AIRA International Codes Meeting
June 14, 2023
Contribution from SYADEM

What we do

We develop and operate a Clinical Decision System on vaccination, able to determine the next required vaccinations for a person based upon:

- Individual situation : vulnerabilities (medical profile) and risk exposure (social and professional profile)
- Locally enforced vaccination policy
- History of administered vaccines

We complemented it with a vaccination information system where individuals and health professionals can store and share profiles and vaccination histories.

It is today massively used in France and Luxembourg.

What we needed

- To capture any vaccination trail
  - Written or digital,
  - Fully explicit or degraded,
  - Whatever the date and country of the vaccination.
- To determine the vaccination agents (the valences) contained into each vaccine.

Capturing any vaccination trail

Support	Variant	Trail	NUVA Code
Written	Fully explicit	Infanrix Hexa	VAC0014
	Abbreviated	Infanrix6	
Digital	CIS (FR)	62966063	
	CNK (BE)	1665363	
Written	Valences FR	dTca	VAC0610
	Valences EN	Tdap	
Digital	CVX	115	
Written	Target disease FR	Vaccin grippe	VAC0110
Digital	CVX	88	
	SNOMED-CT	1181000221105	

Determining the valences

A valence is not a single ingredient, but a shorthand notation used by vaccinologists for a combination and a dose of antigens against a same disease.
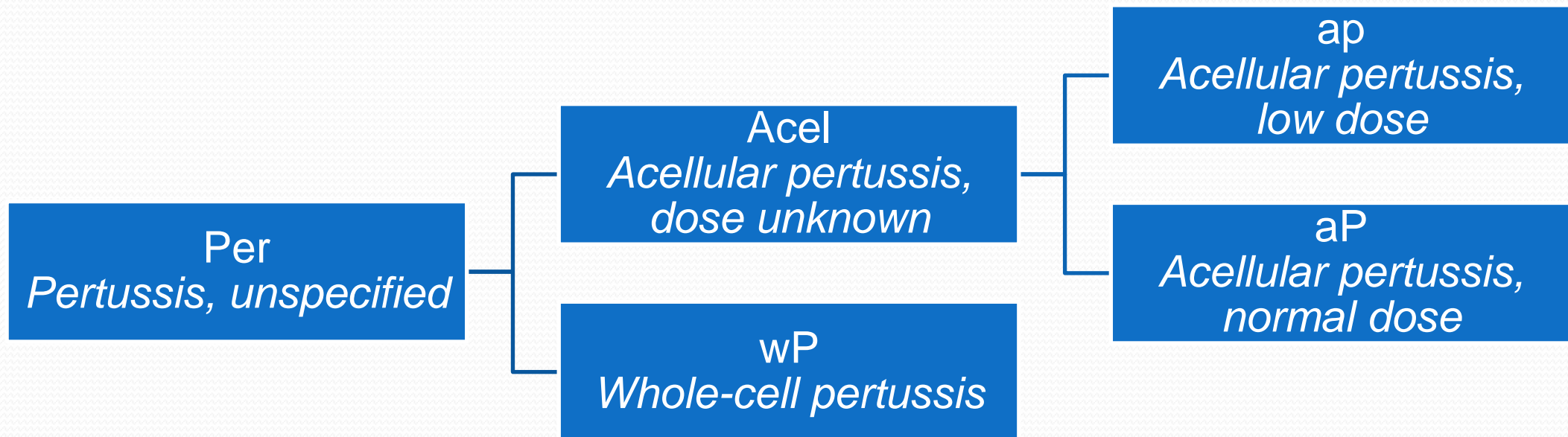
Examples:

- aP – Acellular pertussis vaccine, standard dose
- ap – Acellular pertussis vaccine, low dose
- IPV – Whole inactivated trivalent polio vaccine
- mOPV1 – Live attenuated monovalent oral polio vaccine type 1

Protection is determined by the history of administered valences.

