



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

**Integrated Taxonomy:
Aligning AMT with the SNOMED drug model**

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International drug model

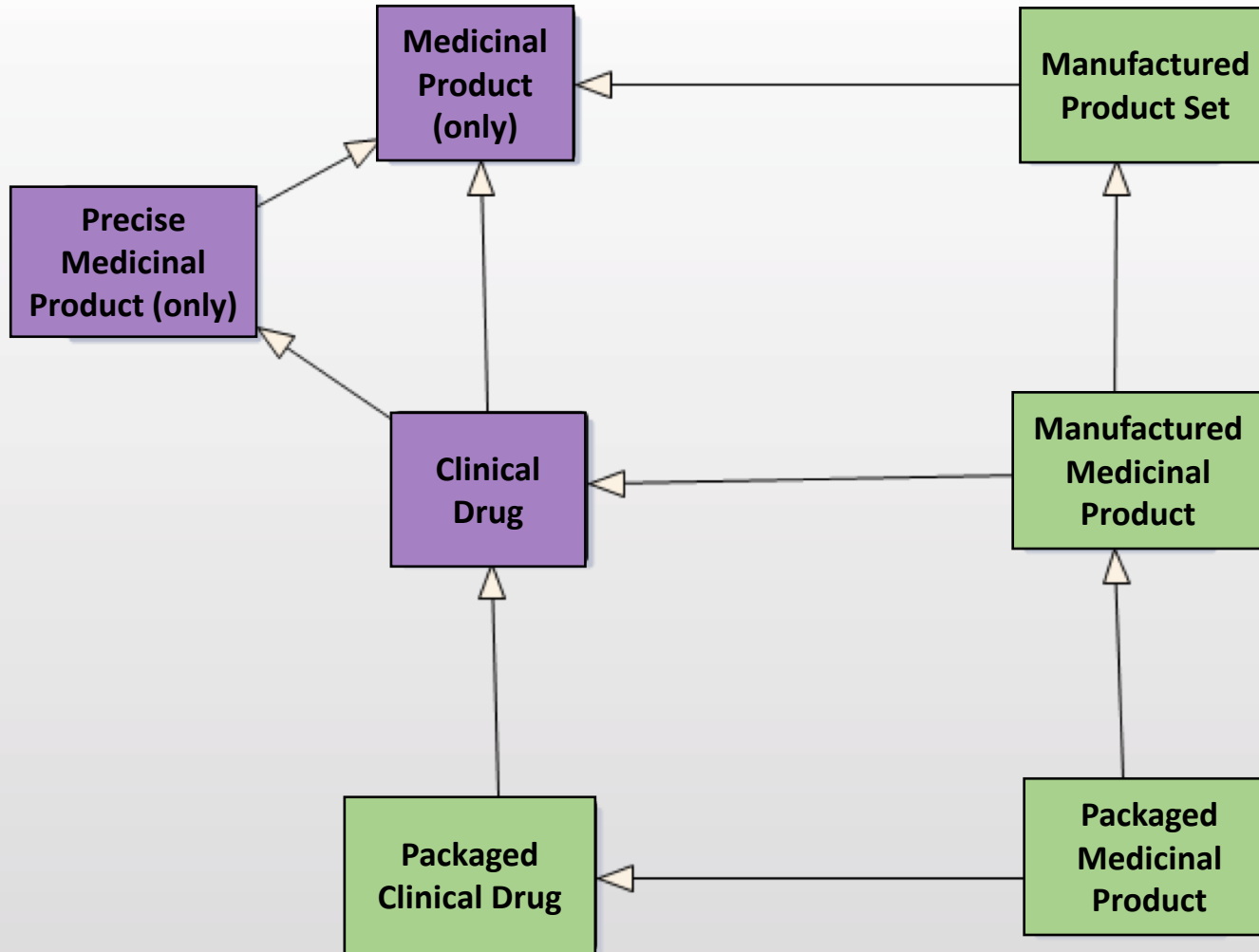


Goal:

