLUMN

The rest of this table allows you to create an **implicit data model for each column in the vertical table** that will be used for each property type.

You use this table to **characterize** how to describe each value in the reference table (such as mass or color)

EXAMPLE 1: for values that describe the MASS of an object, you may want to store values that are

DOMAIN = MASS
DATA TYPE = NUMBER
COLUMN SIZE = 10
COLUMN PRECISION = 2
PREFERRED UOM = kg

EXAMPLE 2: to describe the COLOR of an object, you may want to use values listed in the table R_COLOR

REF TABLE NAME = R COLOR

PROPERTY_SET_ID
PROPERTY_OBS_NO
ACTIVE_IND
COLUMN_PRECISION
COLUMN_SCALE
COLUMN_SIZE
DATA_TYPE
DOMAIN
EFFECTIVE_DATE
EXPIRY_DATE
PPDM_GUID
PREFERRED_CURRENCY_UOM
PREFERRED_UOM
REF_TABLE_NAME
REMARK
SOURCE
USE_COLUMN_NAME
USE_TABLE_NAME
ROW_CHANGED_BY
ROW_CHANGED_DATE
ROW_CREATED_BY
ROW_CREATED_DATE
ROW_QUALITY

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EXAMPLE 1: EQUIPMENT SPECS

The mass of my big red truck

EQUIPMENT_SPEC

EQUIPMENT_ID	VARCHAR2	20	
SPEC_ID	VARCHAR2	20	
SPEC_TYPE	VARCHAR2	20	
ACTIVE_IND	VARCHAR2	1	
AVERAGE_VALUE	NUMBER		
AVERAGE_VALUE_OUOM	VARCHAR2	20	
AVERAGE_VALUE_UOM	VARCHAR2	20	
COST	NUMBER	12	2
CURRENCY_CONVERSION	NUMBER	10	5
CURRENCY_OUOM	VARCHAR2	20	
CURRENCY_UOM	VARCHAR2	20	
EFFECTIVE_DATE	DATE		
EXPIRY_DATE	DATE		
MAX_DATA	DATE		
MAX_VALUE	NUMBER		
MAX_VALUE_OUOM	VARCHAR2	20	
MAX_VALUE_UOM	VARCHAR2	20	
MIN_DATA	DATE		
MIN_VALUE	NUMBER		
MIN_VALUE_UOM	VARCHAR2	20	
MIN_VALUE_OM	VARCHAR2	20	
PPDM_GUID	VARCHAR2	38	
REF_VALUE	NUMBER		
REF_VALUE_OUOM	VARCHAR2	20	
REF_VALUE_TYPE	VARCHAR2	20	
REF_VALUE_UOM	VARCHAR2	20	
REF	VARCHAR2	2000	
SO	VARCHAR2	20	
ST	VARCHAR2	20	
S	VARCHAR2	1024	
R_BY	VARCHAR2	30	
DATE	DATE		
Y	VARCHAR2	30	
ATE	DATE		

R_EQUIP_SPEC

SPEC_TYPE
ABBREVIATION
ACTIVE_IND
EFFECTIVE_DATE
EXPIRY_DATE
LONG_NAME
PPDM_GUID
PROPERTY_SET_ID
REMARK
SHORT_NAME
SOURCE
ROW_CHANGED_BY
ROW_CHANGED_DATE
ROW_CREATED_BY
ROW_CREATED_DATE
ROW_QUALITY

PPDM_PROPERTY_SET

PROPERTY_SET_ID
ACTIVE_IND
EFFECTIVE_DATE
EXPIRY_DATE
PPDM_GUID
PROPERTY_SET_NAME
REMARK
SOURCE
USE_TABLE_NAME
ROW_CHANGED_BY
ROW_CHANGED_DATE
ROW_CREATED_BY
ROW_CREATED_DATE
ROW

PPDM_PROPERTY

PROPERTY_SET_ID
PROPERTY_OBS_NO
ACTIVE_IND
COLUMN_PRECISION
COLUMN_SCALE
COLUMN_SIZE
DATA_TYPE
DOMAIN
EFFECTIVE_DATE
EXPIRY_DATE
PPDM_GUID
PREFERRED_CURRENCY_UOM
PREFERRED_UOM
REF_TABLE_NAME
REMARK
SOURCE
USE_COLUMN_NAME
USE_TABLE_NAME
ROW_CHANGED_BY
ROW_CHANGED_DATE
ROW_CREATED_BY
ROW_CREATED_DATE
ROW_QUALITY

