# DVPD development workflow scenarios

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# Introduction

The Data Vault Pipeline Description allows many variations, how to set up the workflow and toolchain for implementation of data vault loading processes. In the following, we describe some solutions, to give an idea about the possibilites. The primary motiviation is the fact, that different projects need different toolsets, depending on size, technology, team knowledge, history and more. DVPD should give you the freedom to create a toolchain, tailored to the needs of your project while staying open for later improvements.

## The main phases: Analysis/Design and implementation

In the implementation workflow, there are two main phases:

- Phase 1: Gather all necessary knowledge about the source data and design the data vault structure based on that knowledge.
- Phase 2: Implement database objects and the loading process. Test and deploy the process.

DVPD is designed to gather all information during phase 1 and be the single source of information for phase 2. Thats with examples provided here, focus either phase 1 or 2. By using DVPD, all phase 1 examples are compatible to all phase 2 examples.

# Phase 1: DVPD Creation Scenarios

Phase 1 contains analysis and decision making on the source data. There might be products out there, that provide all necessary functions to support this, but mostly this workflow is "stitched" together by using multiple tools. The examples try to emphasize this approach. They can't cover the whole potential. So feel free to think out of the box and combine, what ever you need and like to assemble the completed DVPD for a loading process.

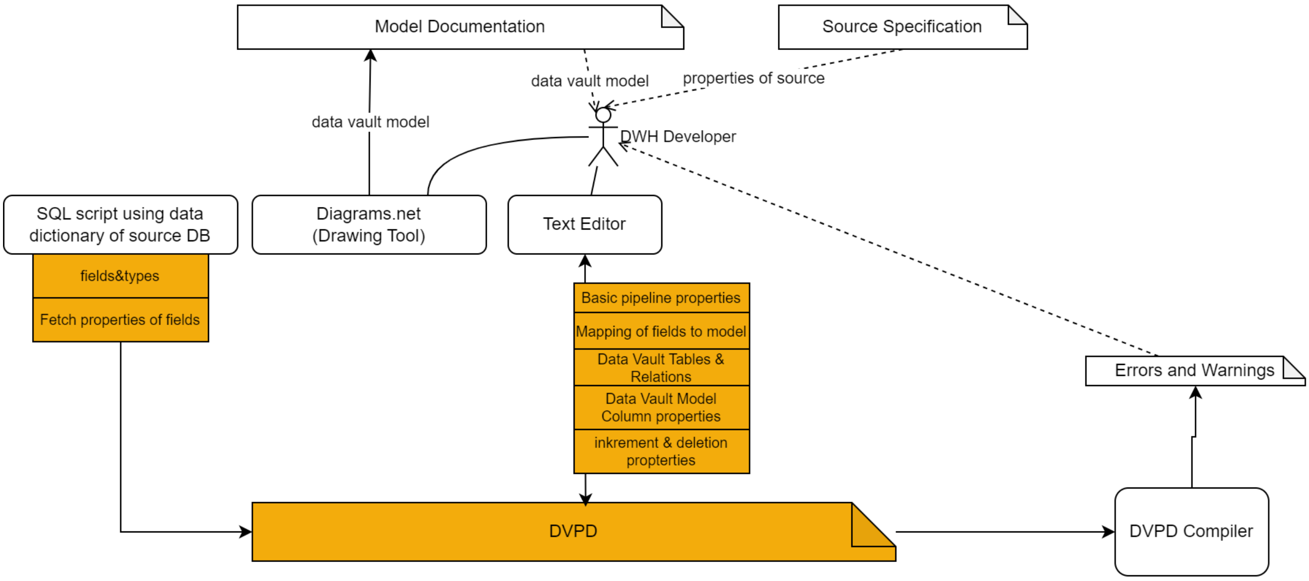
## Example A: nearly "Handmade"

- The sources are mainly database tables or views from the operational systems. To accelerate the process of writing down all source fields, a script can use the database dictionary of the source system to generate the list of fields in DVDP syntax.
- Analysis of the source data (business keys, uniqueness) is done with basic SQL queries by the data engineers and documented in a source specification document
- With the analysis result in mind, the data engineer creates the data vault model, documented in a diagram and in DVPD syntax
- the generated field list is extended with the mapping to the data vault model

- additional properties to guide the access, parsing and increment logic are added to the DVPD

Errors during the compiling of the final DVPD will lead to corrections in the DVPD document.

