Department of Veterans Affairs
Veteran Health Administration
Knowledge Based Systems
Informatics Architecture Support Services

SNOMED International Drug Model

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International drug model – v0.4

Goals

- Common generic-level concepts to serve as anchors for national product-specific extensions
- IDMP alignment / compatibility
- International interoperability
- Simplify and enable CDS
- Targets for concepts in other hierarchies

Alpha release browser: http://browser.ihtsdotools.org/drugs.html?

Fundamental Issues

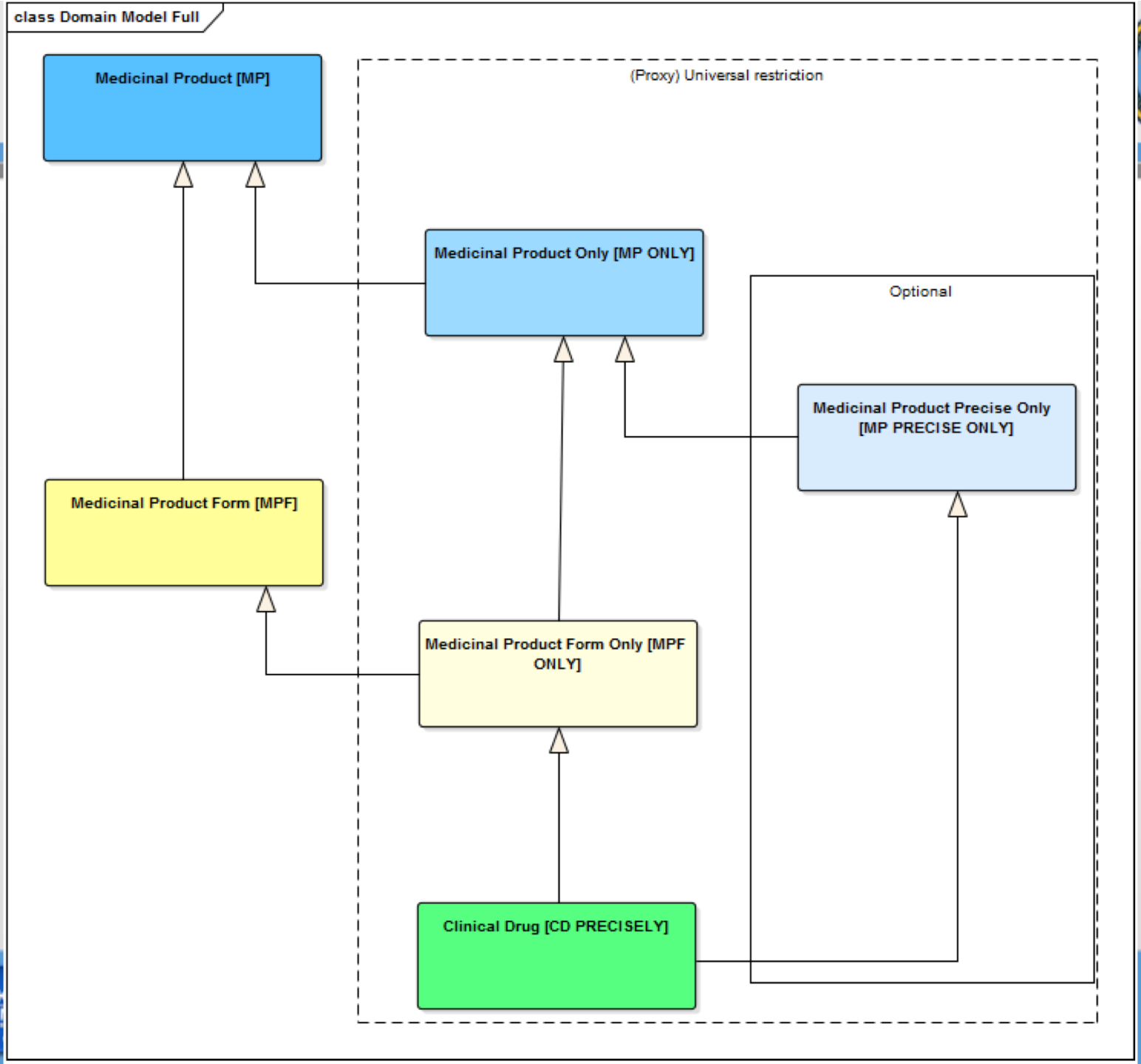
- Open-world vs closed-world
- Products containing vs Products containing only