1

SPEC TYPE = MASS

PROPERTY SET ID = 1

2

USE TABLE NAME = EQUIPMENT_SPEC

3

USE TABLE NAME = EQUIPMENT_SPEC

USE COLUMN NAME = AVERAGE VALUE

COLUMN PRECISION = 0

COLUMN SIZE = 15

DOMAIN = MASS

PREFERRED UOM = kg

4

SPEC TYPE = MASS

AVERAGE VALUE = 15000

AVERAGE VALUE UOM = kg

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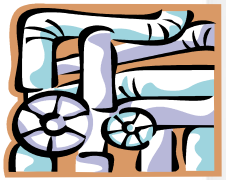
EXAMPLE 2: EQUIP

The inside diameter of my pipeline



SPEC TYPE = INSIDE DIAMETER

PROPERTY SET ID = 2

1

EQUIPMENT_SPEC

EQUIPMENT_ID	**VARCHAR2**	**20**	
SPEC_ID	**VARCHAR2**	**20**	
SPEC_TYPE	**VARCHAR2**	**20**	
ACTIVE_IND	VARCHAR2	1	
AVERAGE_VALUE	NUMBER		
AVERAGE_VALUE_OUOM	VARCHAR2	20	
AVERAGE_VALUE_UOM	VARCHAR2	20	
COST	NUMBER	12	2
CURRENCY_CONVERSION	NUMBER	10	5
CURRENCY_OUOM	VARCHAR2	20	
CURRENCY_UOM	VARCHAR2	20	
EFFECTIVE_DATE	DATE		
EXPIRY_DATE	DATE		
MAX_DATE	DATE		
MAX_VALUE	NUMBER		
MAX_VALUE_OUOM	VARCHAR2	20	
MAX_VALUE_UOM	VARCHAR2	20	
MIN_DATE	DATE		
MIN_VALUE	NUMBER		
MIN_VALUE_OUOM	VARCHAR2	20	
MIN_ALUE_UOM	VARCHAR2	20	
PPD GUID	VARCHAR2	38	
REF ENCE_VALUE	NUMBER		
RE ENCE_VALUE_OUOM	VARCHAR2	20	
R NCE_VALUE_TYPE	VARCHAR2	20	
R NCE_VALUE_UOM	VARCHAR2	20	
	VARCHAR2	2000	
	VARCHAR2	20	
DE	VARCHAR2	20	
C	VARCHAR2	1024	
GED_BY	VARCHAR2	30	
GED_DATE	DATE		
ED_BY	VARCHAR2	30	
ED_DATE	DATE		
	VARCHAR2	20	

R_EQUIP

SPEC_TYPE
ABBREVIATION
ACTIVE_IND
EFFECTIVE_DATE
EXPIRY_DATE
LONG_NAME
PPDM_GUID
PROPERTY_SET_ID
REMARK
SHORT_NAME
SOURCE
ROW_CHANGED_BY
ROW_CHANGED_DATE
ROW_CREATED_BY
ROW_CREATED_DATE
ROW_QUALITY

PPDM_PROPERTY_SET

PROPERTY_SET_ID
ACTIVE_IND
EFFECTIVE_DATE
EXPIRY_DATE
PPDM_GUID
PROPERTY_SET_NAME
REMARK
SOURCE
USE_TABLE_NAME
ROW_CHANGED_BY
ROW_CHANGED_DATE
ROW_CREATED_BY
ROW_CREATED_DATE
ROW_QUALITY

2

USE TABLE NAME = EQUIPMENT_SPEC

PPDM_PROPER

PROPERTY_SET_ID
PROPERTY_OBS_NO
ACTIVE_IND
COLUMN_PRECISION
COLUMN_SCALE
COLUMN_SIZE
DATA_TYPE
DOMAIN
EFFECTIVE_DATE
EXPIRY_DATE
PPDM_GUID
PREFERRED_CURRENCY_UOM
PREFERRED_UOM
REF_TABLE_NAME
REMARK
SOURCE
USE_COLUMN_NAME
USE_TABLE_NAME
ROW_CHANGED_BY
ROW_CHANGED_DATE
ROW_CREATED_BY
ROW_CREATED_DATE
ROW_QUALITY