**Example A: nearly "handmade"**

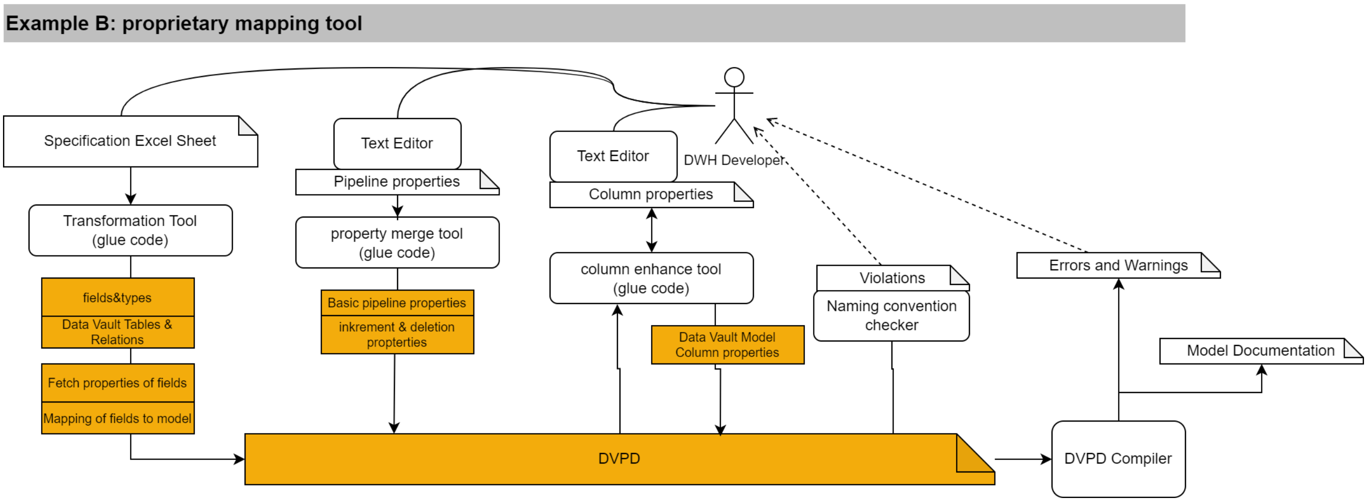

Model Documentation
Source Specification
data vault model
properties of source
data vault model
DWH Developer
SQL script using data dictionary of source DB
Diagrams.net (Drawing Tool)
Text Editor
fields&types
Fetch properties of fields
Basic pipeline properties
Mapping of fields to model
Data Vault Tables & Relations
Data Vault Model Column properties
inkrement & deletion propterties
Errors and Warnings
DVPD
DVPD Compiler

# Example B: proprietary mapping tool

In this project, a team of business analysts provides the whole specification of the source , including primary key and foreign key relations of the source object. This information is provided to the dataengineers in a standardizes Excel sheet. The workflow is as follows:

- the Excel Sheet is provided
- a transformation tool (script) translates the provided information into a draft DVPD
- in parallel a data engineers declares the technical properties for the pipeline in a separate shortened DVPD document (Pipeline properties)
- With a merge script, the draft DVPD gets enhanced with the pipeline properties
- Only in case, some data vault columns and mappings need more technical declaration, this will be provided in a third shortened DVPD and merged with a script into the now completed DVPD document.
- For a fist quality check, a script will parse an check the tables and column names, declared in the DVPD. Convention or consistency violations are reported to the data engineerss and need to be fixed
- Finally the DVPD gets compiled. Errors and warnings need to be managed and fixed before releasing the DVPD into the implementation phase
- Successful compilation of a DVDP will generate a model diagram and a mapping specification table, that are copied into the central documentation tool

