

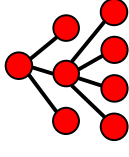
Protokoli za uporabo (Application protocols)

Protokoli za uporabo so specializacija splošnih informacijskih modelov (serija 40 in 100) za posamezno področje (napr. AP 214 je namenjen avtomobilski industriji)

Protokol za uporabo je običajno vezan na procesno verigo za določeno vrsto proizvodov (napr. ladjedelništvo, elekto komponente, avtomobilska industrija...). Posamezen protokol je razdeljen na več modulov.

Inženirski model izdelka (product model) je formalni opis vseh informacij, ki nastopajo v življenjskem ciklu izdelka.

Informacijska veriga procesa (Process chain) je hierarhično strukturirana in v celoto povezana obdelava podatkov, ki nastopa v določenem proizvodnem cilju.



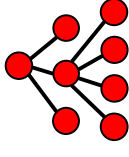
opisne metode	
	EXPRESS #11

protokoli za uporabo (Application Protocols - AP)			
AP 201	AP 202	AP 212	...
AP 203	AP 204	AP 214	
informacijski model splošnih podatkov (Integrated Resources)			
splošni protokoli za uporabo (Application Resources)			
tehnično risanje #101	struktura ladij #102		
končni elementi #104	kinematika #105	
osnovni informacijski modeli (Generic resources)			
osnove opisa izdelkov #41	predstavitev geometrije in topologije #42		
predstavitev struktur #43	struktura izdelka #44		
materiali #45	vizuelna predstavitev #46	tolerance #47	

izmenjava fizičnih datotek #21	programski vmesnik SDAI #22	izvedba podatkovne baze
metode za izvedbo (Implementation Methods)			

metodologija testiranja #31, #32, #33, #34

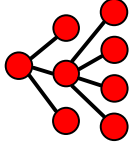
Struktura STEP standarda.



Koraki pri razvoju novega protokola za uporabo:

- 1) **načrt projekta** v katerem je predstavljalno kaj vse naj bi novi AP pokrival, oblikovanje projektne skupine. Potrditev in pomoč s strani STEP ustanov.
- 2) **priprava modela aktivnosti (AAM)**
 - posveti in ocenjevanja s strani strokovnjakov iz industrije in standardnih institucij
 - pripravijo se orodja za testiranje
 - verzijo modela aktivnosti se ponudi v pregled širšemu krogu uporabnikov.
- 3) **izdelava podatkovnega modela (AIM)** in povezovalne tabele (mapping table).
Preverba na vsaj dveh primerih uporabe.
- 4) STEP ustanove standarda sprejejo v večih korakih s časovnimi presledki
 - Working Draft
 - Project Draft
 - Technically complete
 - Editorially complete
 - CD version (Committee Draft)
 - ISO DIS version (Draft International Standard)
 - ISO IS version (International Standard)

Vir: Guidelines for the development and approval of STEP application protocols (ISO TC184/SC4/WG4N511)



Protokol za uporabo je sestavljen iz treh vrst modelov:

Model aktivnosti (Application activity model - AAM)

Model opisuje aktivnosti in procese, ki uporabljajo ali generirajo podatke v inženirskem modelu. Procesi in informacijski tokovi so vezani na določeno področje uporabe. Model aktivnosti naj bo predstavljen po standardu IDEF0.

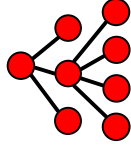
Referenčni model (Application reference model - ARM)

V referenčnem modelu so definirani objekti, ki nastopajo v informacijski verigi procesa, v obliki in terminologiji kakor jih vidi uporabnik. Referenčni model naj bo neodvisen od posameznih primerov uporabe (dokumentiran naj bo v EXPRESS, IDEF1X ali NIAM jeziku za modeliranje).

Podatkovni model (Application interpreted model - AIM)

Model določa izbor potrebnih objektov (entitet in tipov) iz splošnih informacijskih modelov (Integrated Resources), s tem da je preko omejitev in specializacije ugodeno zahtevam v referenčnem modelu (ARM). AIM naj bo definiran v jeziku EXPRESS in EXPRESS-G (grafično predstavitev).

EXPRESS je sprejet kot ISO standard (ISO 10303-11) za modeliranje informacij. EXPRESS jezik je neodvisen od strojne in programske opreme.

