Winner
2007 & 2021
Lawrence D. Eicher Leadership Award

UUIDs for Digital Twins

Saratoga Springs
Combined meeting of WG12 & WG15
“After the DMDII we travelled in different directions”

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Application twin modeling

- Application interpreted model (AIM):
  - Fundamental model of all products
  - Normalized, integrated, unchanging
- Application requirements model (ARM):
  - Necessary model for a type of product
  - Sufficient, unique, unambiguous
- Application twin model (ATM):
  - Fit for purpose model of a physical product
  - Helpful, accurate, comprehensive

EXPRESS for digital twins

- **IDENTIFIED** ENTITY Drill_and_fill_twin
  SUBTYPE OF (Manufacturing_feature_twin);
    hole_in_place : BOOLEAN; -- in-place means is on the wing
    pilot_hole_in_place : BOOLEAN;
    tack_in_place : OPTIONAL **AGGREGATION** Product_view_twin;
    fastener_in_place : OPTIONAL **AGGREGATION** Product_view_twin;
    collar_in_place : OPTIONAL **AGGREGATION** Product_view_twin;
    washer_count : OPTIONAL count_measure;
    sealed : OPTIONAL **AGGREGATION** Product_view_twin;
    engineering_fit : OPTIONAL hole_class;
    disposition : drill_and_fill_condition;
    true_location : **COMPOSITION** geometric_tolerance_twin;
    true_size : **COMPOSITION** dimensional_size_twin;
    true_form : OPTIONAL **COMPOSITION** geometric_tolerance_twin;
  WHERE
   WR1: true_location.prototype ISA position_tolerance;
   WR2: true_size.prototype ISA diameter_size_tolerance;
   WR3: true_form.prototype ISA roundess_tolerance OR cylindricity_tolerance
  END_ENTITY;

New keywords

- The keyword IDENTIFIED is used for entities that have a (UUID) identity in dependent of the product model.
- The keyword COMPOSITION is used to denote an existence dependency between two entities that have identity.
- The keyword AGGREGATION is used to denote an accumulation of one id entified entity within another identified entity.
- The keyword **OUTSIDE** might be used to indicate where information is us eful outside of the file/context
- Expect more

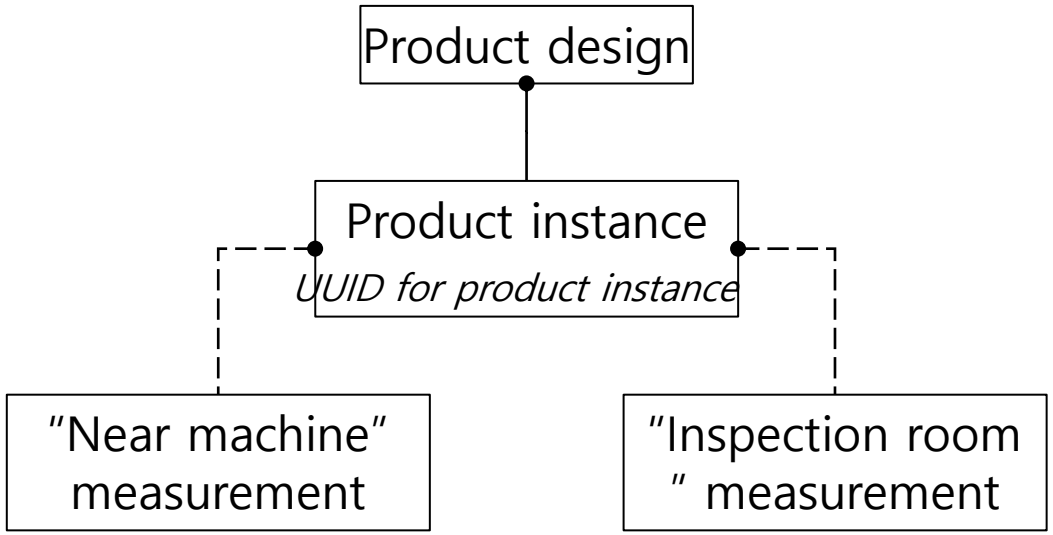
What is fit for purpose?

- Fit for known usage
- Fit for predicted usage
- Fit for unpredicted usage (by building on the ARM and AIM)