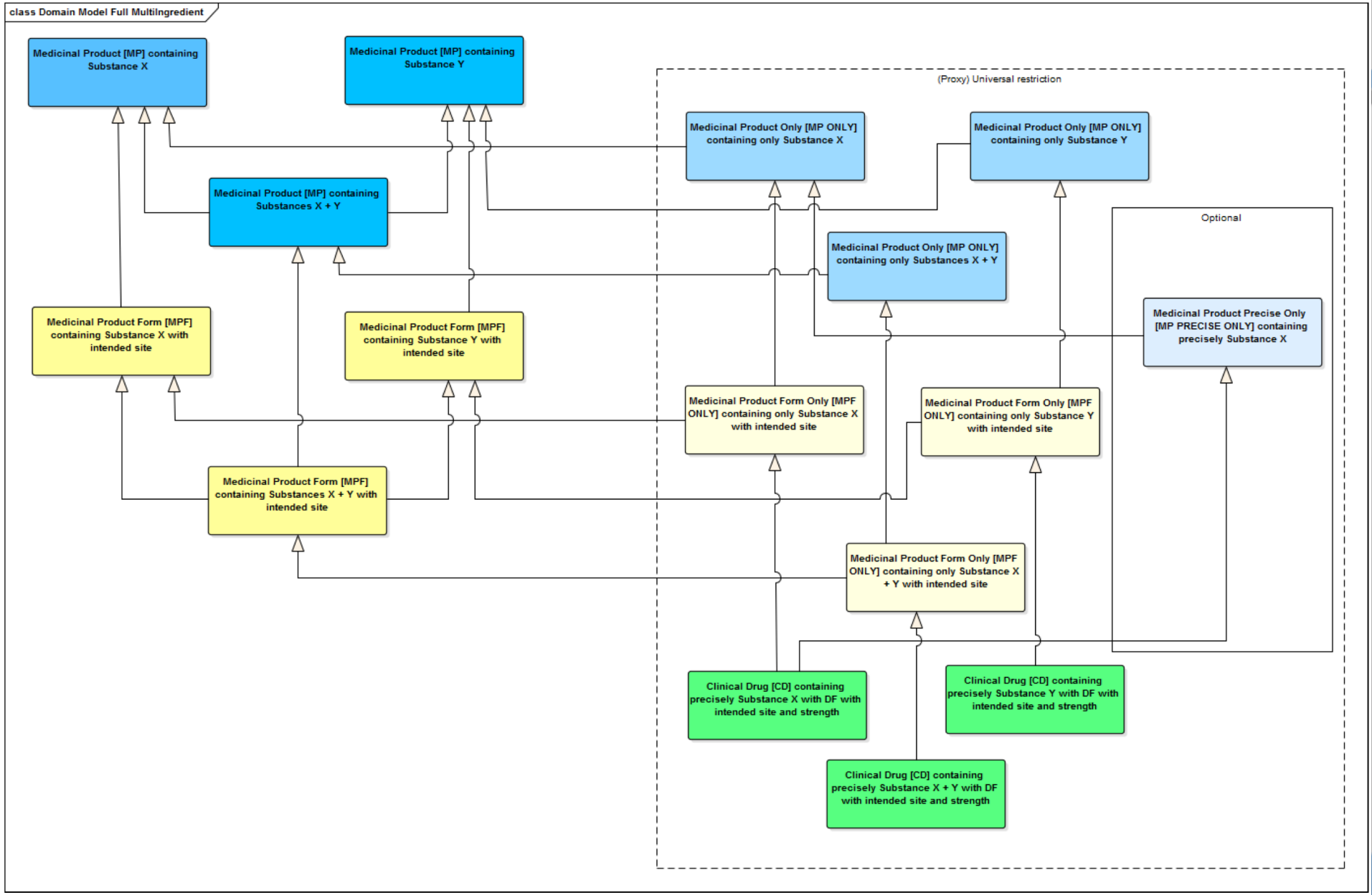
- IMDP is closed-world model, also no hierarchy

- DL limitations
  - Existential vs Universal quantification
- DL work-around pattern
  - Ingredient counting

IDMP – ISO 11616

- PhPID_SUB_L1 → Substance(s) Term
- PhPID_ SUB _L2 → Substance Term(s) + Strength + Reference Strength
- PhPID_ SUB _L3 → Substance Term(s) + Administrable Dose Form
- PhPID_ SUB _L4 → Substance(s) Term+ Strength + Reference Strength + Administrable Dose Form


class Domain Model Full
Medicinal Product [MP]
(Proxy) Universal restriction
Medicinal Product Only [MP ONLY]
Optional
Medicinal Product Precise Only [MP PRECISE ONLY]
Medicinal Product Form [MPF]
Medicinal Product Form Only [MPF ONLY]
Clinical Drug [CD PRECISELY]


class Domain Model Full MultiIngredient
Medicinal Product [MP] containing Substance X
Medicinal Product [MP] containing Substance Y
Medicinal Product [MP] containing Substances X + Y
Medicinal Product Form [MPF] containing Substance X with intended site
Medicinal Product Form [MPF] containing Substance Y with intended site
Medicinal Product Form [MPF] containing Substances X + Y with intended site
(Proxy) Universal restriction
Medicinal Product Only [MP ONLY] containing only Substance X
Medicinal Product Only [MP ONLY] containing only Substance Y
Medicinal Product Only [MP ONLY] containing only Substances X + Y
Optional
Medicinal Product Precise Only [MP PRECISE ONLY] containing precisely Substance X
Medicinal Product Form Only [MPF ONLY] containing only Substance X with intended site
Medicinal Product Form Only [MPF ONLY] containing only Substance Y with intended site
Medicinal Product Form Only [MPF ONLY] containing only Substance X + Y with intended site
Clinical Drug [CD] containing precisely Substance X with DF with intended site and strength
Clinical Drug [CD] containing precisely Substance Y with DF with intended site and strength
Clinical Drug [CD] containing precisely Substance X + Y with DF with intended site and strength

Grouping in SNOMED

Pharmaceutical characteristics

- Medicinal Product (active ingredient) ~ AMT MP
- Medicinal Product Form (+ dose form)
- Clinical Drug (+ strength) ~ AMT MPUU

