Introduction to STEP-NC

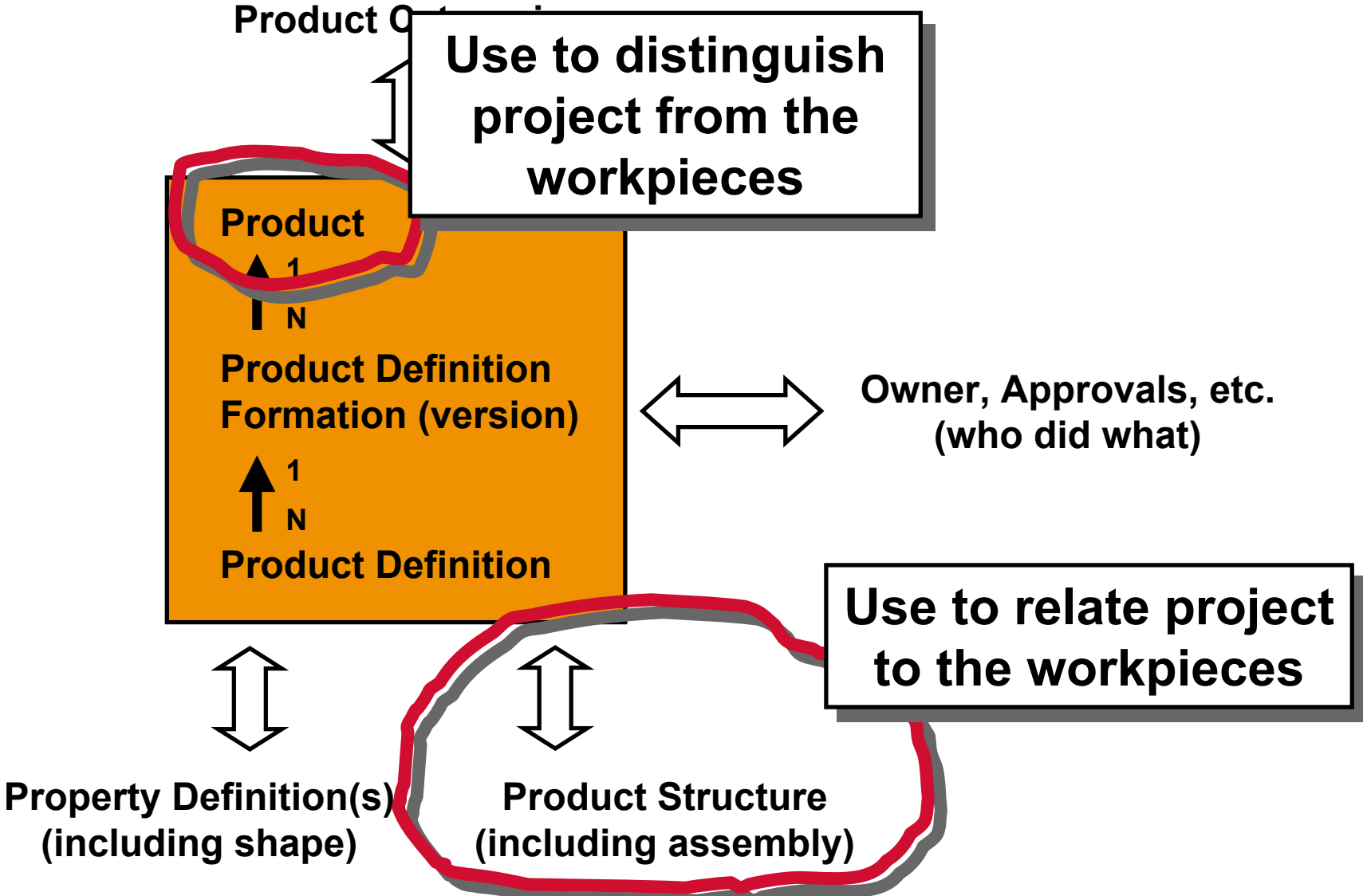*Project and Setups*
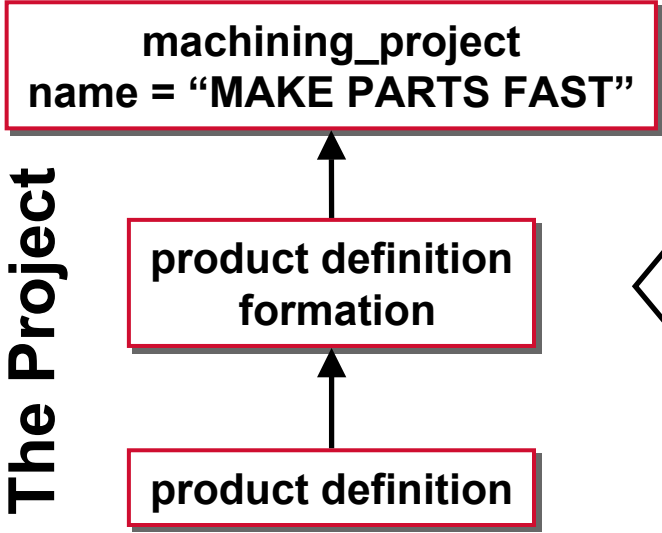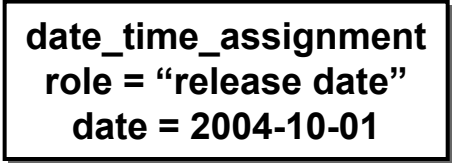
- ## Project is the root of a STEP-NC file
    - **Points to the main workplan**
    - **Points to one or more workpiece**