3

USE TABLE NAME = EQUIPMENT_SPEC

USE COLUMN NAME = MIN VALUE
COLUMN PRECISION = 2
COLUMN SIZE = 8
DOMAIN = LENGTH
PREFERRED UOM = m

NOTE: In PPDM PROPERTY COLUMN there are 2 rows

USE TABLE NAME = EQUIPMENT_SPEC

USE COLUMN NAME = MAX VALUE
COLUMN PRECISION = 2
COLUMN SIZE = 8
DOMAIN = LENGTH
PREFERRED UOM = m

SPEC TYPE = INSIDE DIAMETER

MIN VALUE = 12.25

MIN VALUE UOM = m

MAX VALUE = 13.25

MAX VALUE UOM = m

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EXAMPLE 3: EQUIPMENT SPECS

The color of my big red truck

EQUIPMENT_SPEC

EQUIPMENT_ID	**VARCHAR2**	**20**	
SPEC_ID	**VARCHAR2**	**20**	
SPEC_TYPE	**VARCHAR2**	**20**	
ACTIVE_IND	VARCHAR2	1	
AVERAGE_VALUE	NUMBER		
AVERAGE_VALUE_OUOM	VARCHAR2	20	
AVERAGE_VALUE_UOM	VARCHAR2	20	
COST	NUMBER	12	2
CURRENCY_CONVERSION	NUMBER	10	5
CURRENCY_OUOM	VARCHAR2	20	
CURRENCY_UOM	VARCHAR2	20	
EFFECTIVE_DATE	DATE		
EXPIRY_DATE	DATE		
MAX_DATE	DATE		
MAX_VALUE	NUMBER		
MAX_VALUE_OUOM	VARCHAR2	20	
MAX_VALUE_UOM	VARCHAR2	20	
MIN_DATE	DATE		
MIN_VALUE	NUMBER		
MIN_VALUE_OUOM	VARCHAR2	20	
MIN_VALUE_UOM	VARCHAR2	20	
PPDM_GUID	VARCHAR2	38	
REFERENCE_VALUE	NUMBER		
REFERENCE_VALUE_OUOM	VARCHAR2	20	
REFERENCE_VALUE_TYPE	VARCHAR2	20	
REFERENCE_VALUE_UOM	VARCHAR2	20	
REMARK	VARCHAR2	2000	
SOURCE	VARCHAR2	20	
SPEC_COD	VARCHAR2	20	
SPEC_DES	VARCHAR2	1024	
ROW_CH ED_BY	VARCHAR2	30	
ROW_CH D_DATE	DATE		
ROW_C D_BY	VARCHAR2	30	
ROW_C D_DATE	DATE		
ROW_	VARCHAR2	20	

SPEC TYPE = COLOR

SPEC CODE = RED

R_EQUIP_SPEC

SPEC_TYPE
ABBREVIATION
ACTIVE_IND
EFFECTIVE_DATE
EXPIRY_DATE
LONG_NAME
PPDM_GUID
PROPERTY_SET_ID
REMARK
SHORT_NAME
SOURCE
ROW_CHANGED_BY
ROW_CHANGED_DATE
ROW_CREATED_BY
ROW_CREATED_DATE
ROW_QUALITY

SPEC TYPE = COLOR

PROPERTY SET ID = 3

1

PPDM_PROPERTY_SET

PROPERTY_SET_ID
ACTIVE_IND
EFFECTIVE_DATE
EXPIRY_DATE
PPDM_GUID
PROPERTY_SET_NAME
REMARK
SOURCE
USE_TABLE_NAME
ROW_CHANGED_BY
ROW_CHANGED_DATE
ROW_CREATED_BY
ROW_CREATED_DATE
ROW_QUALITY

2

USE TABLE NAME = EQUIPMENT_SPEC

PPDM_PROPERTY_CO

PROPERTY_SET_ID
PROPERTY_OBS_NO
ACTIVE_IND
COLUMN_PRECISION
COLUMN_SCALE
COLUMN_SIZE
DATA_TYPE
DOMAIN
EFFECTIVE_DATE
EXPIRY_DATE
PPDM_GUID
PREFERRED_CURRENCY_UOM
PREFERRED_UOM
REF_TABLE_NAME
REMARK
SOURCE
USE_COLUMN_NAME
USE_TABLE_NAME
ROW_CHANGED_BY
ROW_CHANGED_DATE
ROW_CREATED_BY
ROW_CREATED_DATE
ROW_QUALITY