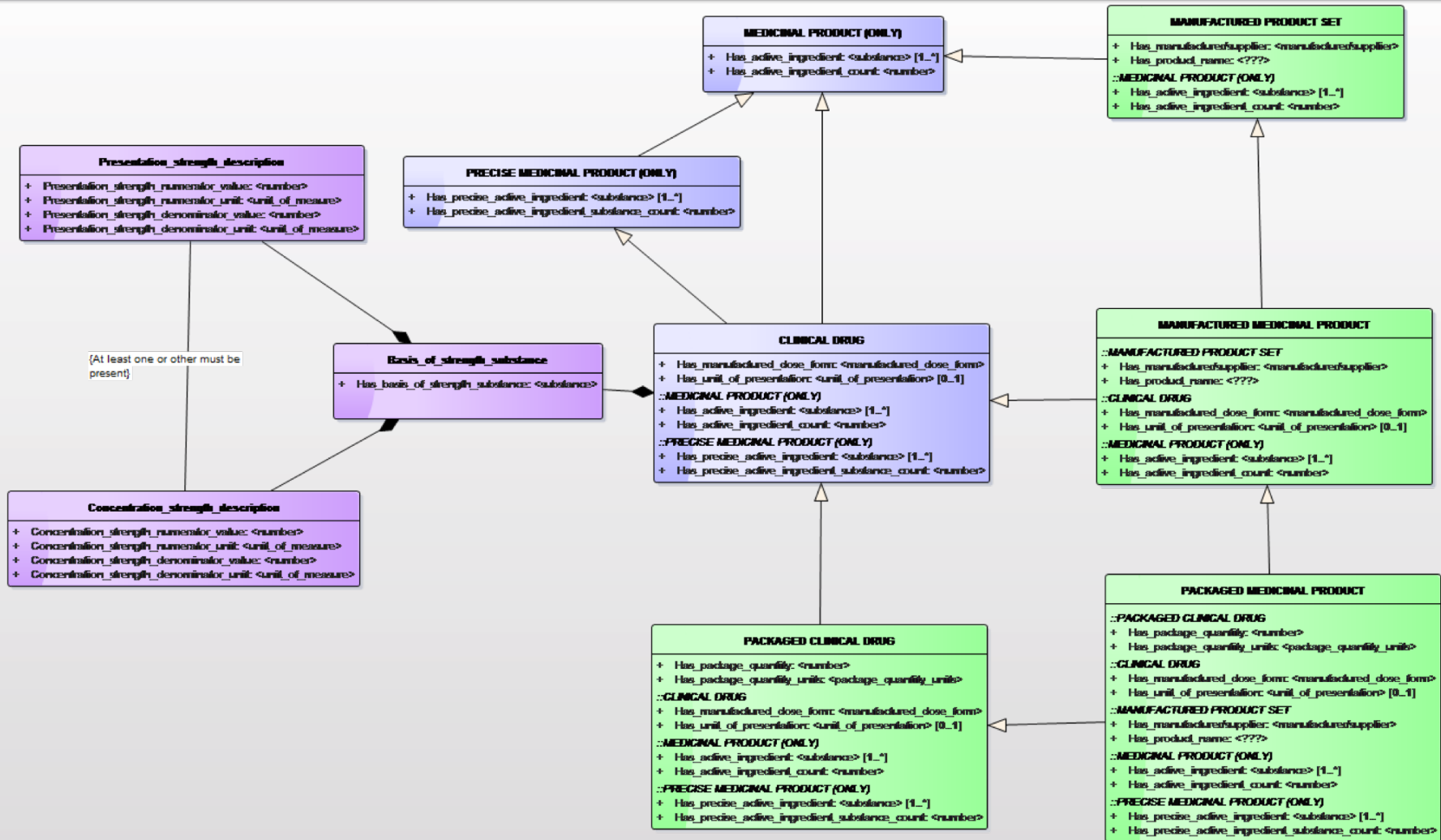
- Common generic-level concepts to serve as anchors for national product-specific extensions
- Simplify and enable CDS