- ## Setups describe how the workpieces are oriented on the machine
    - **A setup may contain many workpieces, or multiple occurrences of one workpiece**

- ## Questions
    - **How are these represented in the AIM?**

- **Project is represented as a product**
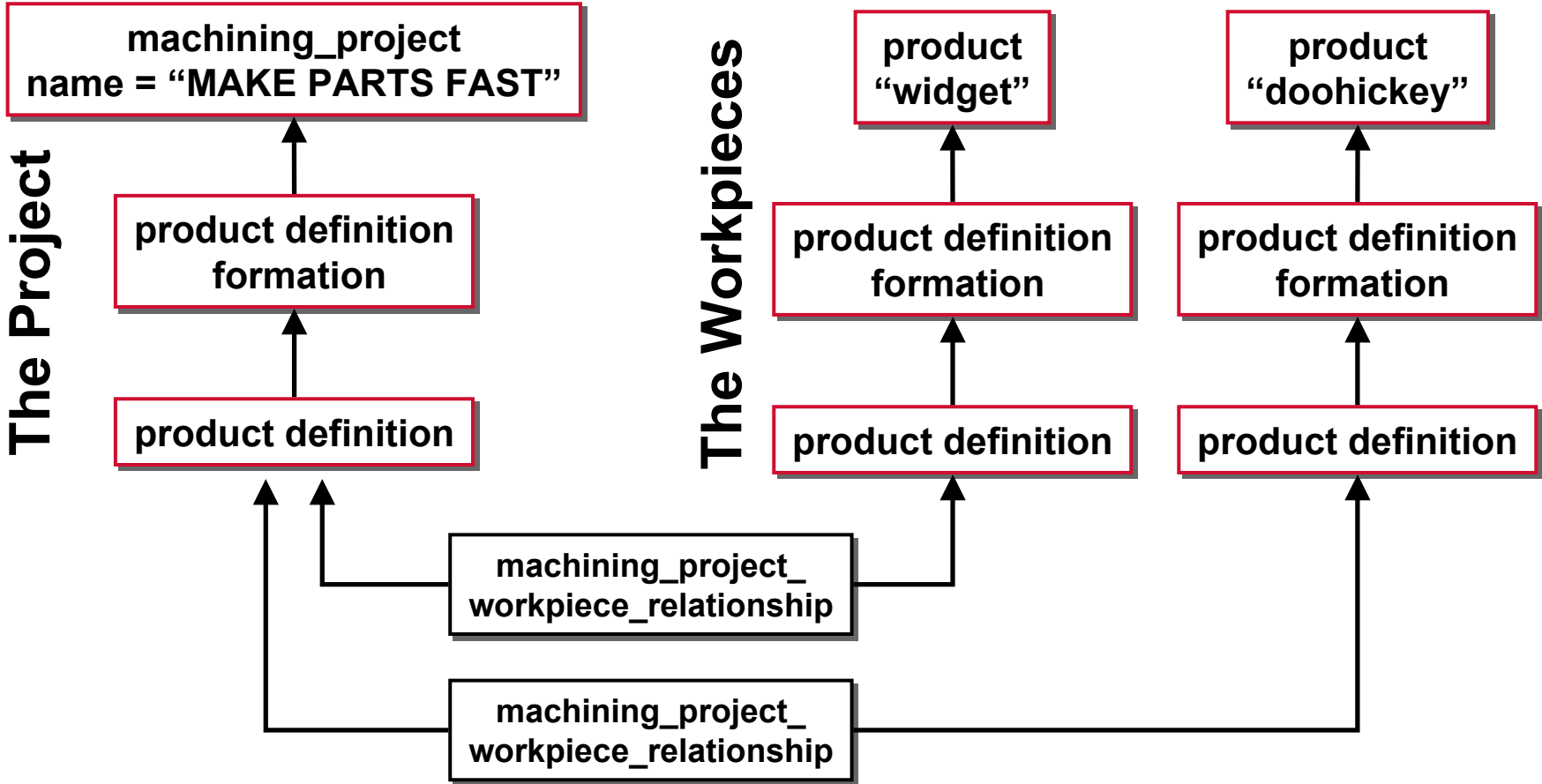 - We can use all of the PDM information to track the project as well as the workpieces
  - Use the product subtype "machining_project"
  - Workpieces just use product.