3

USE TABLE NAME = EQUIPMENT_SPEC

USE COLUMN NAME = SPEC CODE

REF TABLE NAME = R_COLOR

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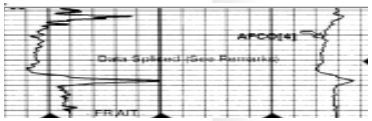
EXAMPLE 4: WELL LOG CURVE

The INDEX for a log



WELL LOG CURVE

UWI
CURVE_ID
ACQUIRED_FOR_BA_ID
ACTIVE_IND
API_CODE_SYSTEM
API_CURVE_CLASS
API_CURVE_CODE
API_CURVE_MODIFIER
API_LOG_CODE
BASE_CURVE_IND
BYPASS_IND
CASED_HOLE_IND
COMPOSITE_IND
CURVE_OUOM
CURVE_QUALITY
DICTIONARY_ID
DICT_CURVE_ID
EFFECTIVE_DATE
EXPIRY_DATE
EXPLICIT_INDEX_IND
FIRST_GOOD_VALUE
FIRST_GOOD_VALUE_INDEX
FRAME_ID
GOOD_VALUE_TYPE
INDEX_CURVE_ID
INDEX_OUOM
INDEX_UOM
JOB_ID
LAST_GOOD_VALUE
LAST_GOOD_VALUE_INDEX
LOG_TOOL_PASS_NO
LOG_TOOL_TYPE
MAX_INDEX
MAX_VALUE
MAX_VALUE_INDEX
MEAN_VALUE
MEAN_VALUE_STD_D
MIN_INDEX
MIN_VALUE
MIN_VALUE
MULTIPLE
MWD_I
NUL
NI
NTATION
EX_TYPE
MNEMONIC
_UNIT_MNEMONIC
S_NO
E

INDEX TYPE = DEPTH

PROPERTY SET ID = 4

1

R INDEX TYPE

INDEX_TYPE
ABBREVIATION
ACTIVE_IND
EFFECTIVE_DATE
EXPIRY_DATE
LONG_NAME
PPDM_GUID
PROPERTY_SET_ID
REMARK
SHORT_NAME
SOURCE
ROW_CHANGED_BY
ROW_CHANGED_DATE
ROW_CREATED_BY
ROW_CREATED_DATE
ROW_QUALITY

PPDM_PROPERTY_SET

PROPERTY_SET_ID
ACTIVE_IND
EFFECTIVE_DATE
EXPIRY_DATE
PPDM_GUID
PROPERTY_SET_NAME
REMARK
SOURCE
USE_TABLE_NAME
ROW_CHANGED_BY
ROW_CHANGED_DATE
ROW_CREATED_BY
ROW_CREATED_DATE
ROW_QUALITY

2

USE TABLE NAME = WELL LOG CURVE

PPDM_PROPERTY_COLUMN

PROPERTY_SET_ID
PROPERTY_OBS_NO
ACTIVE_IND
COLUMN_PRECISION
COLUMN_SCALE
COLUMN_SIZE
DATA_TYPE
DOMAIN
EFFECTIVE_DATE
EXPIRY_DATE
PPDM_GUID
PREFERRED_CURRENCY_UOM
PREFERRED_UOM
REF_TABLE_NAME
REMARK
SOURCE
USE_COLUMN_NAME
USE_TABLE_NAME
ROW_CHANGED_BY
ROW_CHANGED_DATE
ROW_CREATED_BY
ROW_CREATED_DATE
ROW_QUALITY

3

USE TABLE NAME = WELL LOG CURVE
USE COLUMN NAME = MIN INDEX
COLUMN PRECISION = 2
COLUMN SIZE = 15,2
DATA TYPE = NUMBER
DOMAIN = LENGTH
PREFERRED UOM = m

USE TABLE NAME = WELL LOG CURVE
USE COLUMN NAME = MAX INDEX
COLUMN PRECISION = 2
COLUMN SIZE = 15,2
DATA TYPE = NUMBER
DOMAIN = LENGTH
PREFERRED UOM = m