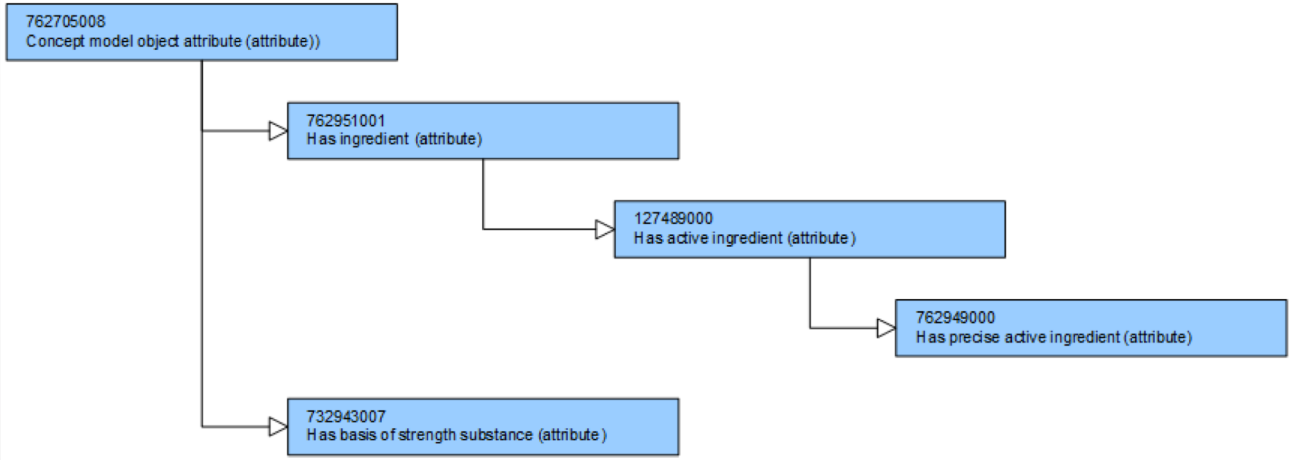
Chemical or behavioural characteristics

- Disposition (mechanism of action)
- Chemical Structure
- Structure and Disposition

Other

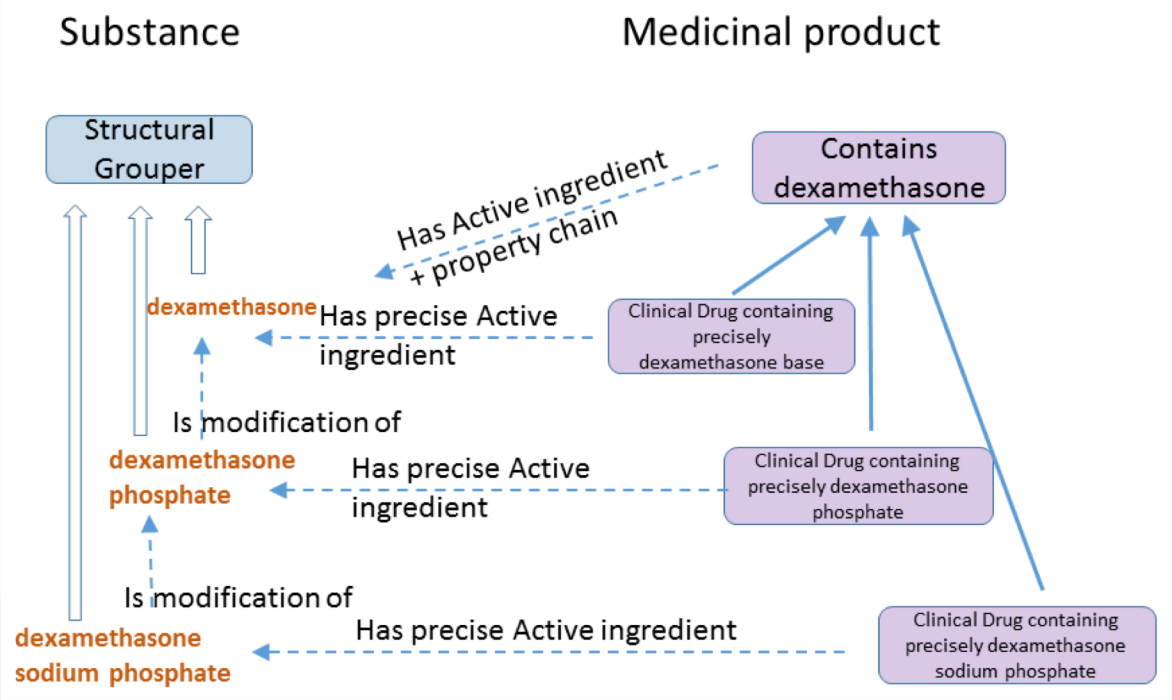
- Intended Site of Administration
- Therapeutic Role (still under development)

Attributes



Role chaining

Has active ingredient ∘ Is modification ⊑ Has active ingredient


Substance
Medicinal product
Structural Grouper
Contains dexamethasone
Has Active ingredient + property chain
dexamethasone
Has precise Active ingredient
Clinical Drug containing precisely dexamethasone base
Is modification of
dexamethasone phosphate
Has precise Active ingredient
Clinical Drug containing precisely dexamethasone phosphate
Is modification of
dexamethasone sodium phosphate
Has precise Active ingredient
Clinical Drug containing precisely dexamethasone sodium phosphate