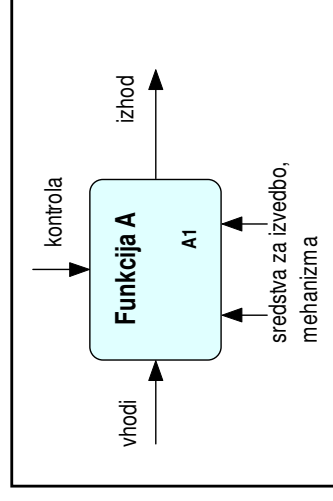


Metode za modeliranje informacij

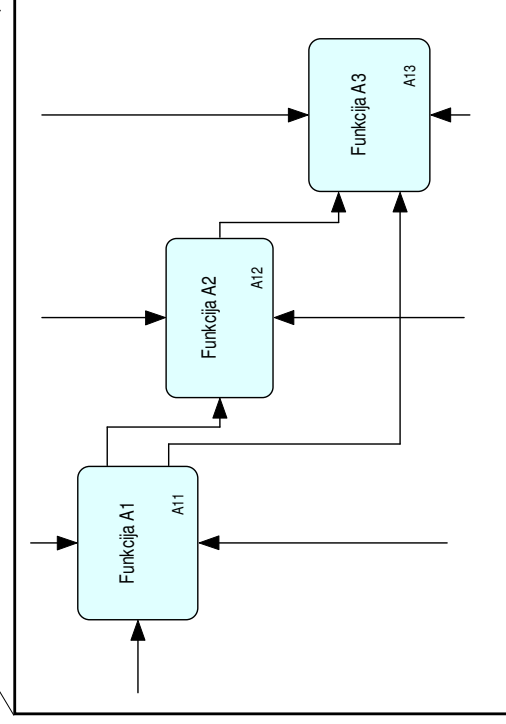
Za **IDEFO** (SADT - Structured Analyses and Design Technique) metodo je značilna funkcijska členitev od vrha navzdol. Posamezne aktivnosti so večnivojsko razčlenjene, s tem je mogoče obvladati tudi kompleksne sisteme.

Model posamezne aktivnosti ali funkcije je grafično predstavljen s pravokotnikom:

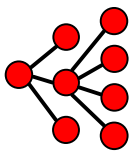
- vhodne informacije (na levi strani)
- izhodne informacije (na desni strani)
- omejitve in kontrolo (zgoraj)
- sredstva in mehanizmi (spodaj)



podrobnejša
razčlenitev
funkcije



Zgradba aktivnosti in večnivojska struktura v IDEFO diagramih.



