

Drivers for the development of an *animal health surveillance ontology*



Crawford Revie



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An ontology defines a common vocabulary for users who need to share information within a domain.

It includes machine-interpretable definitions of basic concepts in the domain and relations among them.

VeNom (Veterinary Nomenclature)

- Different dimensions of knowledge contained in the data

'Squamous cell carcinoma - clitoral'
'Squamous cell carcinoma - conjunctival'
'Squamous cell carcinoma - corneal'
'Squamous cell carcinoma - gastric (stomach)'
'Squamous cell carcinoma - penis/prepuce'
'Squamous cell carcinoma - oesophageal'
'Squamous cell carcinoma - nasal sinus'
'Squamous cell carcinoma - perineal'
'Squamous cell carcinoma - third eyelid/nictitating membrane'
'Squamous cell carcinoma - urethral'
'Squamous cell carcinoma - urinary bladder'

MeSH Terms

- Different dimensions of knowledge contained in the data

Wounds and Injuries [C26]

Fractures, Bone [C26.404]

Femoral Fractures [C26.404.061]

Hip Fractures [C26.404.061.425]

Femoral Neck Fractures [C26.404.061.425.500]

Wounds and Injuries [C26]

Hip Injuries [C26.531]

Hip Fractures [C26.531.750]

Femoral Neck Fractures [C26.531.750.500]

Wounds and Injuries [C26]

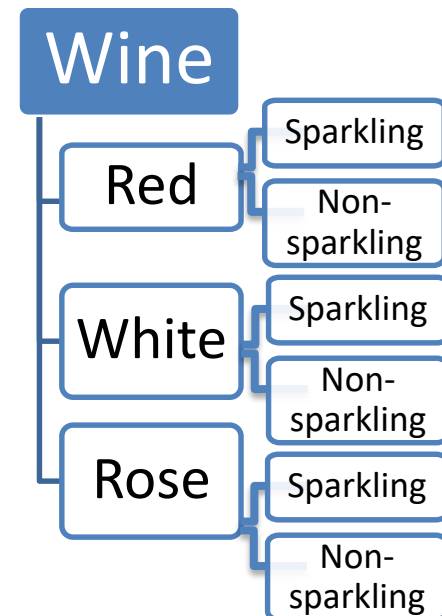
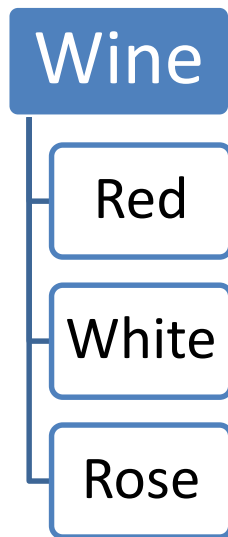
Leg Injuries [C26.558]

Femoral Fractures [C26.558.276]

Hip Fractures [C26.558.276.425]

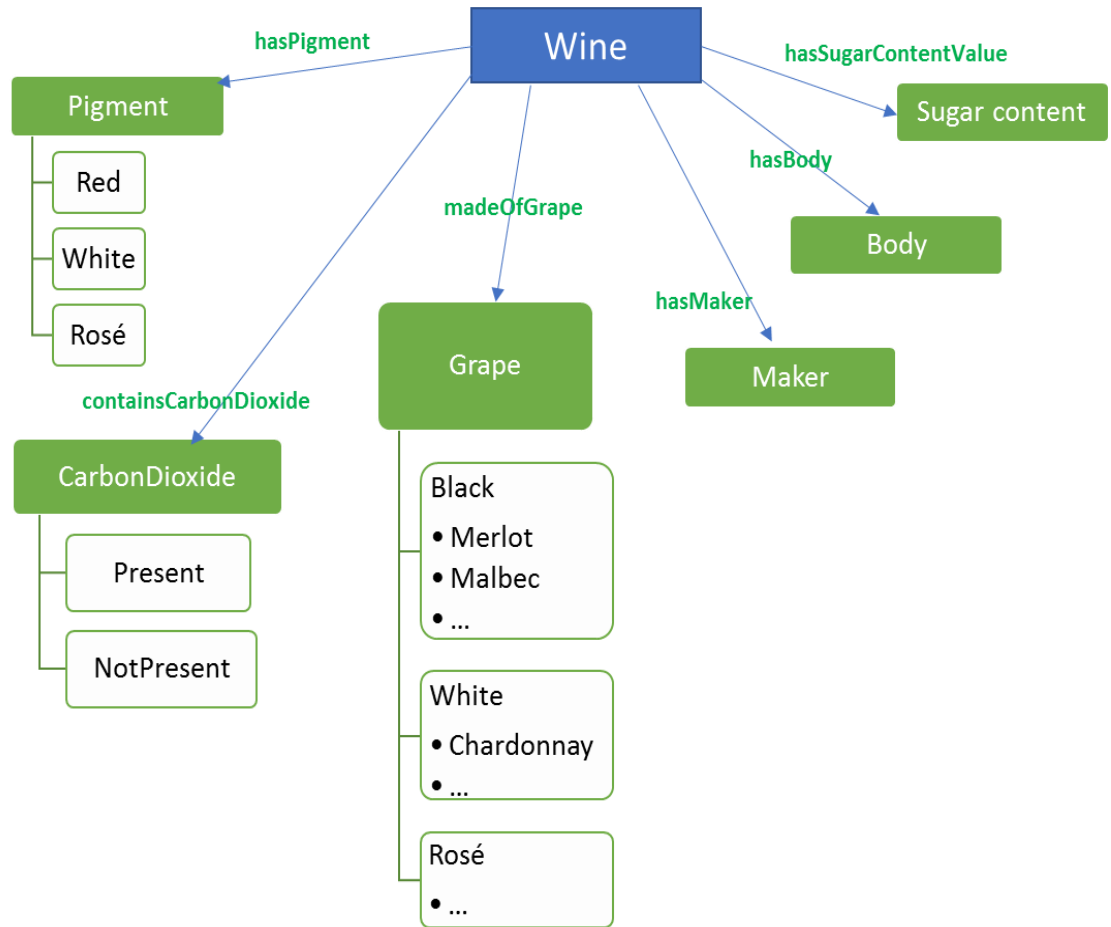
Femoral Neck Fractures [C26.558.276.425.500]