PRIMARY INDEX TYPE = DEPTH
MIN INDEX = 5123.25
MIN INDEX UOM = m
MAX INDEX = 10433.50
MIN INDEX UOM = m

NOTE: In PPDM PROPERTY COLUMN there are 2 rows

erved

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Reference Lists in PPDM

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REFERENCE VALUES

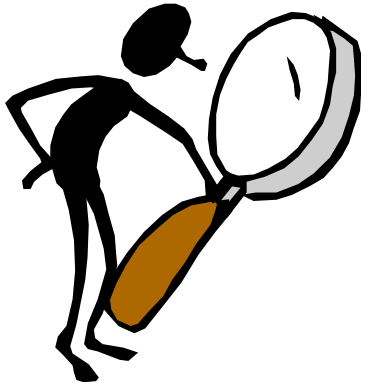

Table names

- R_%
- Reference-like subjects (Areas, BA's…)

Decide what to use in PK values

- Natural values – names or other natural value can reduce joins
- GUID – uniqueness more likely
- Integers - may speed up query and retrieval
- Never force your users to memorize or refer to lists of codes!

Create some business rules and deploy them consistently

- How, who, when, where…

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VALIDITY CHECKING

All *R_%* values

- What happens if the value is not known at load time?
- What happens if the necessary value is not in the table? Who can add or change, what are rules?
- Meaning of NULL data
  - Not received yet
  - Did not look for value
  - Could not determine value
  - Has not happened yet
  - Not relevant here

Valid data ranges

- upper and lower limits
- rule based

Possible to use PPDM_QUALITY_CONTROL or AUDIT

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REFERENCE TABLES

Not all Reference tables are R_%

Use online documentation or constraints to check

FIELD, POOL

AREA

PRODUCT

BUSINESS ASSOCIATE

STRAT_UNIT

…

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Dates

Tips and Tricks

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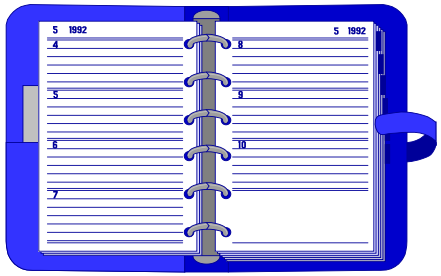
DATE PROBLEMS

Date may be imprecise or unknown

- 1Q93, spring 1983 …..
- year only
- year and month



Architectural Principles

- DATE should not be part of the PK

Decide how to handle technical issues

- handling NULL dates during loads or queries
- search between dates

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DATE SOLUTIONS

Imprecise Dates

- VARCHAR2 (8) date description %_DATE_DESC
  - YYYY – year precision
  - YYYYMM – month precision
  - YYYYQQ – quarter precision
  - YYYYMMDD – day precision
- Use DATE format with dummy values
  - Oracle defaults DAY to 01
  - Oracle defaults MONTH to current

Search between Dates

- Leave expiry data NULL and set *ACTIVE_IND* = 'Y'
- Set to high value (Dec 01, 4712)* (Ensor and Stevenson, 1997)

Don't synthesize false data

- user trust affected

Base site rules on user needs

- loading
- query and retrieval
- future dates such as expiry date

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Tips and Hints

Use the ACTIVE_IND to show what data is currently active. Make sure this column is always accurately populated by using a trigger on EXPIRY_DATE.

If the data has not expired, leave EXPIRY_DATE null.

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Units of Measure

Tips and Tricks

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UNITS OF MEASURE PROBLEMS

Scalability

- retrieval *('all wells that penetrate to 1500 meters')*
- calculation *('average seismic line length')*

Multiple UOM received

- different countries, jurisdictions
- production volume depends on substance

Volume regimes

- Volume measure based on temperature and pressure regimes

Currencies

- Conversion rate varies over time
- Different banks use different conversion rates
- Different transactions use different conversion rates

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UNIT OF MEASURE ARCHITECTURAL PRINCIPLE

Storing UOM

- Standard UOM for every column
  - Meta model
- Original UOM for each row / column
  - Subject tables

Exceptions

- Values whose UOM cannot be standardized
  - Example: Production volume UOM depends on the type of product
  - Example: Vertical tables

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UOM 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 _ UOM_ SYMBOL
WELL	UWI			
WELL	DRILL_TD		DRILL_TD_OUOM	M
WELL	DRILL_TD_OUOM			
WELL_CEMENT	CEMENT_AMOUNT	CEMENT_AMOUNT_UOM	CEMENT_AMOUNT_OUOM	

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Tips and Hints

The PPDM Meta Model does not store data values - only information about the structure of the data model.