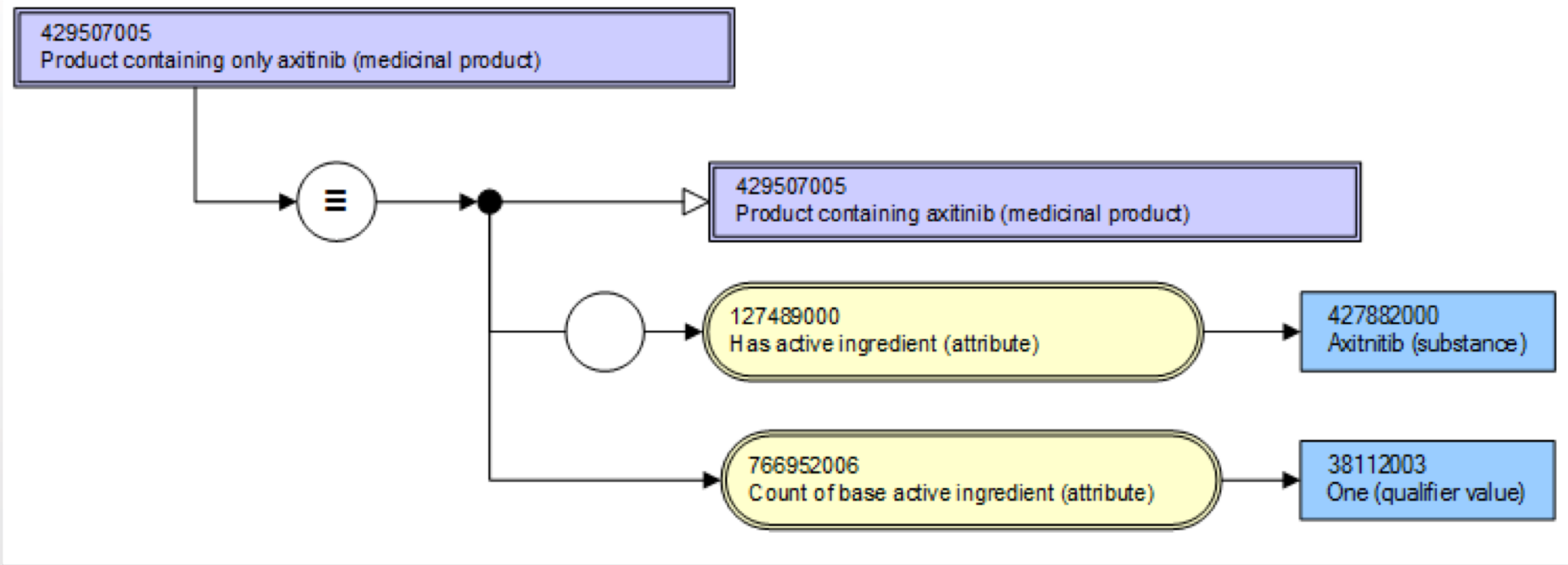
Medicinal Product (MP)

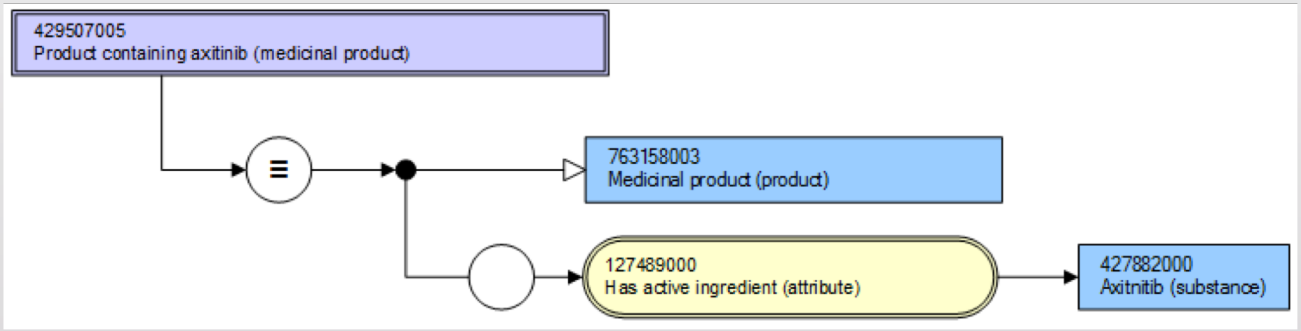
- MP containing : July 2018
  [1..*]{ Has active ingredient = < Substance }
- MP only : Jan 2019
  [1..*]{ Has active ingredient = < Substance }
  [1..1]Count of base active ingredient = < Number
- MP precisely : Extensions only
  [1..*]{ Has precise active ingredient = < Substance }
  [1..1]Count of base active ingredient = < Number
  [0..1]Count of base and modification pair = < Number
  [0..1]Count of active ingredient = < Number

Use cases

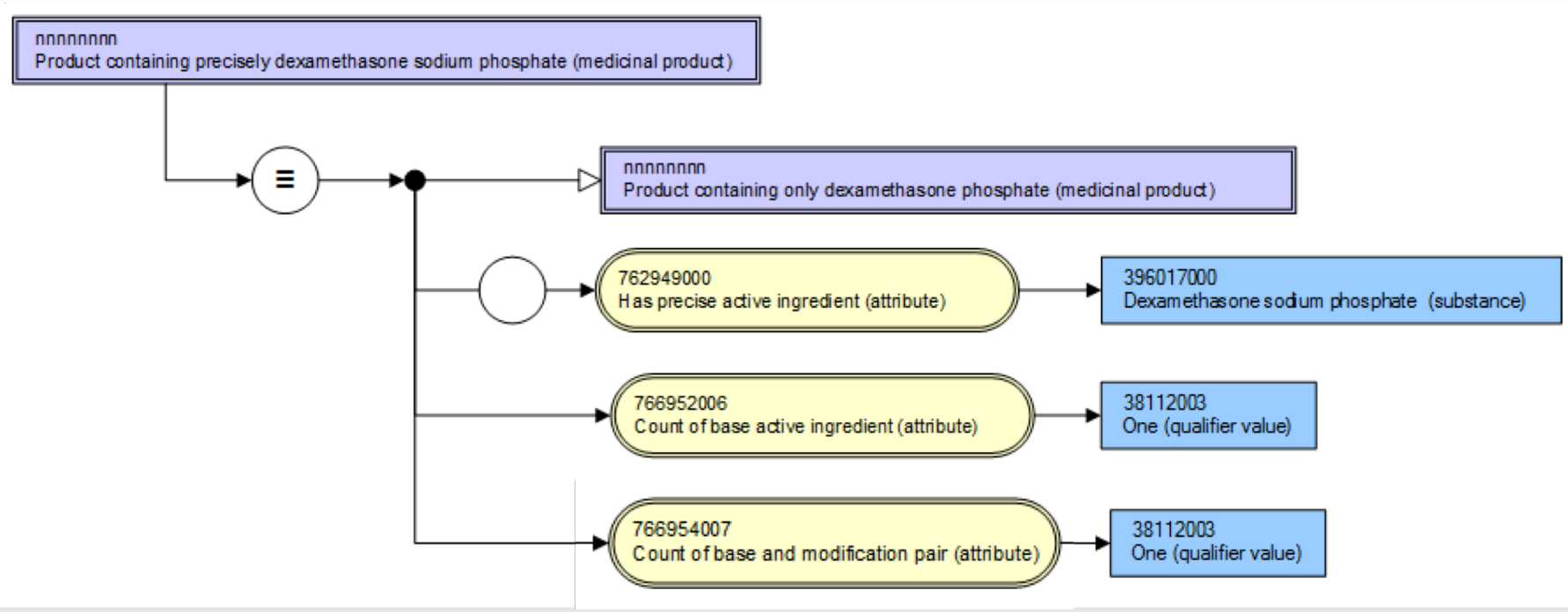
- MP
  - Analysis; aggregation concept
- MP only
  - Generics prescribing
  - CDS, protocols, treatment guidelines
  - Patient records
  - Adverse events / reactions
  - Analysis / research
  - Target for other SNOMED concepts
- MP precisely
  - As for MP only, when more substance detail significant
  - National extensions only