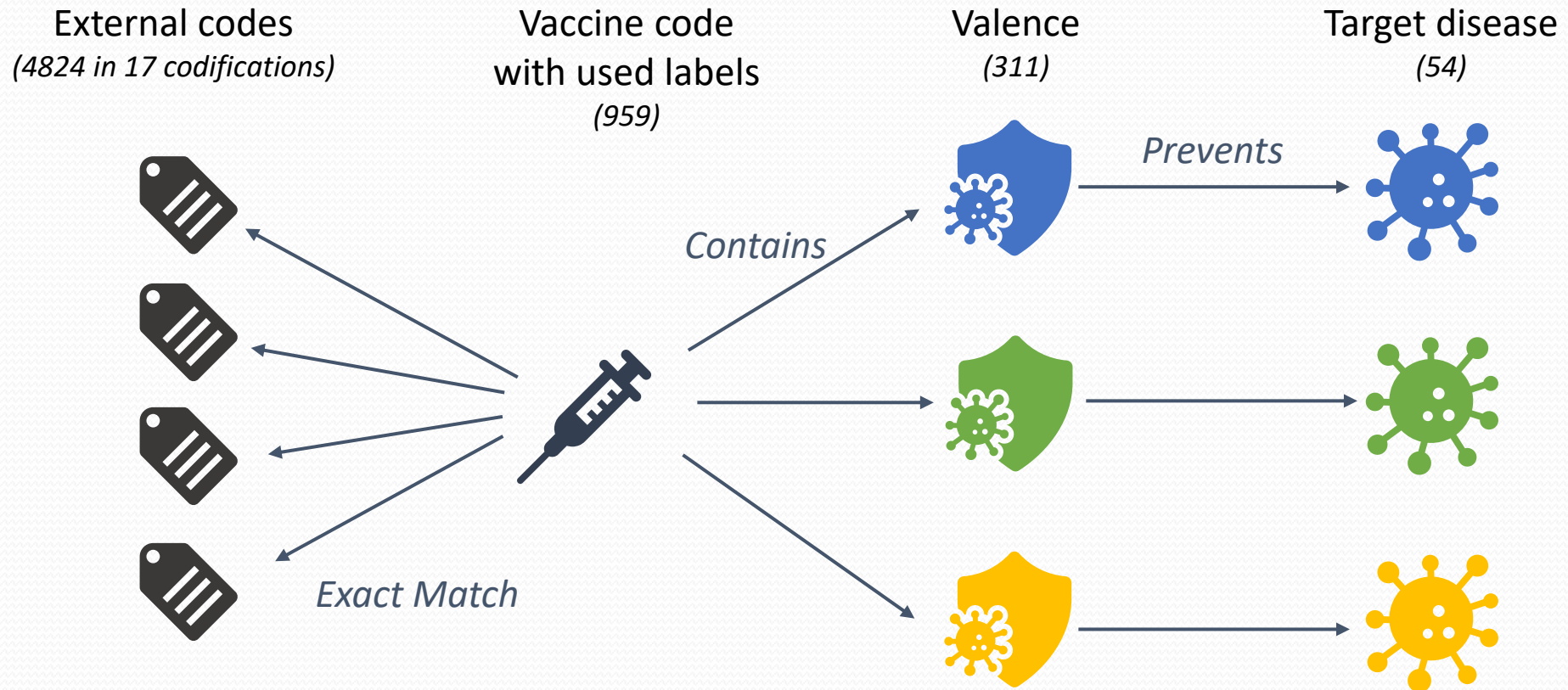# Hierarchical representation of valences

Allows to include vaccines that are not fully identified.
Illustrated here with the case of pertussis valences

Per
Pertussis, unspecified

Acel
Acellular pertussis, dose unknown

wP
Whole-cell pertussis

ap
Acellular pertussis, low dose

aP
Acellular pertussis, normal dose

What valences bring

- They structure the reasoning for the decision support system
- They solve the usual issue of classification of multivalent vaccines
  (in ATC, J07AE = Cholera, J07AP = Typhoid,
  but J07AE51 = Cholera + Typhoid)
- They allow to navigate between different levels of abstraction:
  - Finding all vaccines that can be represented byJ07CA01
  - Finding possible SNOMED-CT representations for REPEVAX
  - A demonstrator is available at https://nuva.mesvaccins.net/mapping

All NUVA concepts

External codes
(4824 in 17 codifications)

**Vaccine code
with used labels**
(959)

Valence
(311)

Target disease
(54)

Prevents

Contains

Exact Match

Counted on February 10th, 2023

NUVA representations

Available:

- As an OWL/RDF graph at https://smt.esante.gouv.fr/terminologie-nuva/ A SPARQL query interface is included.