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

International drug model



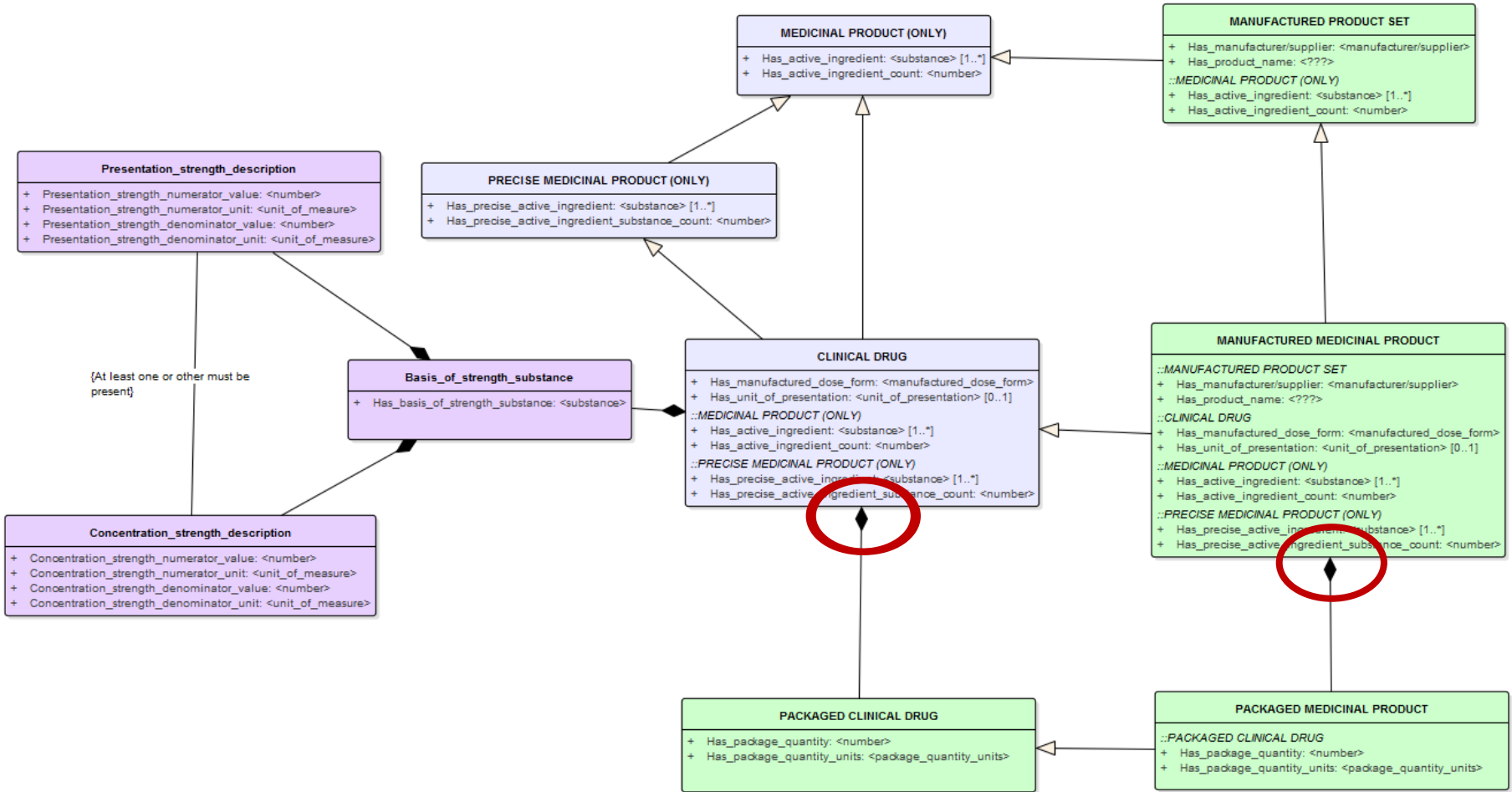
International drug model



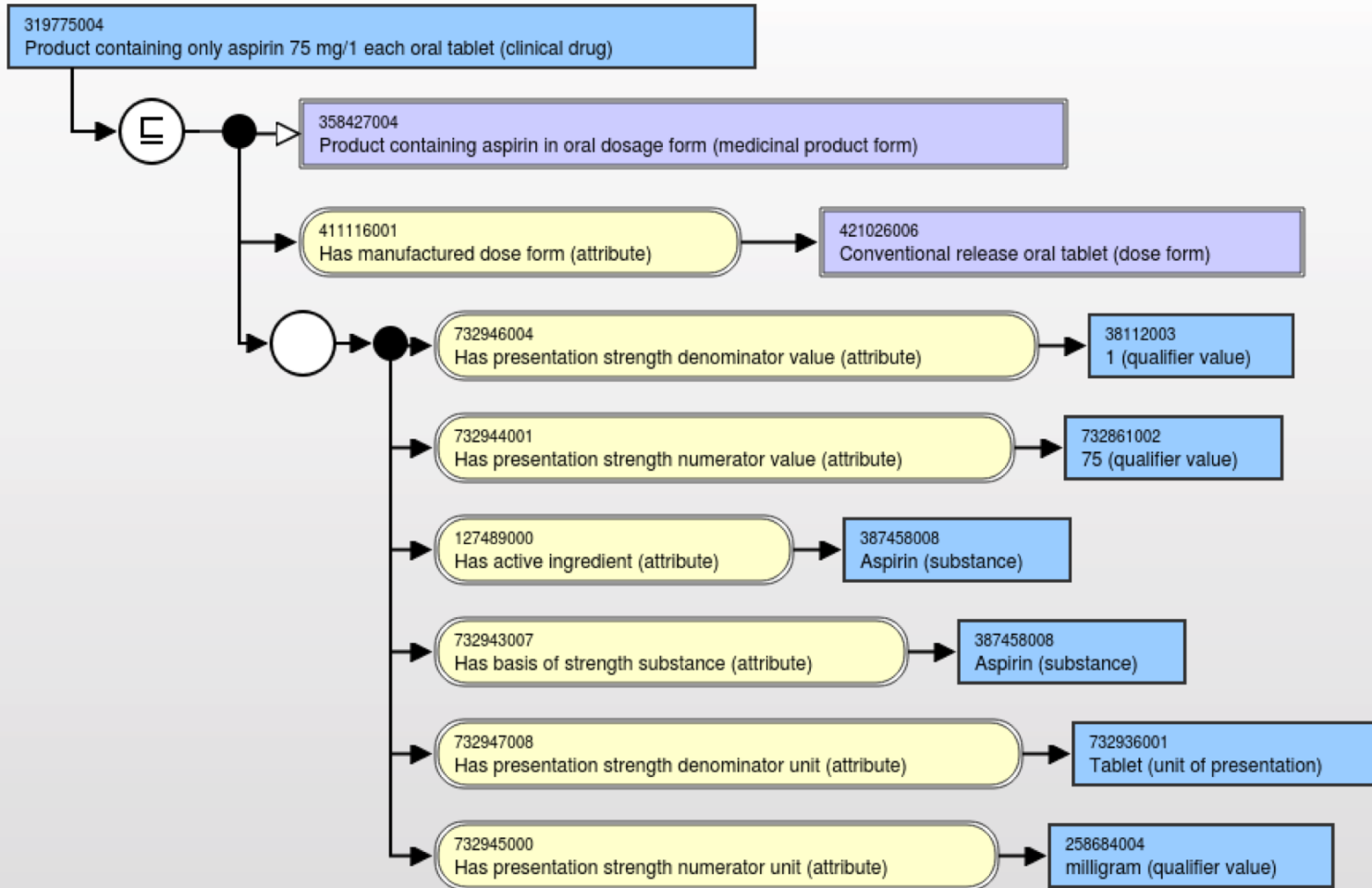
International drug model



class Class Model - Specialisation



International drug model



International drug model



Parents

- ▶ ☰ Product containing aspirin and codeine (medicinal product)
- ▶ ☰ Product containing aspirin in oral dosage form (medicinal product form)
- ▶ ☰ Product containing codeine in oral dosage form (medicinal product form)

● Product containing only aspirin 300 mg and codeine 8 mg/1 each oral tablet (clinical drug) ☆ 📄

SCTID: 404785009

404785009 | Product containing only aspirin 300 mg and codeine 8 mg/1 each oral tablet (clinical drug) |

Aspirin 300 mg and codeine 8 mg oral tablet

Product containing only aspirin 300 mg and codeine 8 mg/1 each oral tablet

Product containing only aspirin 300 mg and codeine 8 mg/1 each oral tablet (clinical drug)

Has manufactured dose form → Conventional release oral tablet

Has presentation strength denominator value → 1
Has presentation strength numerator value → 8
Has active ingredient → Codeine
Has basis of strength substance → Codeine
Has presentation strength denominator unit → Tablet
Has presentation strength numerator unit → milligram

Has presentation strength denominator value → 1