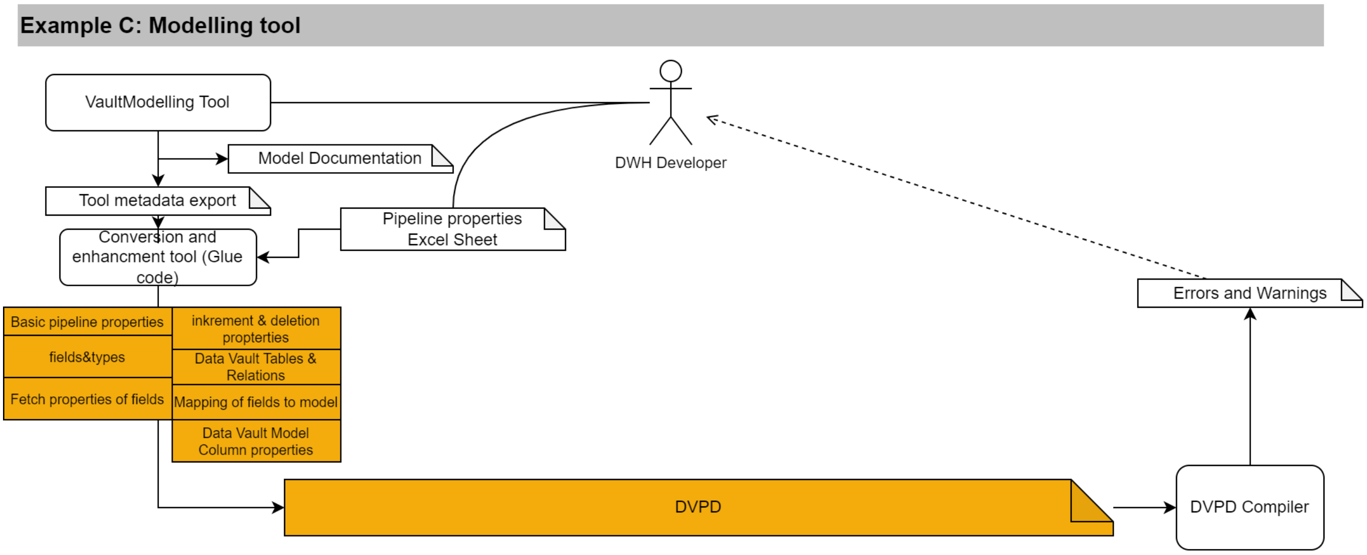
By orchestrating all the steps in a CI workflow, the upper steps take an initial effort of 10 minutes. Corrections are applied and verified in minutes. Depending on the documentation tool, even the update of the central documentation can be automated.


Example B: proprietary mapping tool
DWH Developer
Specification Excel Sheet
Transformation Tool (glue code)
fields&types
Data Vault Tables & Relations
Fetch properties of fields
Mapping of fields to model
Text Editor
Pipeline properties
property merge tool (glue code)
Basic pipeline properties
inkrement & deletion properties
Text Editor
Column properties
column enhance tool (glue code)
Data Vault Model Column properties
Violations
Naming convention checker
Errors and Warnings
Model Documentation
DVPD
DVPD Compiler

## Example C: Modelling tool

In case you have a convenient modelling tool, that is capable of reading source data structures and describe the mapping of the source data to a data vault model, the following workflow might be your choice.