- Different dimensions of knowledge contained in the data



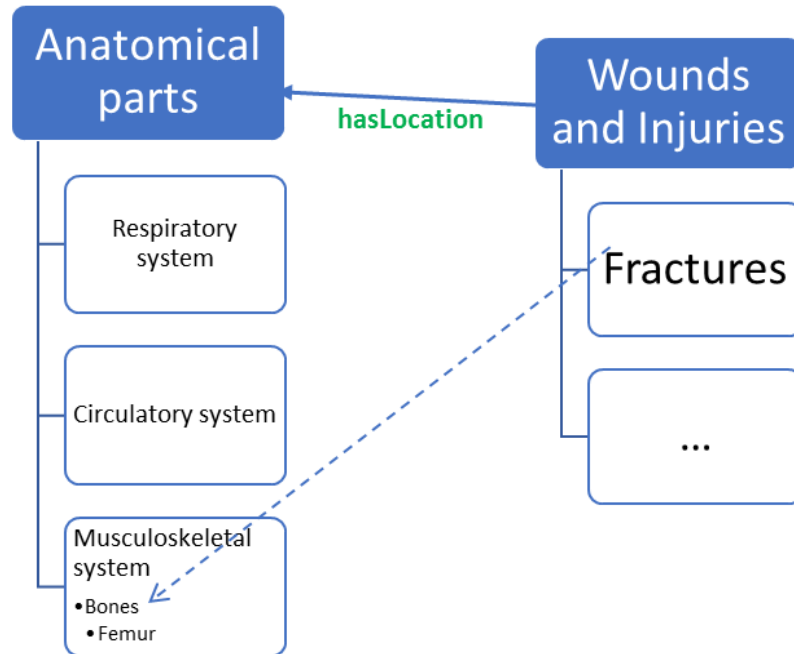
Ontologies

- Data model
- Classes
- Properties
- Instances

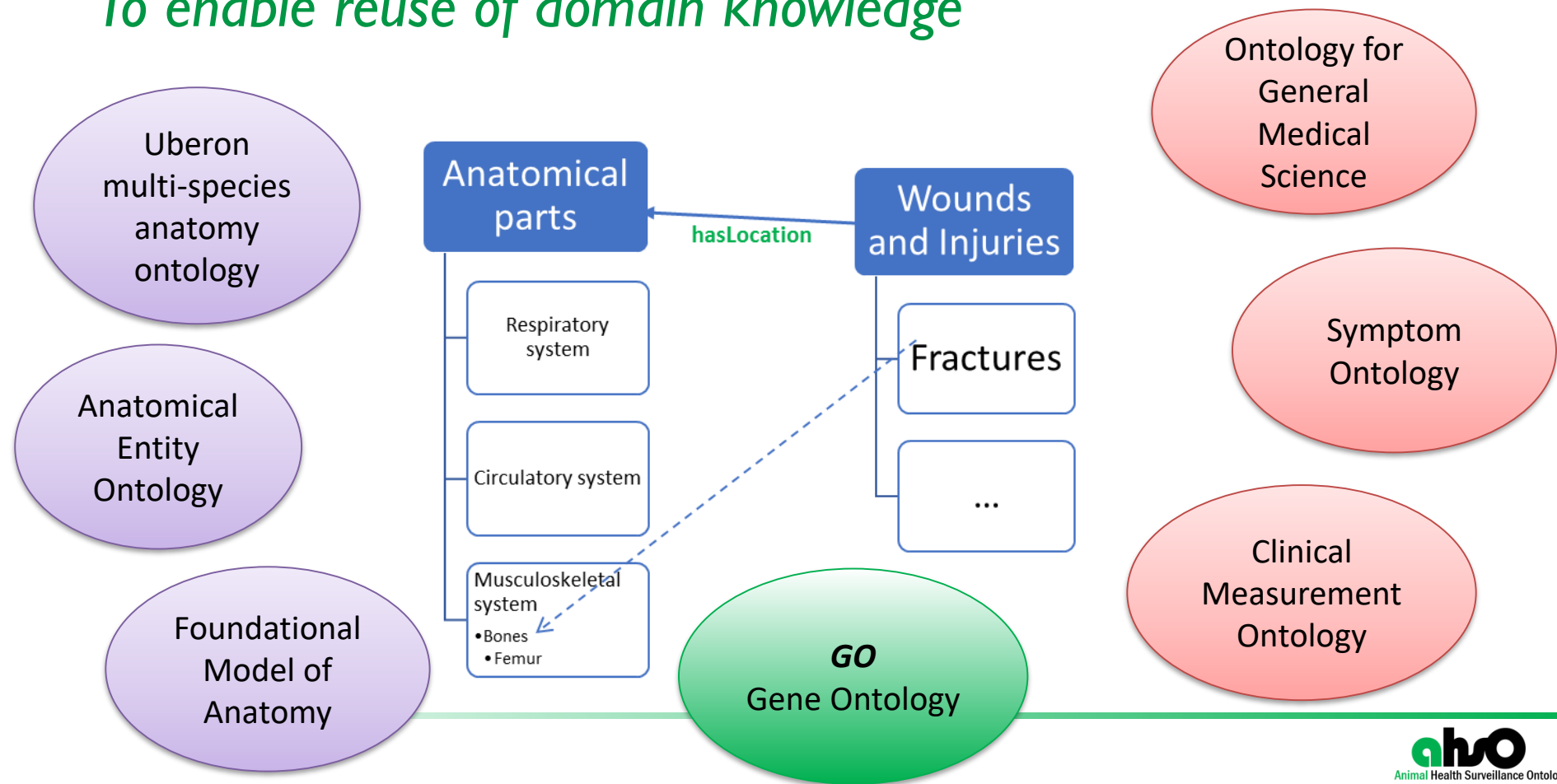


Why use ontologies?

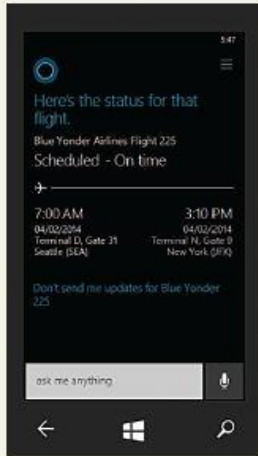
To share common understanding of the structure of information among people or software agents



To enable reuse of domain knowledge



To re-use domain independent knowledge



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✈ Swiss International Airlines
Flight LX 324
Tomorrow, June 4th
Delayed: departing 9:00 am

Departs Zurich (ZRH)
8:30 am
Terminal E
Gate 27

Arrives Rome (FCO)
10:30 am
Terminal 1

Person
Organization
Place
CreativeWork
Intangible
Action
MedicalEntity
Event

Geonames
(‘GIS’)
Ontology

FOAF
(‘people’)
Ontology

SKOS
(‘Thesaural’
structure)
Ontology

To make domain assumptions explicit

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Taxonomy Search Favorites Refset

Search

Options

Search Mode: Partial matching search mode

Status: Active components only

Group by concept

Filter results by Language

english 376

Filter results by Semantic Tag

disorder 273

procedure 101

situation 2

Type at least 3 characters ✓ Example: *shou fra*

femur fracture

376 matches found in 1.022 seconds.