MP only


429507005
Product containing only axitinib (medicinal product)
≡
429507005
Product containing axitinib (medicinal product)
127489000
Has active ingredient (attribute)
427882000
Axitnitib (substance)
766952006
Count of base active ingredient (attribute)
38112003
One (qualifier value)


429507005
Product containing axitinib (medicinal product)
≡
763158003
Medicinal product (product)
127489000
Has active ingredient (attribute)
427882000
Axitnitib (substance)

MP precisely



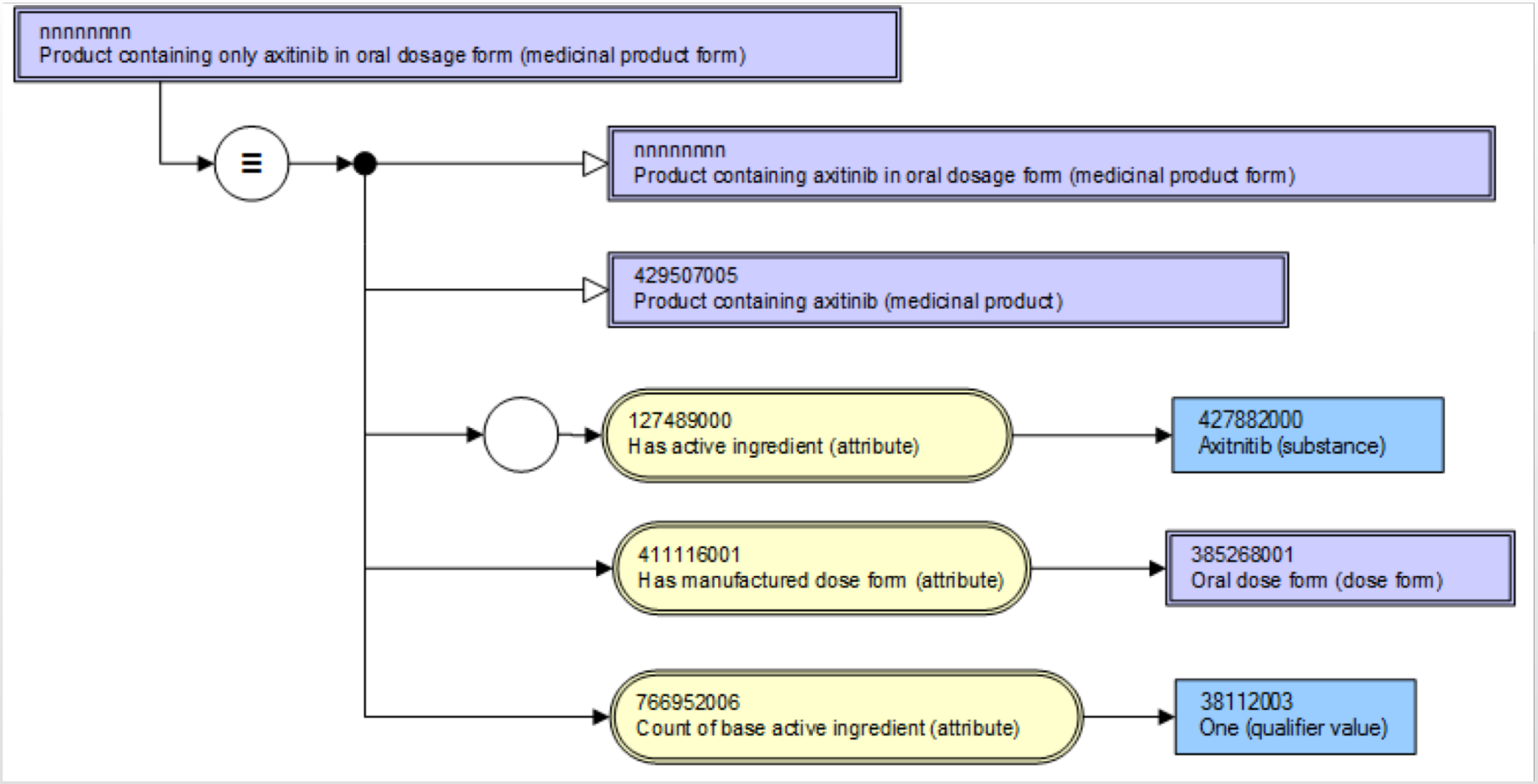
No *has active ingredient* relationship to base substance *Dexamethasone* in inferred form; redundant relationships are omitted

has active ingredient = Dexamethasone sodium phosphate (from parent role)
has active ingredient = Dexamethasone (from role chain)