- **Project has a workplan and set of workpieces**
  - Workplan related as previously described
  - Workpieces are related using a product_definition_relationship subtype called machining_project_workpiece_relationship

Product Orientation

Use to distinguish project from the workpieces

Product

▲ 1

| N

Product Definition Formation (version)

⬌ **Owner, Approvals, etc. (who did what)**

▲ 1

N

Product Definition

Use to relate project to the workpieces

⬍ **Property Definition(s) (including shape)**

⬍ **Product Structure (including assembly)**

machining_project
name = "MAKE PARTS FAST"
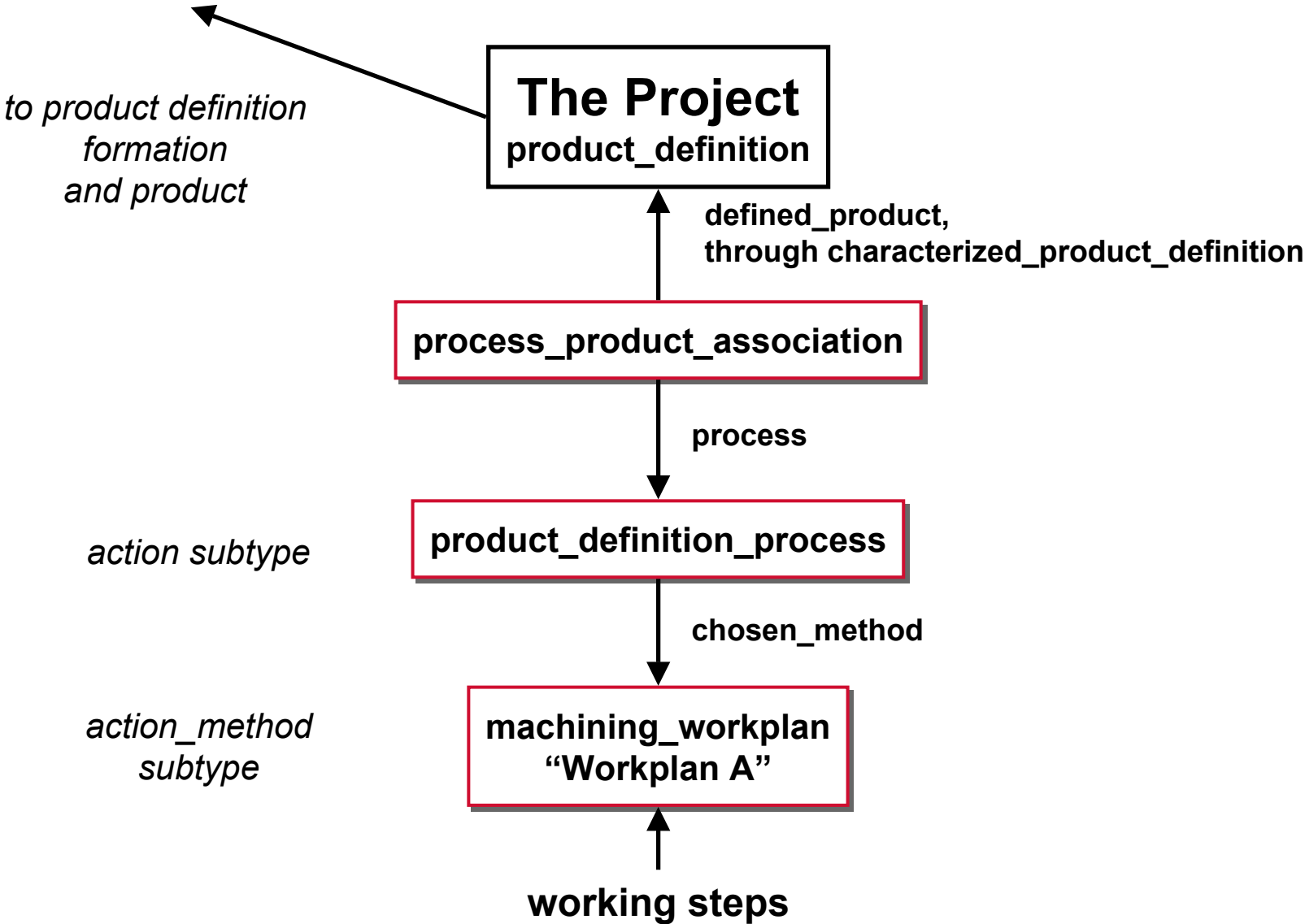
The Project