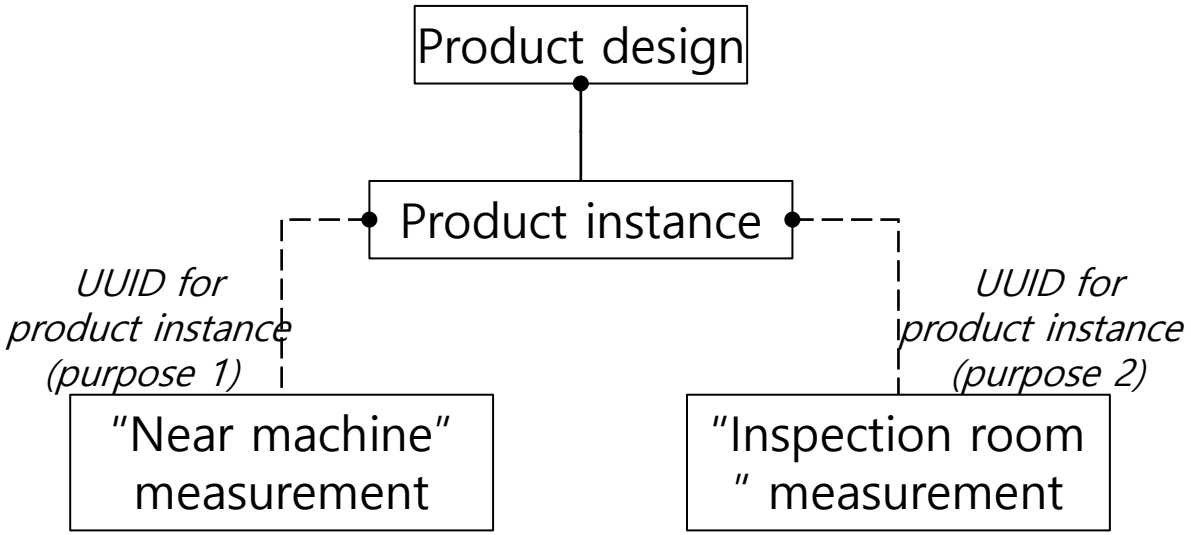
Relationship to a Use Case

- The Use Case is the input to a modeling activity
- The Fit for Purpose is the result of the activity
- The rules are different
  - The AIM is about normalization
  - The ARM is about necessary and sufficient
  - The ATM is about comprehensive and inclusive

- If the use case requires a digital twin of a widget then the ATM should include all of its properties from inception to obsolescence

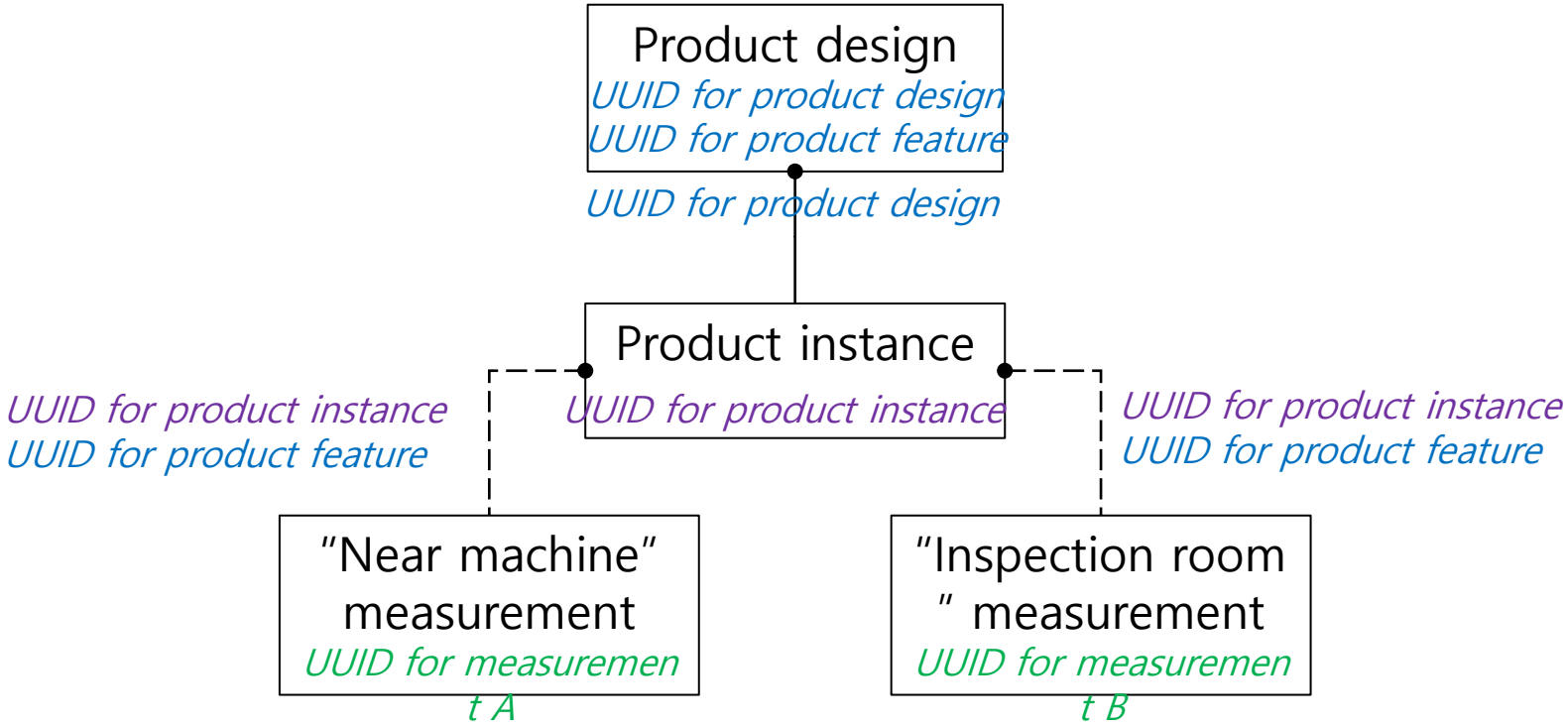


"persistent" UUID



"less persistent" UUID

Is this how we would like to use UUIDs?



"persistent" UUID