Medicinal Product Form (MPF)

- MPF containing : July 2018, Jan 2019
  [1..1]Has manufactured dose form = <Pharm. dose form
  [1..*]{ Has active ingredient = < Substance }
- MPF only : July 2018, Jan 2019
  [1..1]Has manufactured dose form = <Pharm. dose form
  [1..*]{ Has active ingredient = < Substance }
  [1..1]Count of base active ingredient = < Number
- MPF precisely Extensions only
  - Same pattern as MP precisely
  - Not compatible with PhPID_SUB_C3
    - *"administrable dose form"*

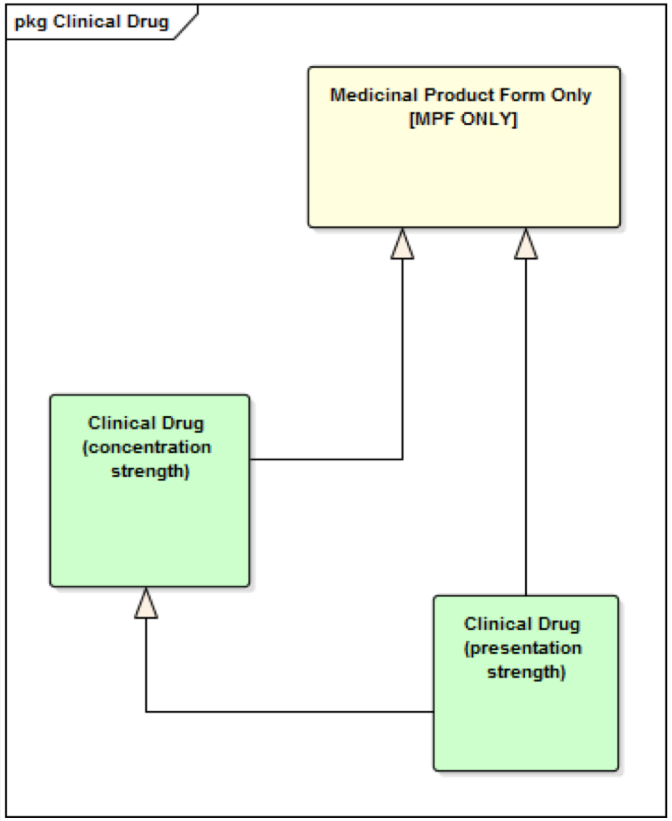
MPF only


nnnnnnnn
Product containing only axitinib in oral dosage form (medicinal product form)
≡
nnnnnnnn
Product containing axitinib in oral dosage form (medicinal product form)
429507005
Product containing axitinib (medicinal product)
127489000
Has active ingredient (attribute)
427882000
Axitnitib (substance)
411116001
Has manufactured dose form (attribute)
385268001
Oral dose form (dose form)
766952006
Count of base active ingredient (attribute)
38112003
One (qualifier value)

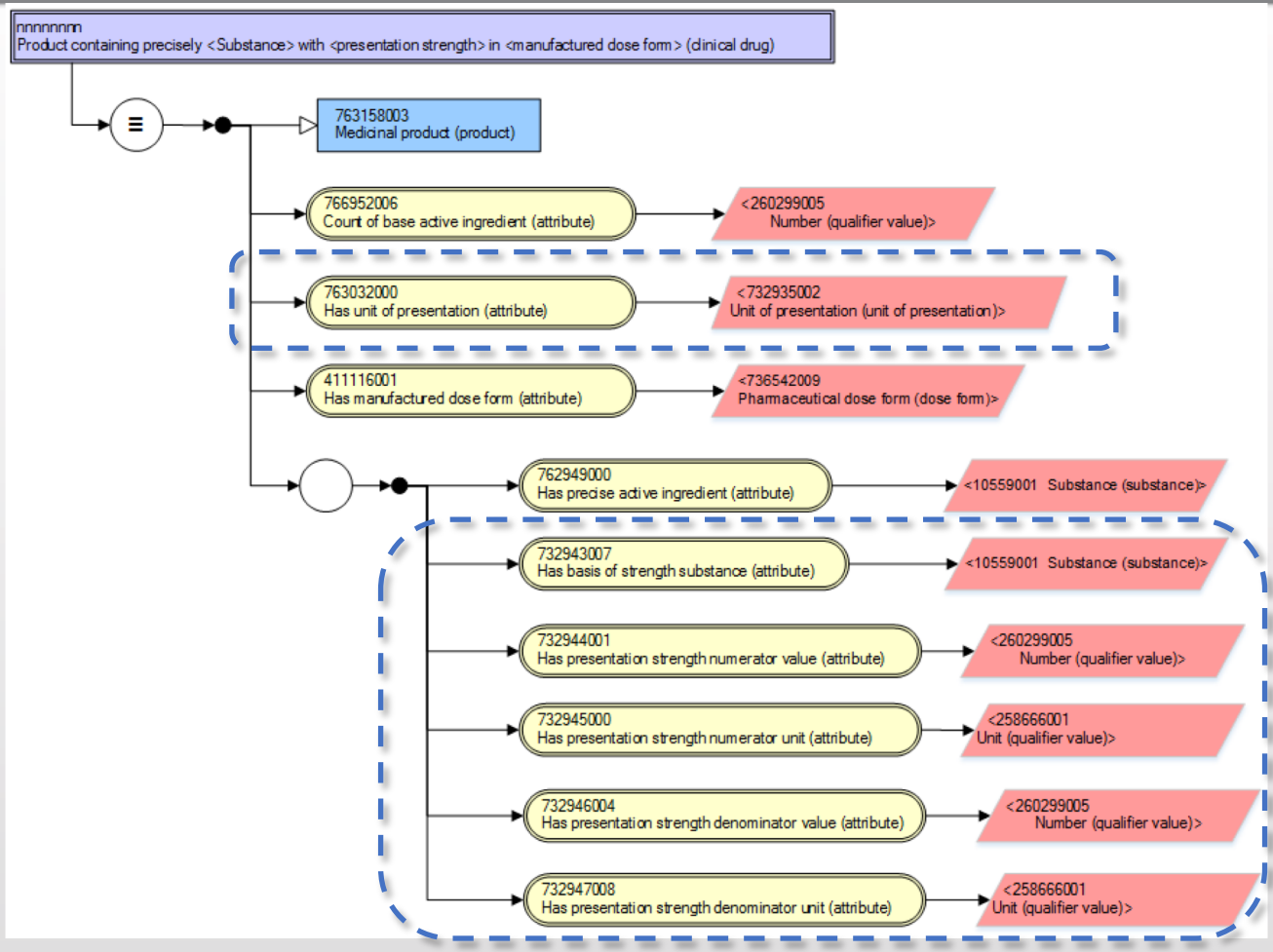
Clinical Drug (CD precisely)