Has presentation strength numerator value → 300
Has active ingredient → Aspirin
Has basis of strength substance → Aspirin
Has presentation strength denominator unit → Tablet
Has presentation strength numerator unit → milligram

Children (0)

No children

International drug model



Parents

- ▶ ☰ Product containing aspirin (medicinal product)
- ▶ ☰ Product containing codeine (medicinal product)

☰ Product containing aspirin and codeine (medicinal product) ☆ ↗

SCTID: 412096001

412096001 | Product containing aspirin and codeine (medicinal product) |

Product containing aspirin and codeine (medicinal product)
Product containing aspirin and codeine
Aspirin and codeine

Has active ingredient → Aspirin
Has active ingredient → Codeine

Children (7)

- ● Aspirin + codeine 400mg/8mg dispersible tablet (product)
- ● Aspirin + codeine 500mg/8mg dispersible tablet (product)
- ▶ ☰ Product containing aspirin and butalbital and caffeine and codeine phosphate (medicinal product)
- ▶ ☰ Product containing aspirin and carisoprodol and codeine phosphate (medicinal product)
- ● Product containing only aspirin 300 mg and codeine 8 mg/1 each oral tablet (clinical drug)
- ● Product containing only aspirin 325 mg and codeine 30 mg/1 each oral tablet (clinical drug)
- ● Product containing only aspirin 325 mg and codeine 60 mg/1 each oral tablet (clinical drug)