product definition formation

product definition

Design owner, approvals dates and times

person_organization_assignment
role = "design owner"
person = "Dave Rhodes"

date_time_assignment
role = "release date"
date = 2004-10-01

to product definition formation and product

The Project
product_definition

defined_product,
through characterized_product_definition

process_product_association

process

action subtype

product_definition_process

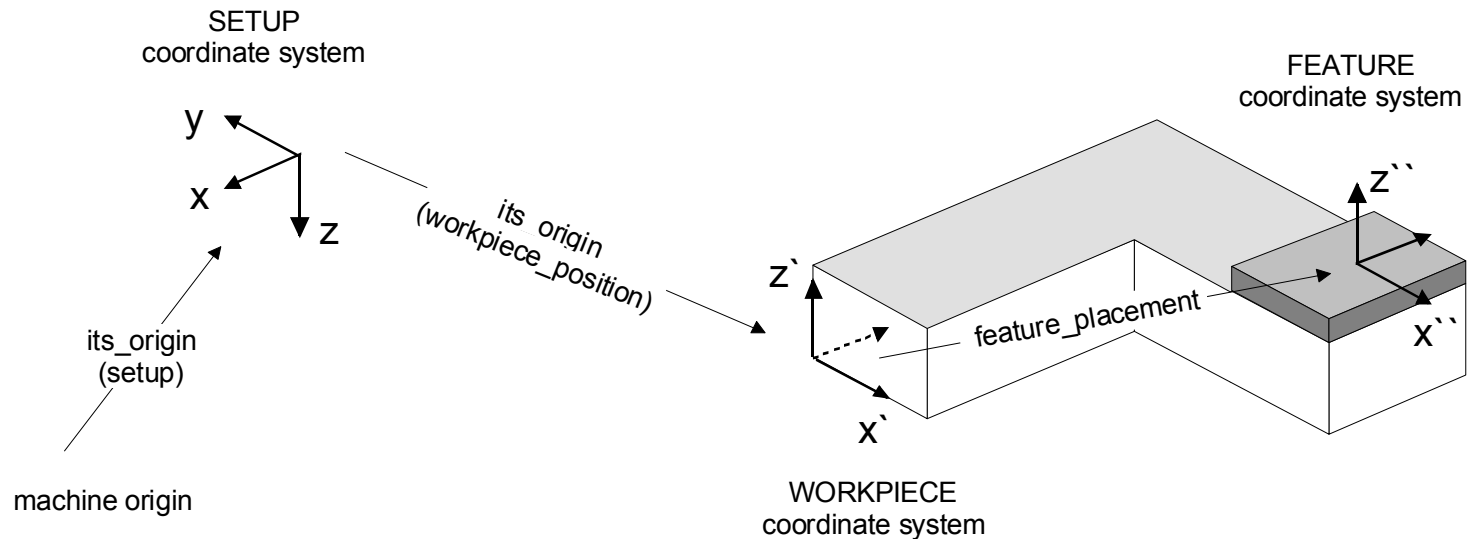**chosen_method**

action_method subtype

**machining_workplan "Workplan A"**

working steps

- **A setup describes the orientation and locations of workpieces on the machine**
  - **Referenced by a workplan**
  - **Conceptually similar to an assembly**
  - **A setup may have many copies of the same workpiece**
  - **Also describes "keep out" regions where fixtures may be.**