- Presentation strength only July 2018
- Concentration strength only
- Presentation and concentration strength July 2018, Jan 2019, July 2019

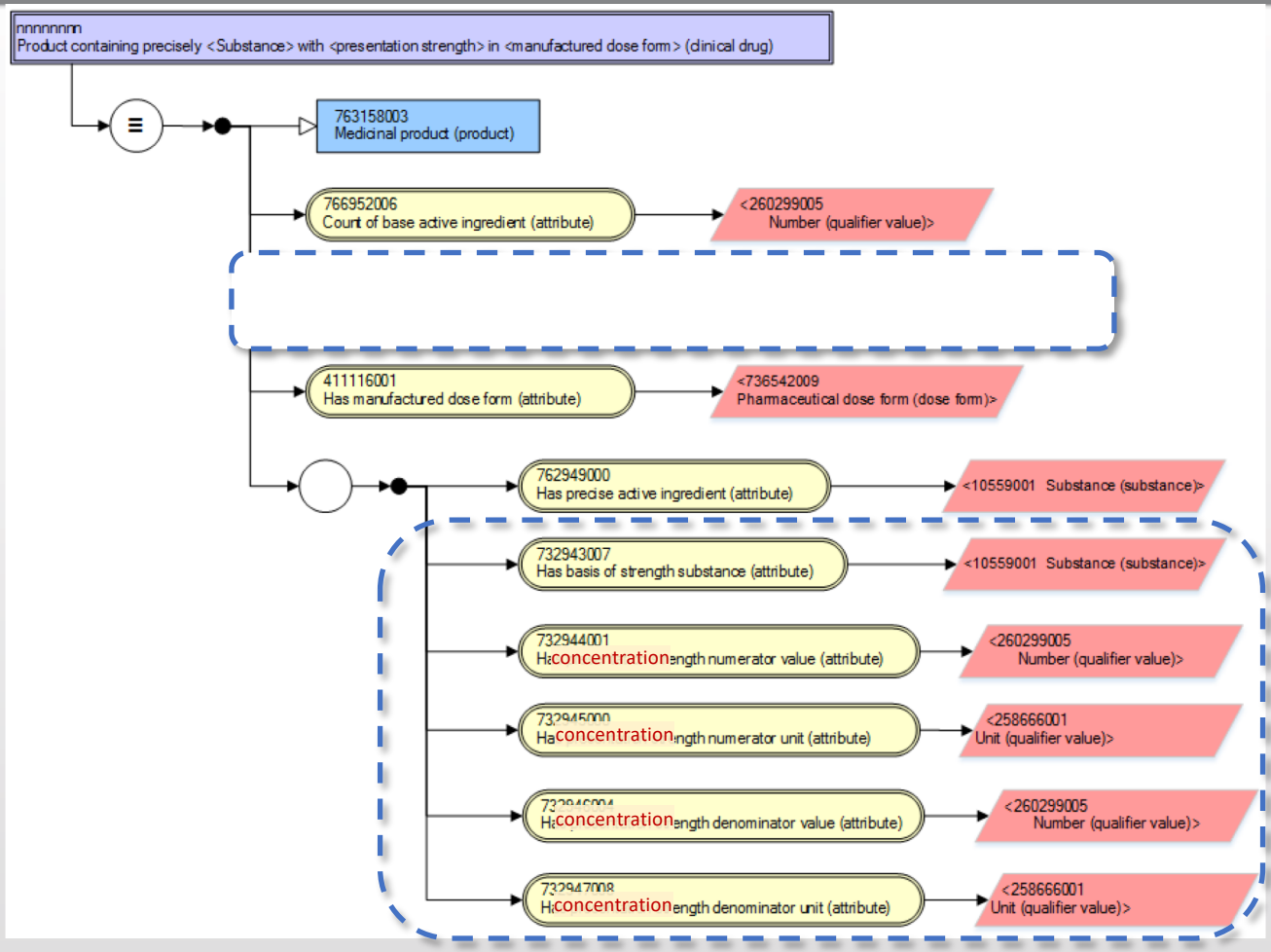
- most closely related to the Manufactured Item of IDMP
- closest international representation of products authorized by national regulatory agencies