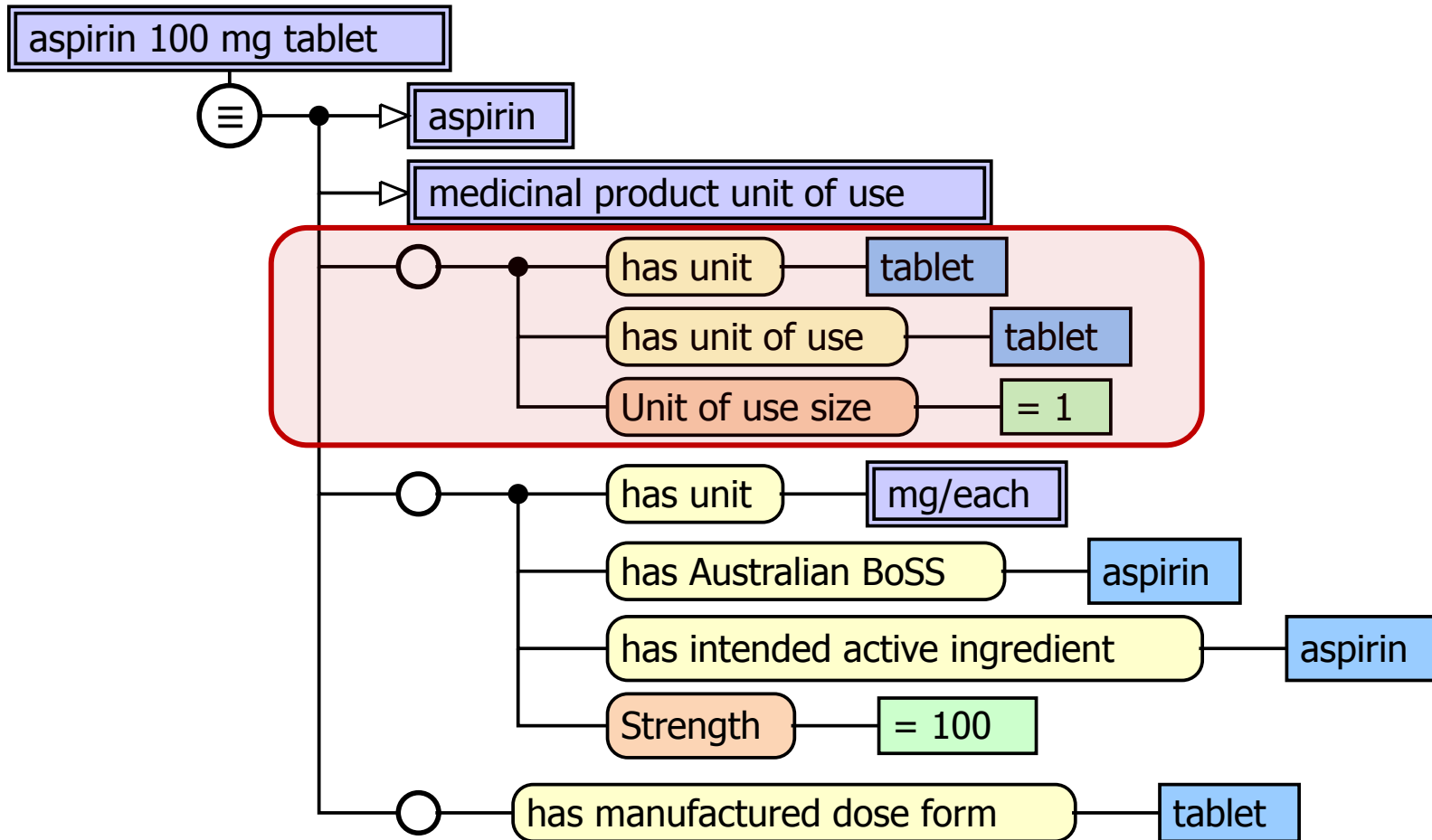
AMT drug model



“7 box model”

1. MP - Medicinal Product
2. MPUU - Medicinal Product Unit of Use
3. MPP - Medicinal Product Pack
4. TP - Trade Product
5. TPUU - Trade Product Unit of Use
6. TPP - Trade Product Pack
7. CTPP - Containered Trade Product Pack
- 8? AU Substance

AMT drug model



Model alignment



Boxes do not exactly align

- TP != Manufactured Product Set
- MP has “containing” cf “only” semantics

Separate vs combined numerator/denominator

- Can be handled mechanically

Strengths / quantities vary between jurisdictions

- How are these chosen at International level?