SETUP
coordinate system

FEATURE
coordinate system

y

x

z

its_origin
(workpiece_position)

z``

its_origin
(setup)

z`

feature_placement

x``

machine origin

x`

WORKPIECE
coordinate system

- ## Handled in the same way as machining projects
  - **A product subtype machining_setup**
  - **Relates to workpiece with a product_definition_relationship subtype machining_setup_workpiece_relationship**
  - **Transform within the setup are handles in the same way as STEP assemblies — with item-defined transforms.**

```
┌─────────────────────────┐     ┌─────────────────────┐   ┌─────────────────────┐
│  machining_setup /      │     │  product / pdf /    │   │  product / pdf /    │
│       pdf /             │     │ product definition  │   │ product definition  │
│  product definition     │     │     "widget"        │   │    "doohickey"      │
│ name = "Setup v1.0"     │     └─────────────────────┘   └─────────────────────┘
└─────────────────────────┘

          ┌──────────────────────┐
          │  machining_setup_    │
          │ workpiece_relationship│
          └──────────────────────┘

          ┌──────────────────────┐
          │  machining_setup_    │
          │ workpiece_relationship│
          └──────────────────────┘
```
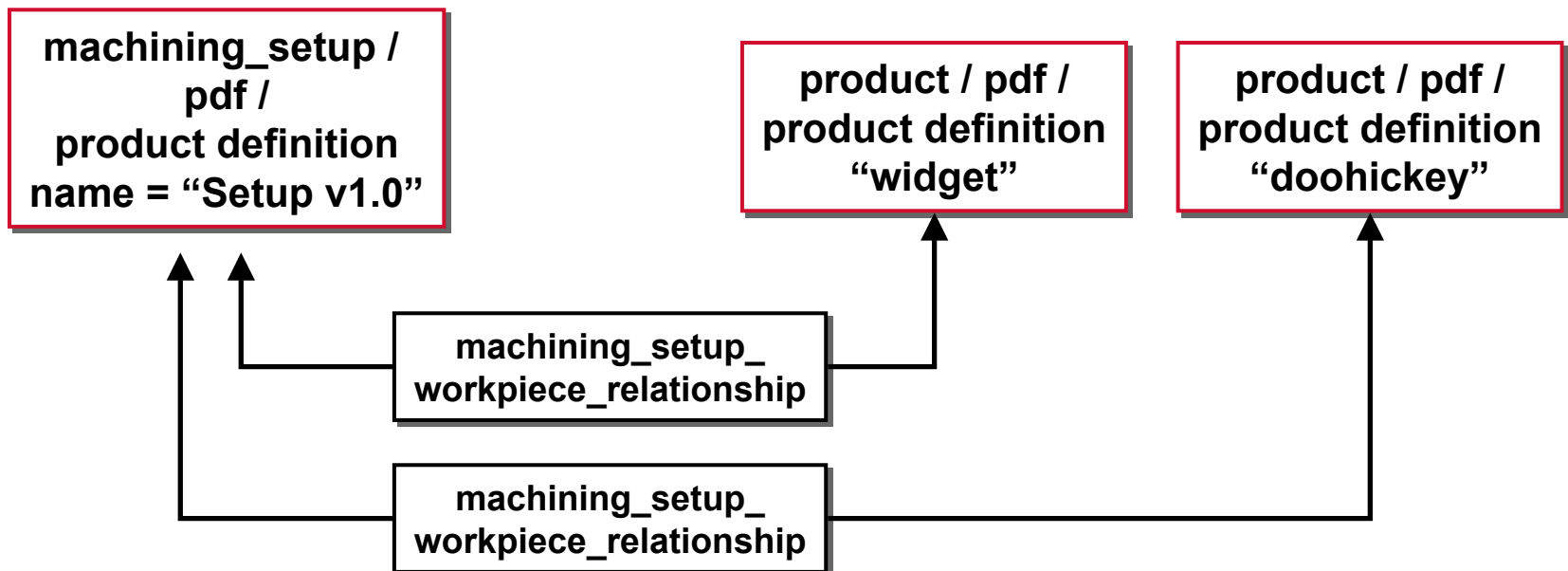
- **The placement of the workpiece within the setup is handled with a context dependent shape rep.**
  - Context-dependent shape representation relates an item defined transform to the relationship.
  - The item-defined transform points to an a2p3d in the setup's product definition shape that gives the workpiece offset.
  - Also points to an a2p3d in the workpiece shape that gives the origin for the workpiece.