- in the modelling tool
  - Read and analyze source data structure with the modeling tool
  - Create or extend the data vault accordingly
  - configure the mapping
  - add DVPD property data in custom fields, when possible
  - Export the modell and the mapping into a processible format
- Add DVPD specific properties, that can't be stored in the modelling tool in a separate document (e.g. an excel sheet)
- By using a converter process (glue code), convert the exported mapping ans model into a DVPD and merge all seperatly defined DVPD properties
- compile the DVPD and manage and fix errors


Example C: Modelling tool
VaultModelling Tool
DWH Developer
Model Documentation
Tool metadata export
Pipeline properties Excel Sheet
Conversion and enhancment tool (Glue code)
Basic pipeline properties
inkrement & deletion propteries
fields&types
Data Vault Tables & Relations
Fetch properties of fields
Mapping of fields to model
Data Vault Model Column properties
Errors and Warnings
DVPD
DVPD Compiler

# Phase 2: DVPD Processing Scenarios

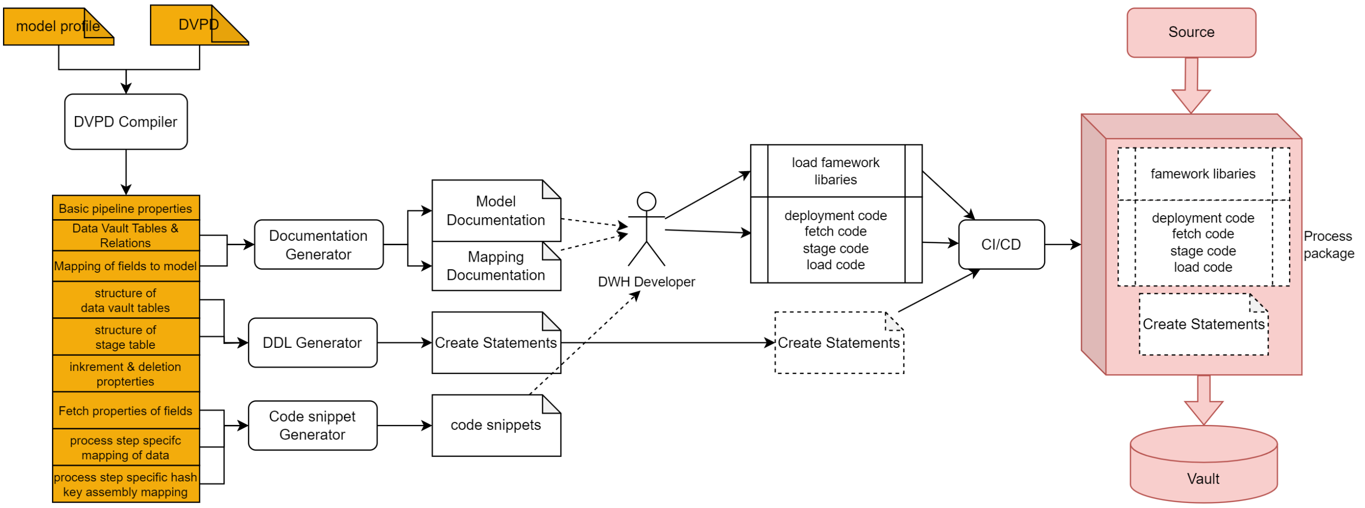
With the complete description of the source structure, target model and field mapping, an automated implementation/generation of the loading processes can achieved. The level of automation depends on the capabilites of the used processing tools. The following scenarios describe different levels of automation.

# Example A: DDL and Documentation generator only

- load processes are implemented manually by copy & adapt, supported by a set of libraries, standardized implementation frameworks and generated code snippets,
- deplyoment of database objects relies on scripts containing the DDL statemments
- documentation is done manually in a general documentation tool. To keep consistency, documentation snippets are generated from the DVPD and copied into the documentation tool

This approach has the most flexibilty to face variations of incoming data formats, transportation protocol and incremental logic. It will mostly be used in small projects or projects with a high and hardly predictable number of input formats.