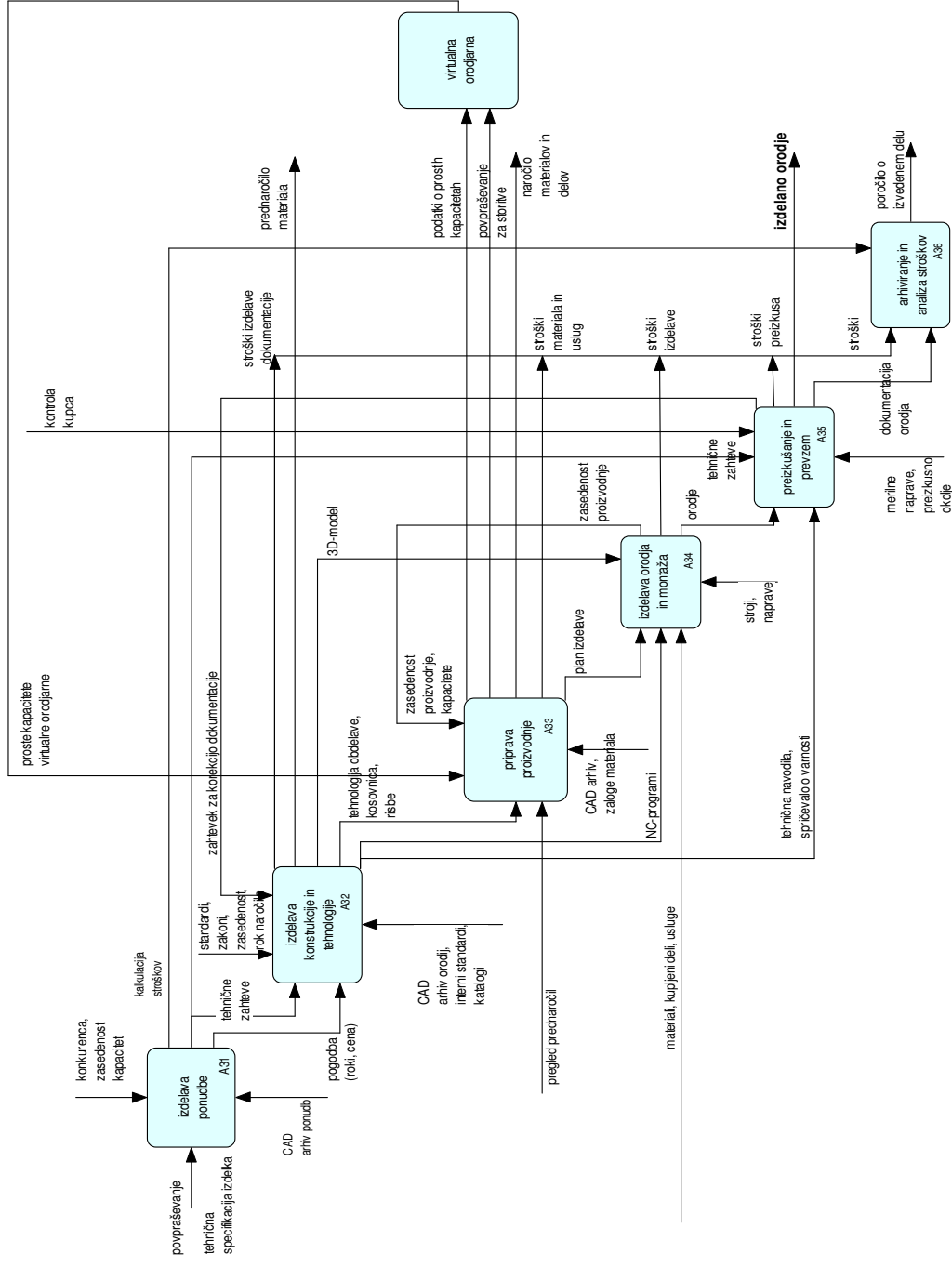
LECAD

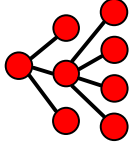
**J. Duhovnik, J. Tavčar,
Fakulteta za strojništvo**