- **This is the same technique used for describing the offset of components within an assembly.**
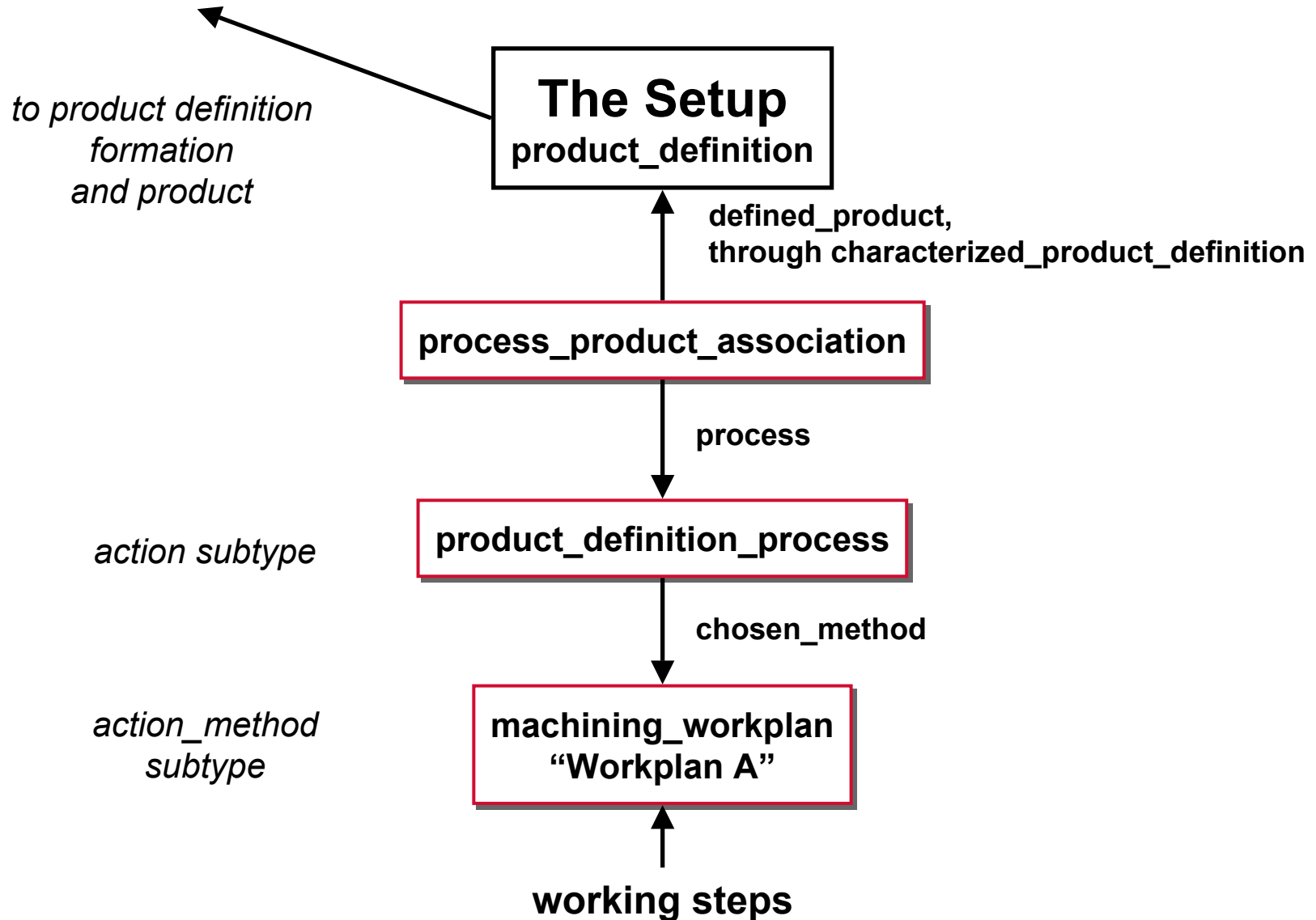
- ## Project is the root of a STEP-NC file
  - **Points to the main workplan**
  - **Points to one or more workpiece**

  - **Mapped as machining_project product subtype**

- ## Setups describe how the workpieces are oriented on the machine
  - **Referenced by a workplan.**

  - **Mapped as machining_setup product subtype**
  - **Similar to a mechanical assembly, needs a bit more investigation to make sure it is harmonized.**