The default Unit of Measure for a measured value is stored in the meta model.

The original Unit of Measure is stored in the business table. This value is only used to restore values back to the original (usually for regulatory reporting).

Use the Meta Model to convert units from one system to another.

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CURRENCIES IN PPDM

Currency values should be stored as %_COST

- Currency domain (NUMBER 12,2).
- CURRENCY_OUOM is the currency in which the funds were originally received by the payee.

CURRENCY_CONVERSION with each currency

- Currency conversion domain (NUMBER 10,5)
- *"CURRENCY CONVERSION RATE: 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 only. When this value is multiplied by the STORED currency value, the original value of the transaction in the original currency is obtained."*

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Tips and Hints

Use the same stored currency unit of measure for the entire implementation or at least regionally.

Be aware that different banks use different exchange values for different transaction types. Usually it's best to use the conversion rate captured in your financial system.

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Coordinate Systems

Tips and Tricks

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COORDINATE SYSTEM PROBLEMS

Scalability

- retrieval *('all wells that fall within my area')*

Bad or incomplete data

- original reference system unknown
- reference system was captured incorrectly
- conversions not done correctly

Multiple sets of coordinates

- original, revised
- datum dependant

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CS ARCHITECTURAL PRINCIPLE

Store geographic coordinates by default

- Latitude, longitude
- In some cases, other reference systems are allowed
  - Local referenced systems are important for some business functions

Preferred coordinates all referenced to same CS

- At least regionally, globally if practical

Support multiple coordinate systems in *%_VERSION* table

- UTM, polyconic
- Other coordinate systems
- Store the preferred version in this table also

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SPATIAL INFORMATION = GIS?

GIS does not handle sub-surface

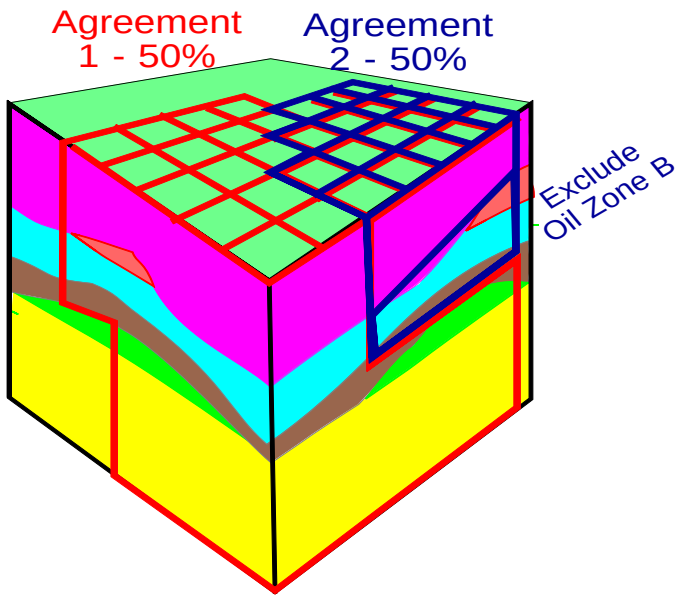
- Depths ranges
- Zones
- Pools, reservoirs are not polygons

Spatial locations version over time

- Historical
- Predictive

Attribute information may be related

- May need huge amounts of structured information



Not all uses of spatial information are GIS related
Can you embed spatial objects in a complex database?
Can you include spatial objects in a SQL Query?

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COORDINATE SYSTEM EXAMPLE

WELL_NODE

NODE_ID	LATITUDE	LONGITUDE	COORDINATE_SYSTEM_ID	UWI
12345	45.3456	49.1584	NAD83	12345
23456	46.2347	56.3628	NAD83	SMITH12F

WELL_NODE_VERSION

NODE_ID	SRC	OBS_NO	UTM_X	UTM_Y	COORDINATE_SYSTEM_ID
12345	PPDM	1	200654	4956258	WGS83
12345	PPDM	2	200538	4956283	NAD27

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Tips and Hints

NEVER store coordinate information without a Coordinate Reference. Don't assume you know what it is – check it out before you load!