STEP - Standard za izmenjavo podatkov o izdelkih

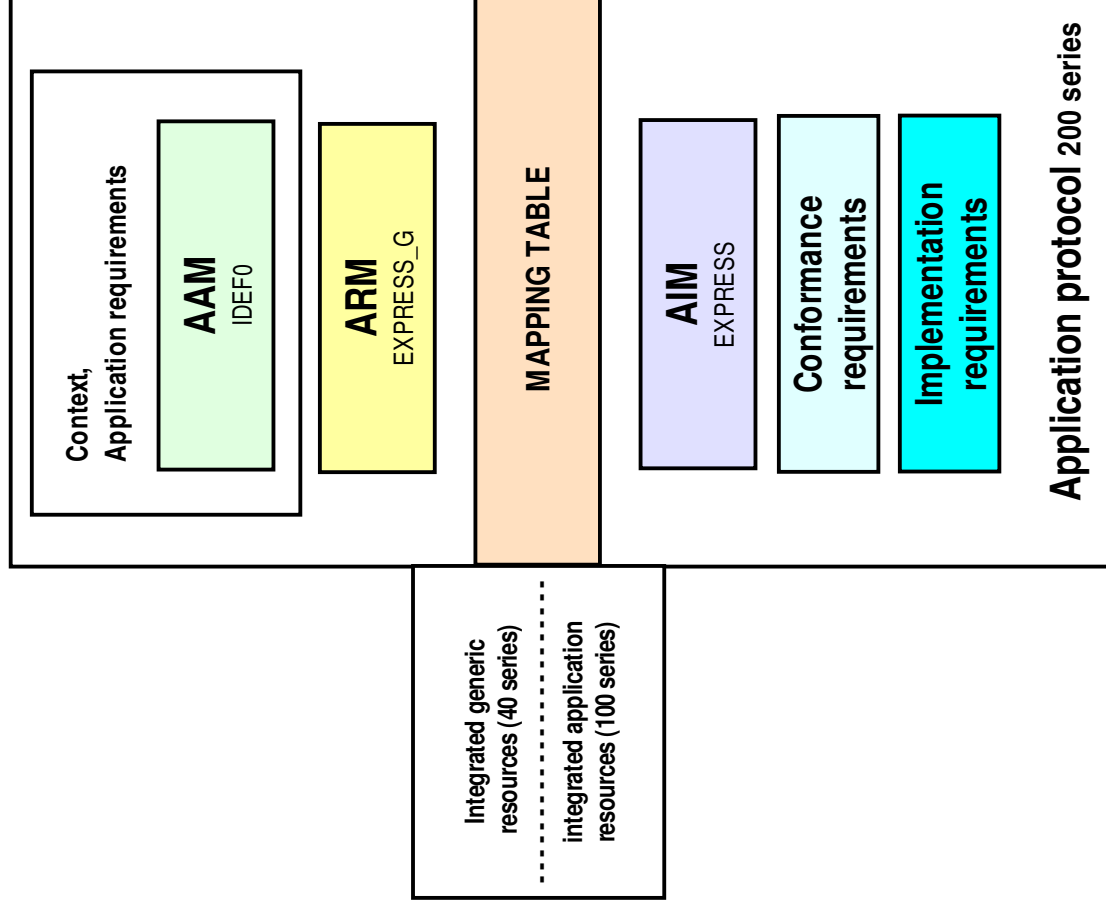
Funkcijska razčlenitev izdelave orodja (IDEFO).

Razčlenitev funkcije A3 Konstrukcija in izdelava orodij





Vsebina protokola za uporabo:



1. Predstavitev obsega in namena (Scope)

Kratka predstavitev vrste proizvodov in dela življenjskega cikla, ki ga protokol za uporabo pokriva.

2. Referenčni standardi (Normative references)

3. Definicije in okrajšave

4. Informacijske zahteve

Opis funkcijskih in informacijskih zahtev protokola za uporabo, ki so potrebne za razumevanje. Na kratko naj bo predstavljen model aktivnosti.

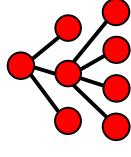
4.1 Funkcijske enote (Units of functionality)

5.0 Podatkovni model (Application interpreted model)

5.1 Povezovalna tabela (Mapping table)

5.2 Podatkovni model v EXPRESS jeziku (AIM EXPRESS short list)

Priloge: A B C ...



4.1 Funkcijske enote (Units of functionality)

Rezultat analize modela aktivnosti je v AP dokumentih predstavljen s funkcijskimi enotami, ki naj bodo grajene tako kot je najpreglednejše z zornega kota uporabe. Namen funkcijskih enot je organizirati in povezati objekte v referenčnem modelu. Vsaka funkcijska enota naj v svojem opisu vsebuje svoj obseg in namen ter seznam objektov, ki jih združuje.

Primer funkcijske enote iz AP 214:

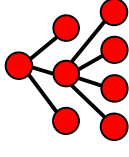
4.1.6 classification UoF (S6)

This unit of functionality specifies the information for classification of parts and tools due to various categories.
Example 16 - Examples for classification are the classification of standard parts, library parts, in-process parts. Additionally parts and tools may be classified due to functional aspects.

Example 17 - Examples for categories of functional classification are screws, bolts, nuts, shafts, or brackets.

The following application objects are used by the classification UoF:

- *Assembly_classification;*
- *Classification_attribute;*
- *Function_classification;*
- *Function_classification_relationship;*
- *In_process_classification;*
- *Item_classification;*
- *Library_item_classification;*
- *Regulated_item_classification;*
- *Service_classification;*
- *Standard_item_classification;*

**Definirani in opisani tudi vsi ostali objekti in atributi, ki nastopajo pri predvideni uporabi:****4.2.163 Item**

An Item is an object that is intended to be produced or employed in a production process. It can be either a single piece part or an assembly of arbitrary complexity.

Example 135 - In case of a car an Item can be the whole car itself, the assembly of the engine, the car body, a mudguard, or the side window glass.