- Through an exploration tool at https://nuva.mesvaccins.net

- A FHIR representation has also been drafted

AIRA International Codes Meeting
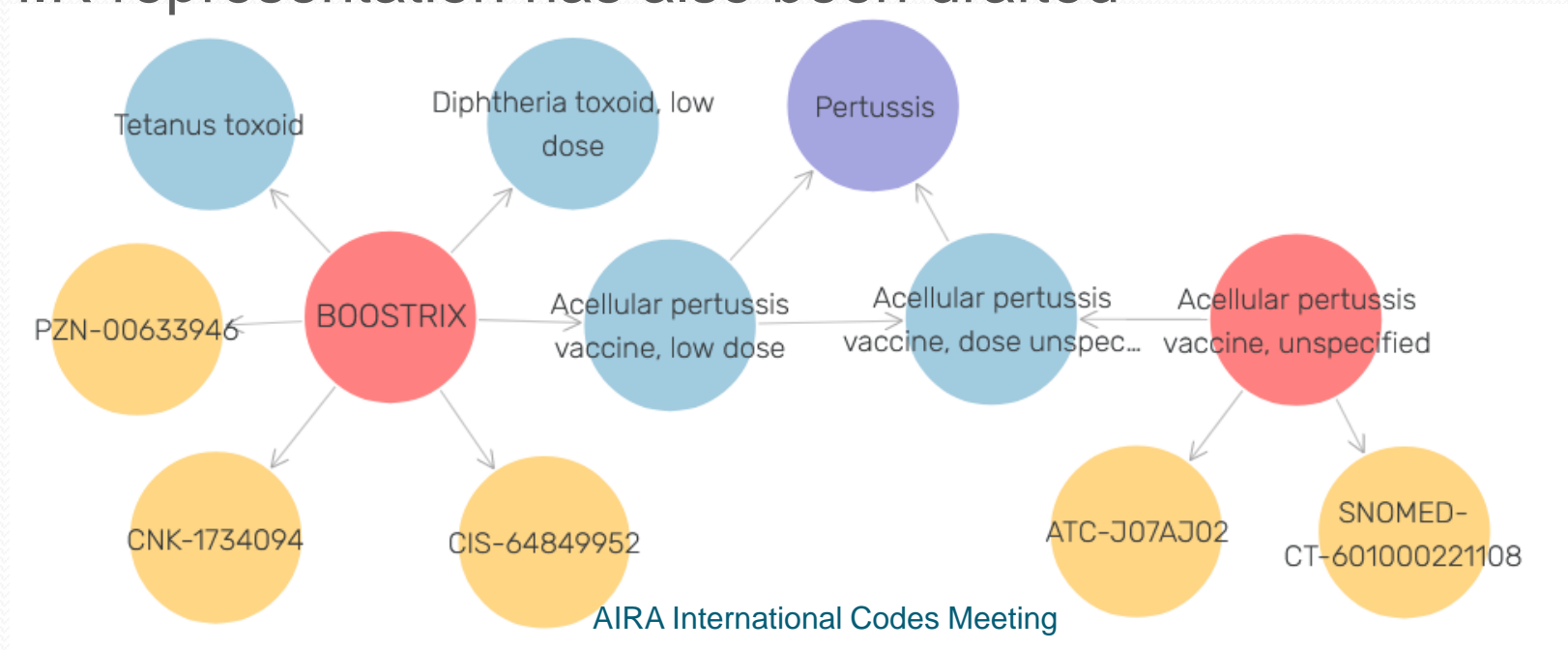
Field experience

- Used in France by MesVaccins.net (2M vaccination cards), the French Army EHR and some editors relying upon our CDS.

- Used in Luxembourg for the national Electronic Vaccination Card.

- Only 40% of the records in the MesVaccins database could have been encoded with the national drug code system.

The EUVABECO project

- 14 partners from 9 EU countries

- Learn from vaccination initiatives during the COVID crisis

- Build and test implementation plans for Member States to deploy:
    - EVC - A portable digital vaccination card (NUVA based)
    - CDS - A vaccination decision support system (NUVA based)
    - Screening tools to address vulnerable populations
    - Models for forecasting of vaccination effectiveness
    - ePIL - Digital leaflet to facilitate the transfer of vaccines stocks

Pilot projects relying upon NUVA

Country	CDS	EVC
Belgium	X	X
Germany		X
Greece	X	X
Latvia	X	X
Poland	X	
Portugal	X	X

AIRA International Codes Meeting

Proposed evaluation criteria

- Exhaustiveness – Against an estimated target of 1200 codes
- Ambiguousness – Average number of real vaccines per code
- Informativeness – 3 steps scale for the represented knowledge
- Inclusivity of paper trails – 3 steps scale according to flexibility
- Inclusivity of digital trails – Against a target of 50 code systems
- Translatability to external codes – 3 steps scale according to flexibility
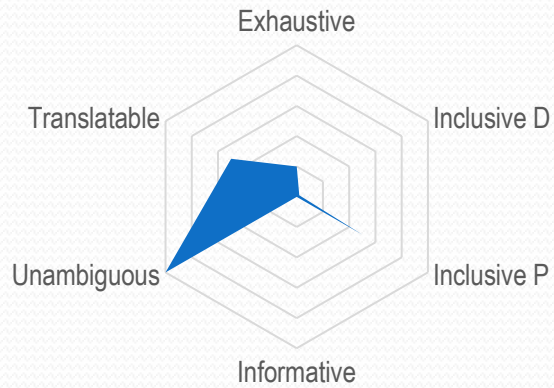
Further aggregated into two synthetic metrics:

- Ability to capture (exhaustive, inclusive)
- Ability to process (unambiguous, informative, translatable)
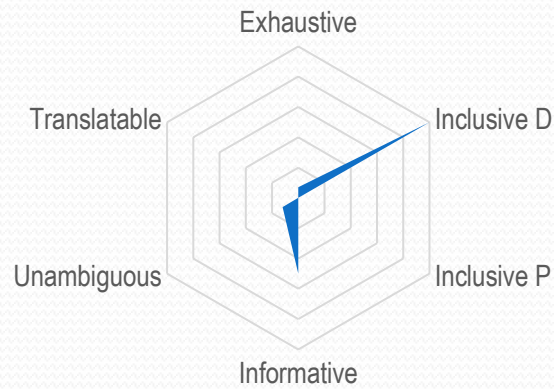
Considered code systems

- Pharmaceutical codes (using the French CIS as reference)
- ATC (WHO)
- SNOMED-CT International Version
- CVX (US codification)
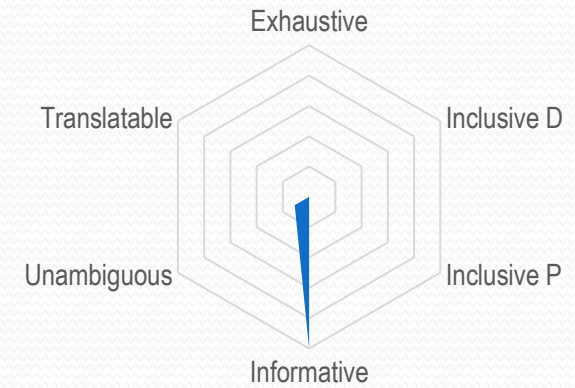- Canadian Vaccine Catalogue (CVC)
- NUVA