Although you can store Transformation parameters in PPDM, the data model should not be used for transformations. Use a valid geodetic program to convert between coordinate systems

The Coordinate System Module stores lots of information that can be useful to you

- ✓ *Datum and ellipsoid details*
- ✓ *Coordinate system transformations*
- ✓ *Mapping system transformations*
- ✓ *Acquisition method*
- ✓ *Alternate names or identifiers*

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Semantics

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UNDERSTAND THE SEMANTICS

Value to be migrated = 1,000,000

- Are the units of measure stored or inferred?
- What are the semantics in the column name?
- What are the semantics in the table name?
- What other columns give meaning to this value?

When you load into PPDM

- What other columns can you populate to fully describe the semantics?
- Try not to leave any information inferred if you can avoid it.
- Use ACTIVE_IND, dates, quality columns

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Extending PPDM

Guidelines

Recommendations

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EXTENSIBILITY DO'S

Meet your business needs

Add tables

- table name prefix AB_

Add columns to the end of the table

- column name prefix AB_

Add constraints when needed

Apply Architectural Principles

PPDM Change Management

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EXTENSIBILITY DON'TS

Modify the Primary Key

Mis-use columns and tables

- Avoid adding tables that duplicate PPDM tables

Make PPDM null-able columns mandatory

- Conflict with other vendors

Change data types or lengths on existing columns

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SUBSETTING DO'S

Remove tables you do not require

- Define a footprint
- Remove constraints to tables you have removed

Ultimate goal is interoperability

- Readily exchange data between partners and regulatory agencies
- Plug and play applications

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SUBSETTING DON'TS

Remove a parent table for a structure in your footprint

Remove or alter Primary key components

Remove columns from PPDM tables

Remove constraints to tables in your footprint

Change the optionality of columns

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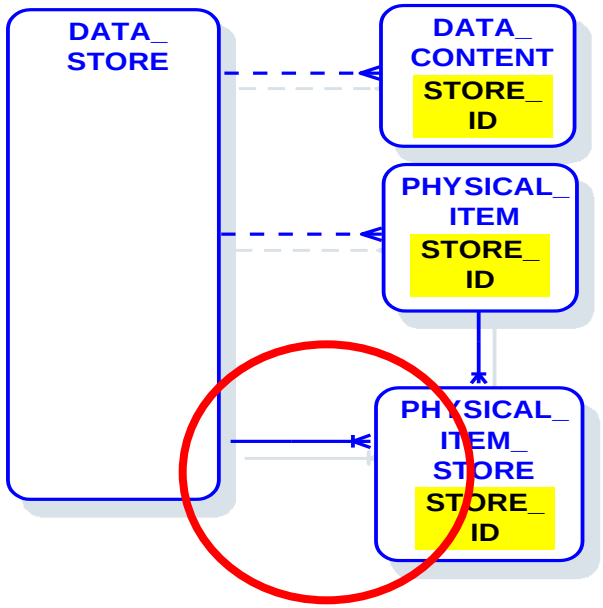
PPDM IS DENORMALIZED – BEWARE!

Three places for STORE_ID

- Each meets specific user need

Primary location

- *PHYSICAL_ITEM_STORE*
- populate other columns only if needed
- use triggers and stored procedures to keep in synch