Each Item is either a Part (see 4.2.213) or a Tool (see 4.2.337).

The data associated with an Item are the following:

- description;
- id;
- name.

4.2.163.1 description

The description specifies additional information about the Item (see 4.2.163).

The description need not be specified for a particular Item.

4.2.163.2 id

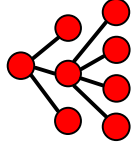
The id specifies the identifier of the Item that shall be unique within the scope of an organization.

4.2.163.3 name

The name specifies the word or group of words by which the Item is referred to

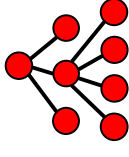
Example 136 - shaft, engine, fender are examples for name.

The name need not be specified for as particular Item.



Priloge protokola za uporabo

- A** Razširjen izpis podatkovnega modela (AIM) v EXPRESS jeziku
- B** Okrajšana imena podatkovnega modela
- C** Dodatne zahteve za posamezna področja uporabe
- D** Dodaten opis prožnosti pri uporabi protokola
- E** Model aktivnosti (prikaz z IDEF0 in opisom)
- F** Referenčni model
- G** Podatkovni model prikazan grafično z EXPRESS-G jezikom
- H** Disketa s podatkovnim modelom v EXPRESS jeziku
- I** Smernice za uporabo protokola
- J** Tehnične razprave, ki so nastale med razvojem protokola
- J** Reference na uporabljene standarde



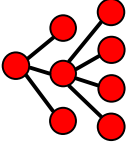
Primerjava vsebine protokolov za uporabo:

AP 214

- 4.1.1 product_management_data UoF
- 4.1.2 element_structure
- 4.1.3 item_definition_structure
- 4.1.4 default_setting
- 4.1.5 work management
- 4.1.6 classification
- 4.1.7 specification_control
- 4.1.8 process_plan
- 4.1.9 wireframe_model
- 4.1.10 wireframe_model_and_surface_model
- 4.1.11 connected_surface_model
- 4.1.12 faceted_b_rep_model
- 4.1.13 b_rep_model
- 4.1.14 compound_b_rep_model
- 4.1.15 csg_model
- 4.1.16 item_property
- 4.1.17 material_property
- 4.1.18 geometric_presentation
- 4.1.19 annotated_presentation
- 4.1.20 shaded_presentation
- 4.1.21 explicit_draughting
- 4.1.22 associative_annotation
- 4.1.23 kinematics
- 4.1.24 general_feature
- 4.1.25 user_defined_feature
- 4.1.26 form_feature_with_explicit_shape
- 4.1.27 form_feature_with_generative_shape
- 4.1.28 fea_mesh
- 4.1.29 fe_analyses
- 4.1.30 fea_results
- 4.1.31 surface_conditions
- 4.1.32 plus_minus_tolerances
- 4.1.33 geometric_tolerances
- 4.1.34 external_reference_mechanism

AP 203

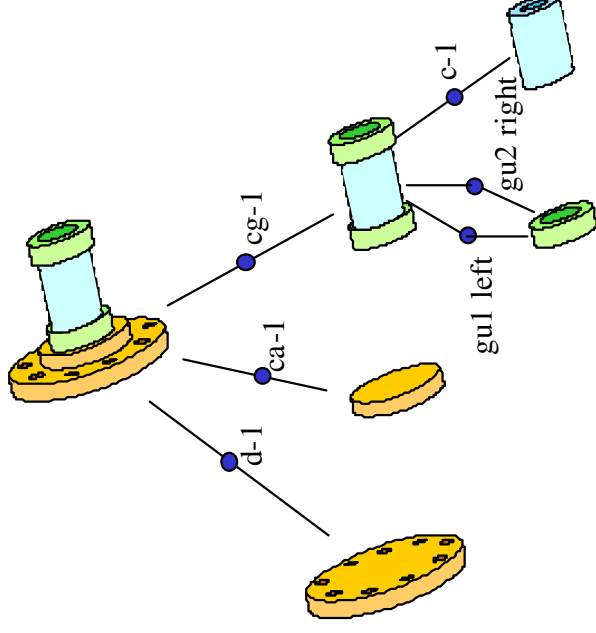
- 4.1.1 advanced_boundary_presentation
- 4.1.2 authorization
- 4.1.3 bill_of_material
- 4.1.4 design_activity_control
- 4.1.5 design_information
- 4.1.6 effectivity
- 4.1.7 end_item_identification
- 4.1.8 faceted_boundary_representation
- 4.1.9 manifold_surface_with_topology
- 4.1.10 non_topological_surface_and_wireframe
- 4.1.11 part_identification
- 4.1.12 shape
- 4.1.13 source_control
- 4.1.14 wireframe_with_topology