**Example A: DDL and Documentation Generation only**



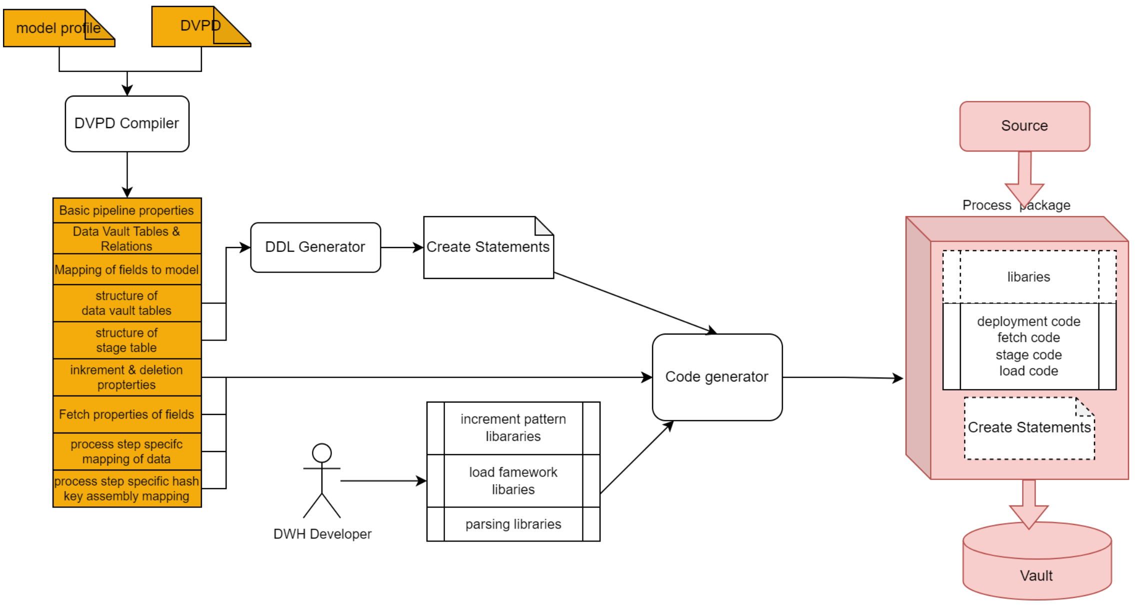
# Example B: Code Generator

This is an evolution of the Example A, but instead of providing only code snippets, the generator creates the complete code. Adaption to new formats and technologies must be achieved by providing new libraries to the generator.

Generation of documentation is not needed for the implementation process.(It is still good practices to support analysis and linage investigation).

Implementation of general libraries takes more effort in testing and needs higher discipline from the maintainting developers. Therefore it is only efficient for projects with a high number of source objects, that follow the same formats, protocols and increment pattern.