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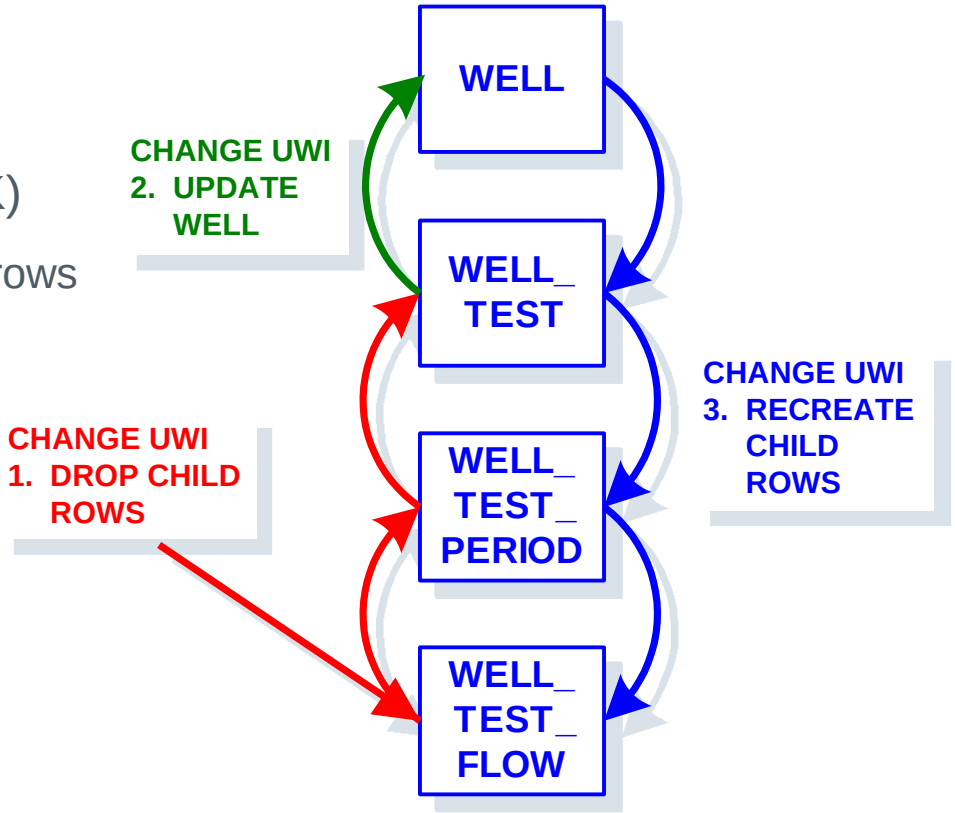
DATA UPDATES

Change Optional Foreign Keys (FK)

- Child FK to NULL
- Parent to new value
- Update child tables

Change Primary Key (PK)

- Drop and re-create child rows



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DATA DELETES

Can define *ON DELETE CASCADE* in DDL

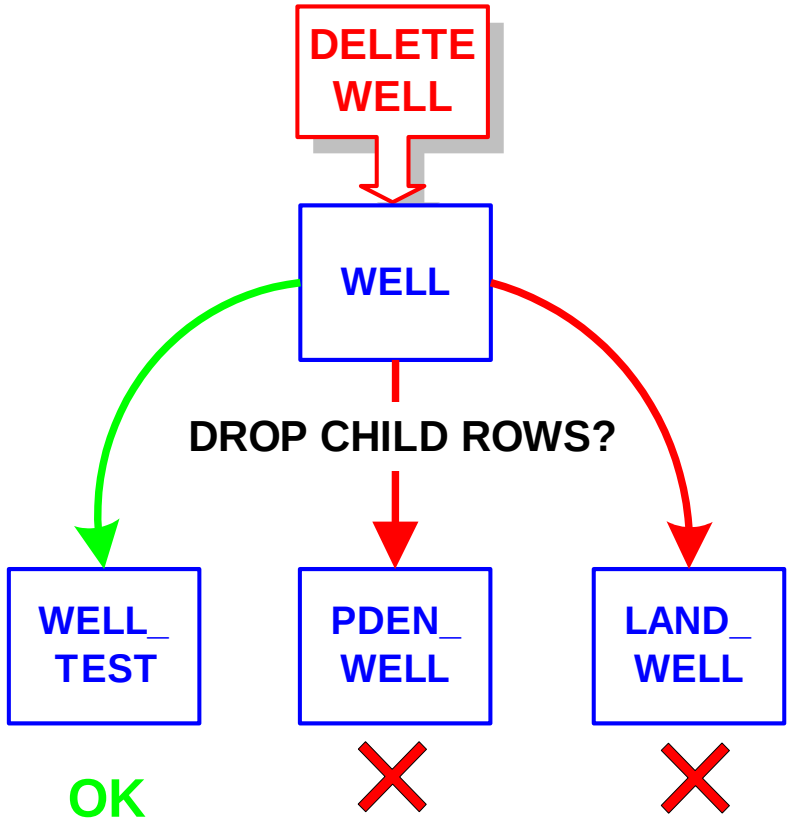
- not discriminatory, will delete all children

Manage procedurally

- Start delete at bottom level of children
- Delete parent last

Understand the business rules for every affected group of users

- It's not always appropriate to delete the children!



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Tips and Hints

PPDM grows through the

Change Management Process.

People who use it have an influence on the model.

www.ppdm.org/forums/

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Thank you

Any questions?

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