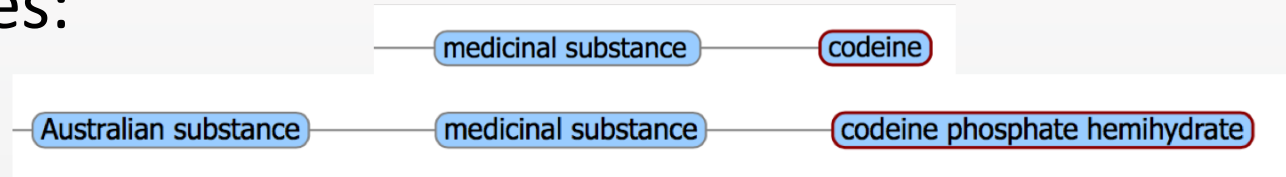
GCI will aid integration / mitigate modelling style

Substances and substance classes



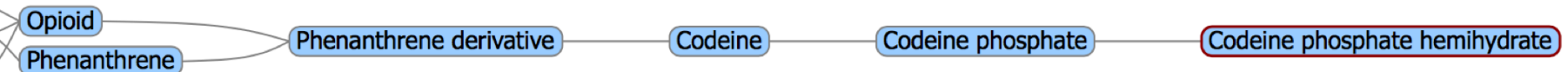
AU Substances:

- disjoint
- no substance classes, groupers, etc



International substances:

- not disjoint
- has substance classes, groupers, etc
- links from Clinical Findings e.g., causative agent



AU Substance map



From AU Substance to International Substance

Constructed lexically

Does not account for modelling conflicts

- calcium carbonate (AU substance) == Calcium carbonate (substance)
- calcium (AU substance) == Calcium (substance)
- BUT Calcium carbonate (substance) ISA Calcium (substance)
- AND calcium carbonate (AU substance) DISJOINT WITH calcium (AU substance)

Integration heuristics



1. INT substances that are targets of map are “real”
2. If have children, change the ISA relationships to point at nearest ancestor that is not a target of the map
3. Optionally add an isModificationOf relationship from old child to old parent
4. Replace all AU substances in the relationships file with the corresponding INT substance (OR: Add an equivalence axiom between each of the substance codes)

Illustrative example*



INT has hierarchy:

ACE Inhibitor	ISA	Substance
Enalapril	ISA	ACE Inhibitor
Enalapril sulphate	ISA	Enalapril
Enalapril nitrate	ISA	Enalapril

AU has:

Enalapril (AU)	ISA	Substance AU
Enalapril sulphate (AU)	ISA	Substance AU
Enalapril carbonate (AU)	ISA	Substance AU

Map has:

Enalapril (AU)	Equivalent To	Enalapril
Enalapril sulphate (AU)	Equivalent To	Enalapril sulphate

* Invented substances

Illustrative example



Then transformed relationships are:

ACE Inhibitor	ISA	Substance
Enalapril	ISA	ACE Inhibitor
Enalapril sulphate	ISA	ACE Inhibitor
Enalapril sulphate	isModificationOf	Enalapril
Enalapril nitrate	ISA	ACE Inhibitor
Enalapril nitrate	isModificationOf	Enalapril
Enalapril carbonate	ISA	Substance

Proof of concept



Set of scripts that process Map and Relationships files

Generates additional / replacement relationships

Loaded into Ontoserver

Limited success so far

Proof of concept



Query Expression:

[[help](#)] [[spec](#)]

```
* : 246075003 |Causative agent| =  
  < 30344011000036106 |Australian substance|
```

Before

Showing 0 to 0 of 0 rows

[Download](#)

CODE	DESCRIPTION
------	-------------

Query Expression:

[[help](#)] [[spec](#)]

```
* : 246075003 |Causative agent| =  
  < 30344011000036106 |Australian substance|
```