**Example B: Code generator**

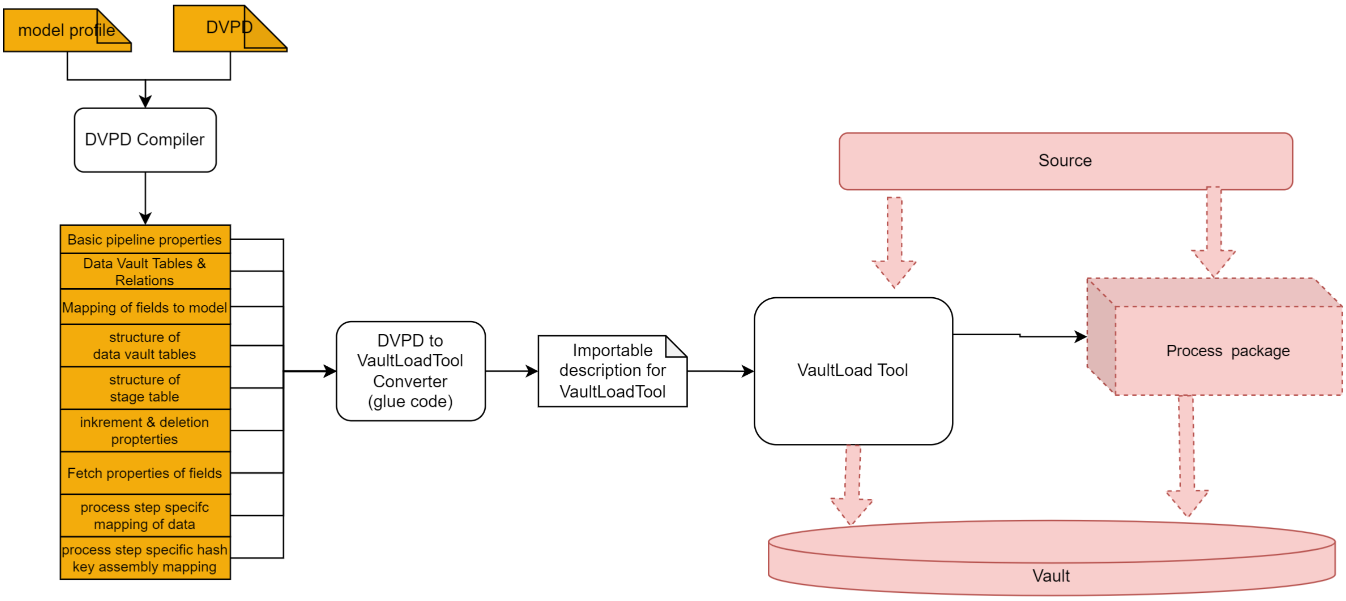

model profile
DVPD
DVPD Compiler
Basic pipeline properties
Data Vault Tables & Relations
Mapping of fields to model
structure of data vault tables
structure of stage table
inkrement & deletion propterties
Fetch properties of fields
process step specifc mapping of data
process step specific hash key assembly mapping
DDL Generator
Create Statements
Code generator
DWH Developer
increment pattern libararies
load famework libaries
parsing libraries
Source
Process package
libaries
deployment code
fetch code
stage code
load code
Create Statements
Vault

## Example C: Data Vault Tool Input Converter

In case there is a complete tool available, that allows implementation of processes by providing specific metadata, it can be possible to convert the result of the dvpd compiler into the input metadata of the tool.

Depending on the type of tool, the processes are run by the tool or the tool generates the processing code.

**Example C: Data Vault Tool Input Converter**


model profile
DVPD
DVPD Compiler
Basic pipeline properties
Data Vault Tables & Relations
Mapping of fields to model
structure of data vault tables
structure of stage table
inkrement & deletion propterties
Fetch properties of fields
process step specifc mapping of data
process step specific hash key assembly mapping
DVPD to VaultLoadTool Converter (glue code)
Importable description for VaultLoadTool
VaultLoad Tool
Source
Process package
Vault

# There is no ultimate architecture, but some bad

As mentioned in the introduction, there is no best option, that fits for all projects the same. It depends on the sprectrum of sources, the available budget, the teamsize and the toolstack already in place or favoured.

Since the DVPD itself is an enclosed artifact containing all informations, one might be tempted to use it as the final deployment package and rely on the consistency of an execution engine, that compiles the dvpd and executes the result instantly.

**It is not recommended to do so**.

**Don't build monolithic architectures**

**Only small independent modules with a distinct set of responsibilities and functions stay testable**

This is already valid for all tools of the implementation workflow but especially for the final loading processes Keepin mind, that retesting of released loading processes should be highly avoided. This is, why most examples create packages for deployment, that are decoupled from all future code changes in the development. Feeding the DVDP to a monolithic execution engine puts all implemented pipelines to risk of failuire when the engines gets changed (e.g. update). In the worst case, this might corrupt your data vault.

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