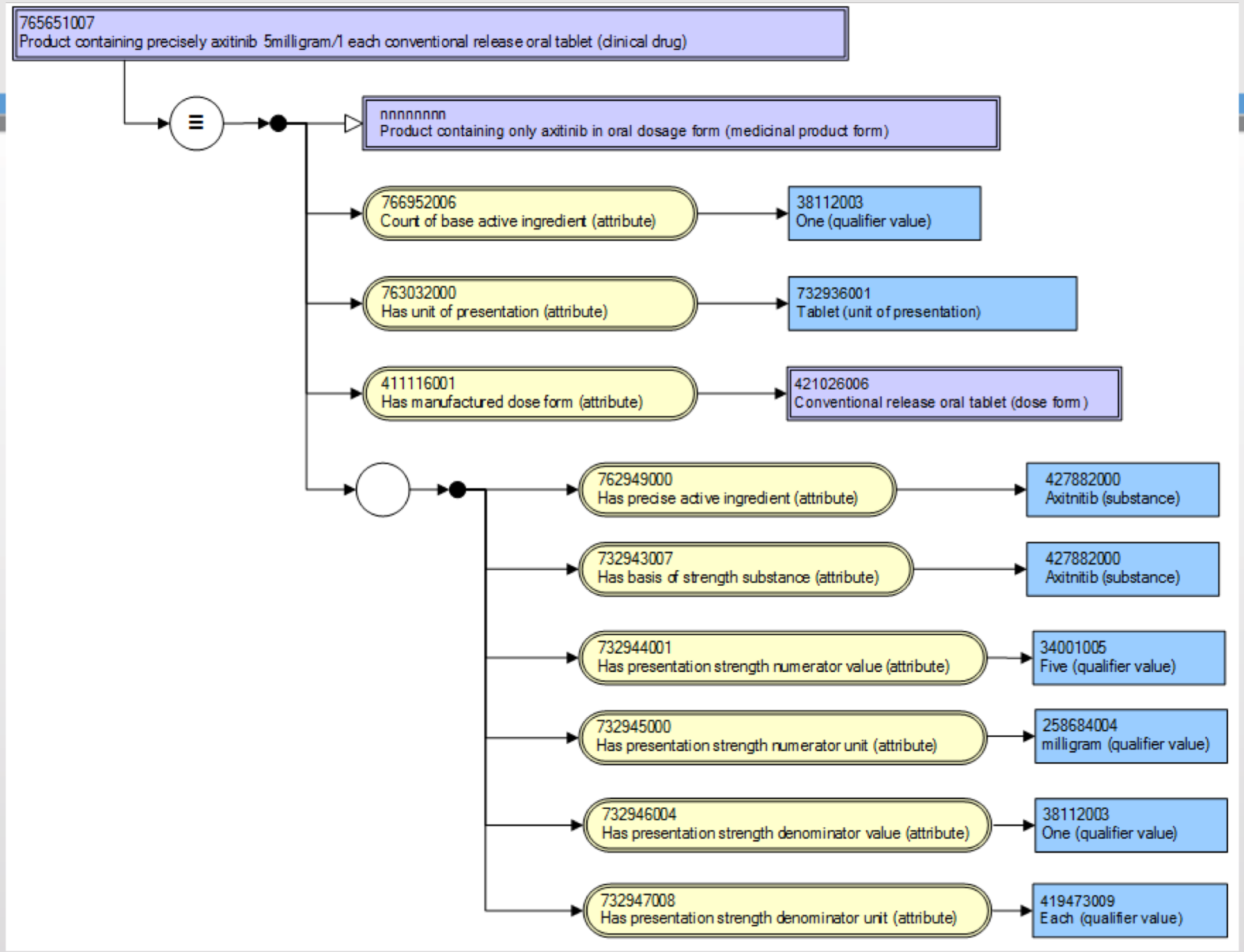


CD precisely (presentation strength)



CD precisely (concentrat'n strength)




765651007
Product containing precisely axitinib 5milligram/1 each conventional release oral tablet (clinical drug)
≡
nnnnnnnn
Product containing only axitinib in oral dosage form (medicinal product form)
766952006
Count of base active ingredient (attribute)
38112003
One (qualifier value)
763032000
Has unit of presentation (attribute)
732936001
Tablet (unit of presentation)
411116001
Has manufactured dose form (attribute)
421026006
Conventional release oral tablet (dose form)
762949000
Has precise active ingredient (attribute)
427882000
Axitnitib (substance)
732943007
Has basis of strength substance (attribute)
427882000
Axitnitib (substance)
732944001
Has presentation strength numerator value (attribute)
34001005
Five (qualifier value)
732945000
Has presentation strength numerator unit (attribute)
258684004
milligram (qualifier value)
732946004
Has presentation strength denominator value (attribute)
38112003
One (qualifier value)
732947008
Has presentation strength denominator unit (attribute)
419473009
Each (qualifier value)

SNOMED “value add”

- CD (only) presentation and CD (only) concentration concepts are directly compatible with the IDMP Manufactured Item

- Manufactured Item is not an "identified" class in IDMP

Problems

1. Conditional ingredient counting
   - Cannot be a basis for extension if modelling rules depend on global content
   - Lack of consistency for consumers
   - Counts are defining characteristics
2. Naming of counting properties / clear definition of counting rules
3. Disjointness rules for substances?
4. Concepts as numbers
5. Consistency (or not) of units across Clinical Drugs

Questions?