After

Showing 1 to 10 of 3961 rows

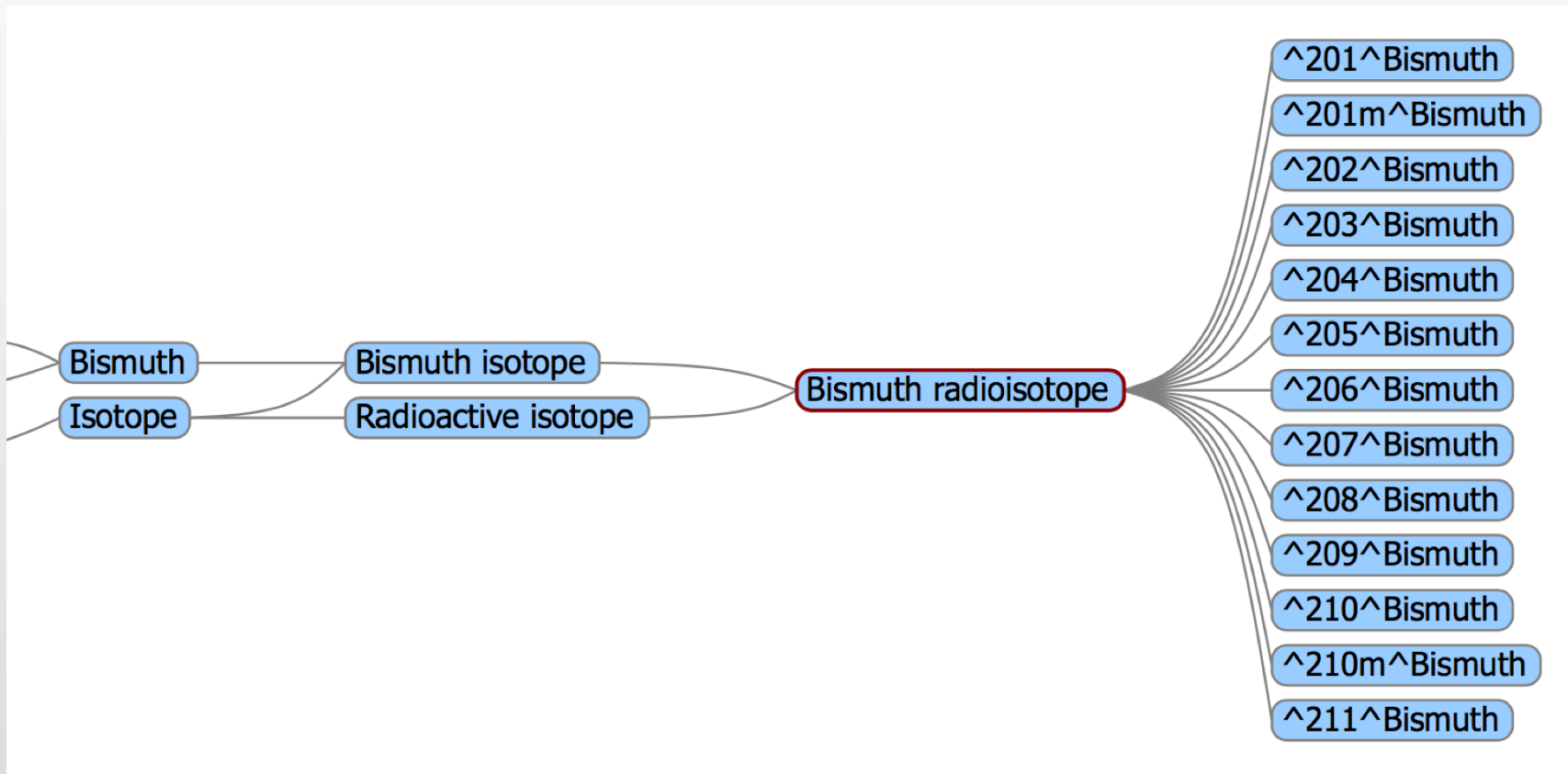
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CODE	DESCRIPTION
291857001	Thyroxin poisoning of undetermined intent
290498007	Accidental thiopental sodium poisoning
724697004	Abuse of nicotine
60199004	Methadone poisoning
293650007	Cimetidine allergy
129638002	Haemolytic anaemia due to hyperbaric oxygen
291568009	Cefazolin poisoning
290787007	Levodopa poisoning of undetermined intent
293074006	Cycloserine adverse reaction
294867005	Factor XIII products allergy