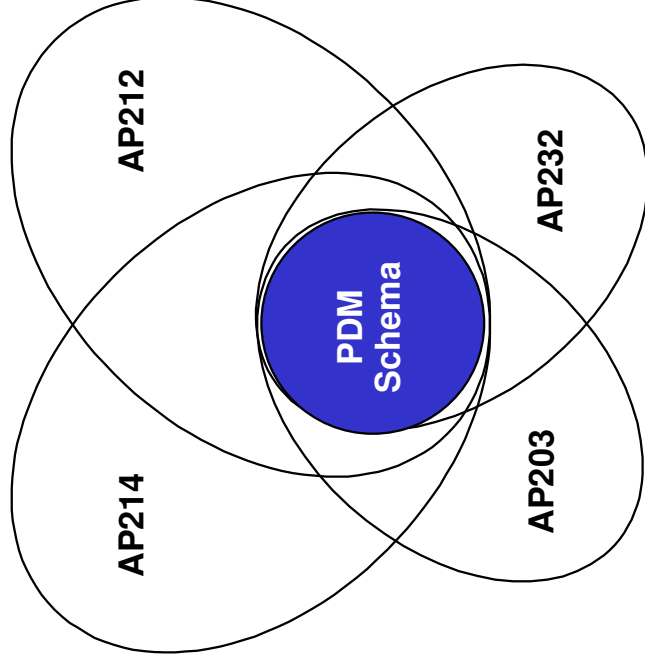
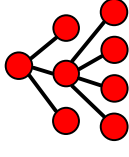
**PDM data exchange**

The modular semantic units of functionality are listed below:

Part Classification,
Part Properties,
Part Structure and Relationships,
Document Identification,
Document Classification,
External Files,
Relationships Between Documents
and Constituent Files
Document and File Properties,
Document and File Association
to Product Data,
Document and File Relationships,
Alias Identification,

Authorization,
Configuration and Effectivity Information,
Work Management Data.





**Common PDM data Schema
generated and maintained
by PDES, Inc. and ProSTEP**



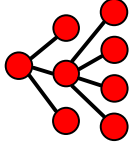
**Real Subset of PDM relevant
STEP APs (AP203, 212, 214, 232)**



**Fulfills nearly all requirements for
PDM data exchange**

Main functionality for parts and documents:

- identification
- versioning
- structures incl. transformations
- approvals and authorization
- project, work order, work request
- effectivities
- classification and properties



STEP PDM schema

The STEP PDM (Product Data Management) Schema is a reference information model for the exchange of a central, common subset of the data being managed within a PDM system. It represents the intersection of requirements and data structures from a range of STEP Application Protocols, all generally within the domains of design and development of discrete electro/mechanical parts and assemblies.

The STEP PDM Schema is *not* a specification for the functionality required for the complete scope of all PDM system functionality – i.e., it is *not* the union, but the intersection, of functionality present in the set of STEP Application Protocols. There exists functionality important for complete PDM functionality that is not represented in the PDM Schema, but is in other units of functionality present in STEP APs.

By definition, a PDM system is something that manages data about products. At the central core of PDM information is product identification. A product in STEP represents the concept of a general managed item within a PDM system. In the STEP PDM Schema, the general product concept may be interpreted as either a Part (see section) or a Document (see section). In this way, parts and documents are managed in a consistent and parallel fashion. Section describes a mechanism to associate product data with an additional identifier (alias).

Also central to the functionality of many PDM systems is identification of external files (both digital and physical), their relationship to managed documents (see section), and how they can be associated with core product identification (see section). The external file reference mechanism in the STEP PDM Schema is described in section of this document.

Classification, Product properties, Various general authorization and organizational data that are related to core product identification play an important role in PDM systems. Product structures are the principle relationships that define assemblies and product configurations.