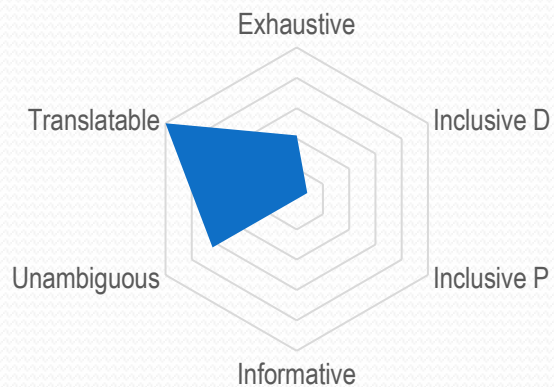# Indicators per code system

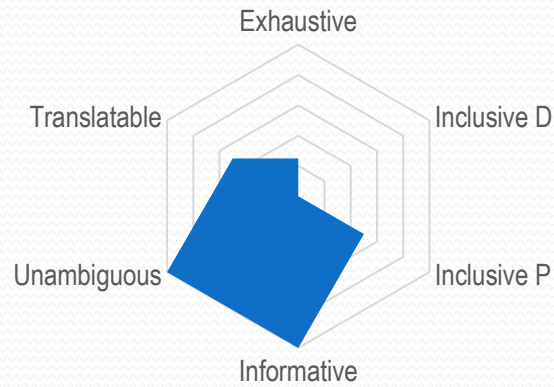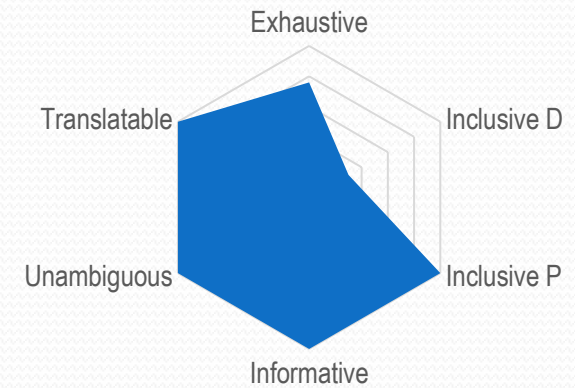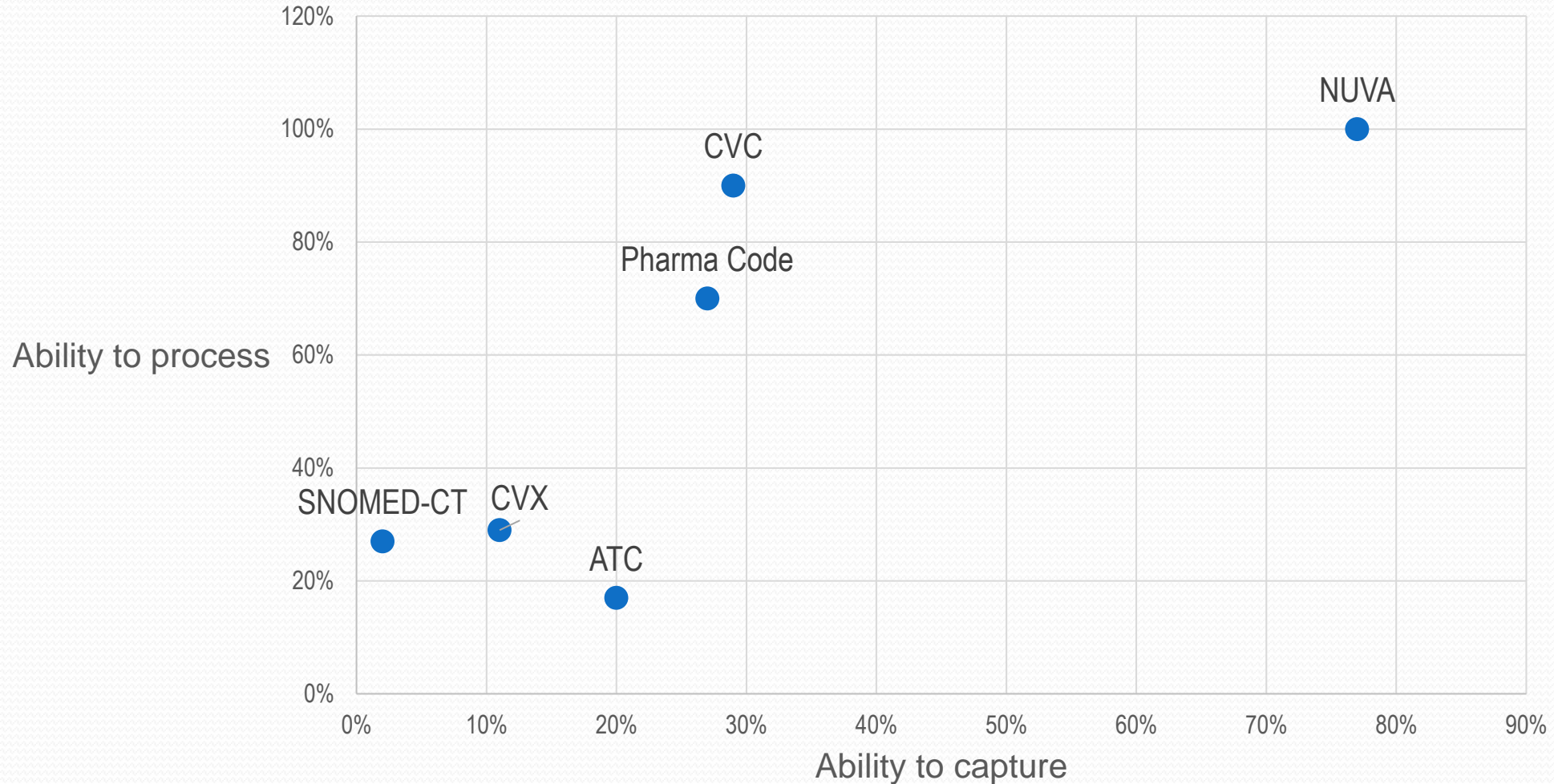Pharmaceutical code (CIS)

ATC

SNOMED-CT

CVX

CVC

NUVA

Synthetic indicators

Scatter plot with x-axis "Ability to capture" (0% to 90%) and y-axis "Ability to process" (0% to 120%). Data points: NUVA (~77%, 100%), CVC (~29%, 90%), Pharma Code (~27%, 70%), CVX (~11%, 30%), SNOMED-CT (~2%, 28%), ATC (~20%, 17%).

NUVA as a common good

- We identified the need for a pivot terminology in our study for the EU citizen's vaccination card
- We propose to make it a common good since:
  - We consider it has a value for public health
  - It will anyhow create a favorable ground for decision support systems
- It can either be used as a code system per se or a translation tool
- Euvabeco is an opportunity to use it at the European scale
- The appropriate governance structure is still to be defined

Prof. Jean-Louis Koeck
+33 647 88 63 33
jlkoeck@mesvaccins.net

François KAAG
+33 766 44 43 46
fkaag@mesvaccins.net