Isotopes

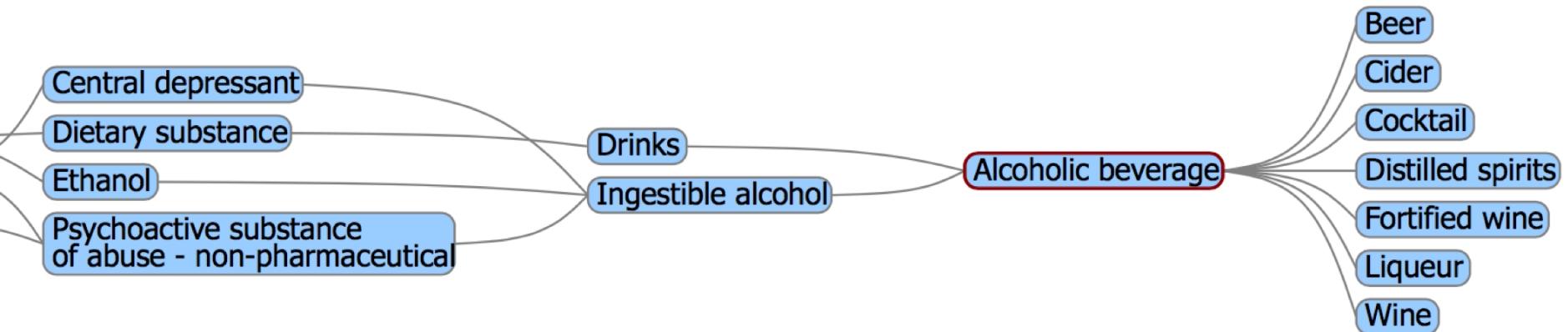


Identified issues



Looked at children of map targets

Found modelling errors



Alcoholic beverage **contains** Ingestible alcohol

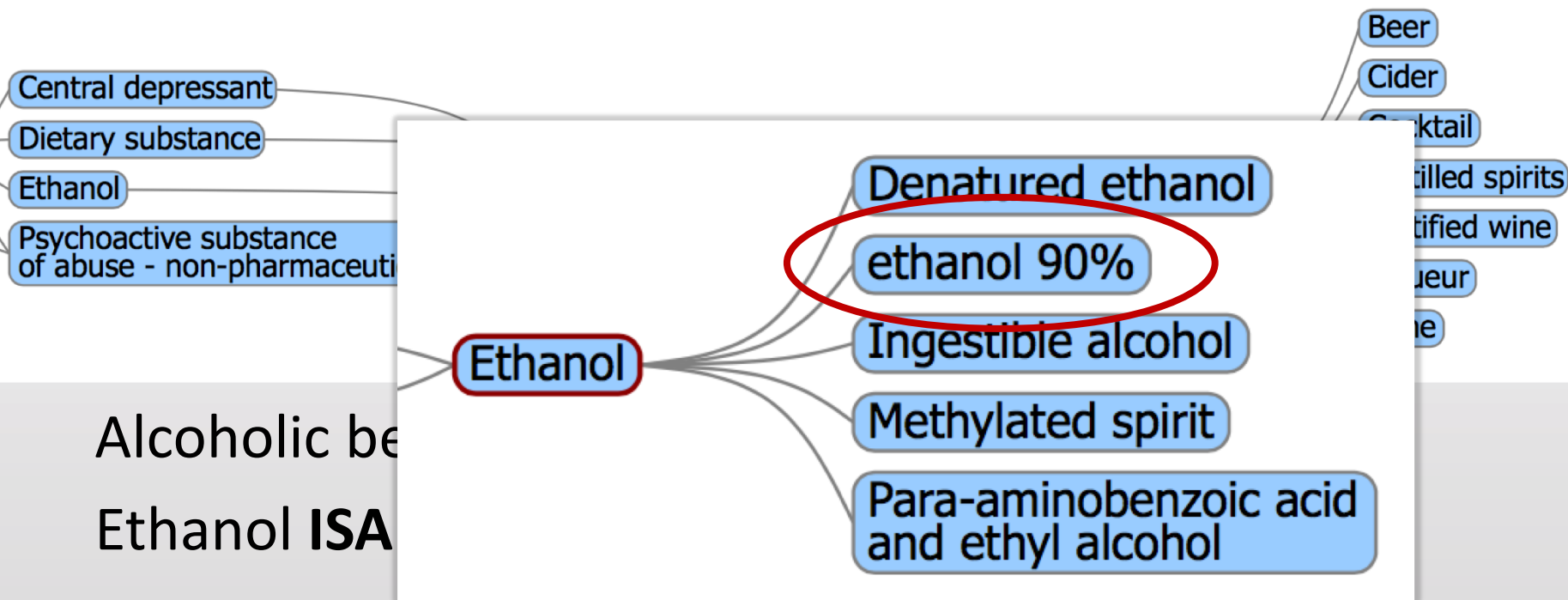
Ethanol **ISA** Ingestible alcohol

Identified issues



Looked at children of map targets

Found modelling errors





Shrimp with demo integrated taxonomy



Questions?