Fracture of femur	Fracture of femur (disorder)
Open fracture of femur	Open fracture of femur (disorder)
Closed fracture of femur	Closed fracture of femur (disorder)
Stress fracture of femur	Stress fracture of femur (disorder)
Fracture of neck of femur	Fracture of neck of femur (disorder)
Fracture of shaft of femur	Fracture of shaft of femur (disorder)
Multiple fractures of femur	Multiple fractures of femur (disorder)
Fracture of femur (disorder)	Fracture of femur (disorder)
Supracondylar fracture femur	Supracondylar fracture femur (disorder)

Concept Details

Summary Details Diagram Expression Refsets Members Refer

Parents

- Fracture of lower limb (disorder)
- Injury of thigh (disorder)

Fracture of femur (disorder) ☆

SCTID: 71620000

71620000 | Fracture of femur (disorder) |

Fracture of femur
Fracture of thigh
Fracture of upper leg
Fracture of femur (disorder)

Finding site → Bone structure of femur
Associated morphology → Fracture

Children (9)

- Closed fracture of femur (disorder)
- Fracture of distal end of femur (disorder)

To support research and knowledge discovery from data

Fracture of the femur

Osteochondroma of
femur

All injuries of the
femur?

All injuries of the
LEG?

Ontologies applied to ***data-driven surveillance***



Desired functions

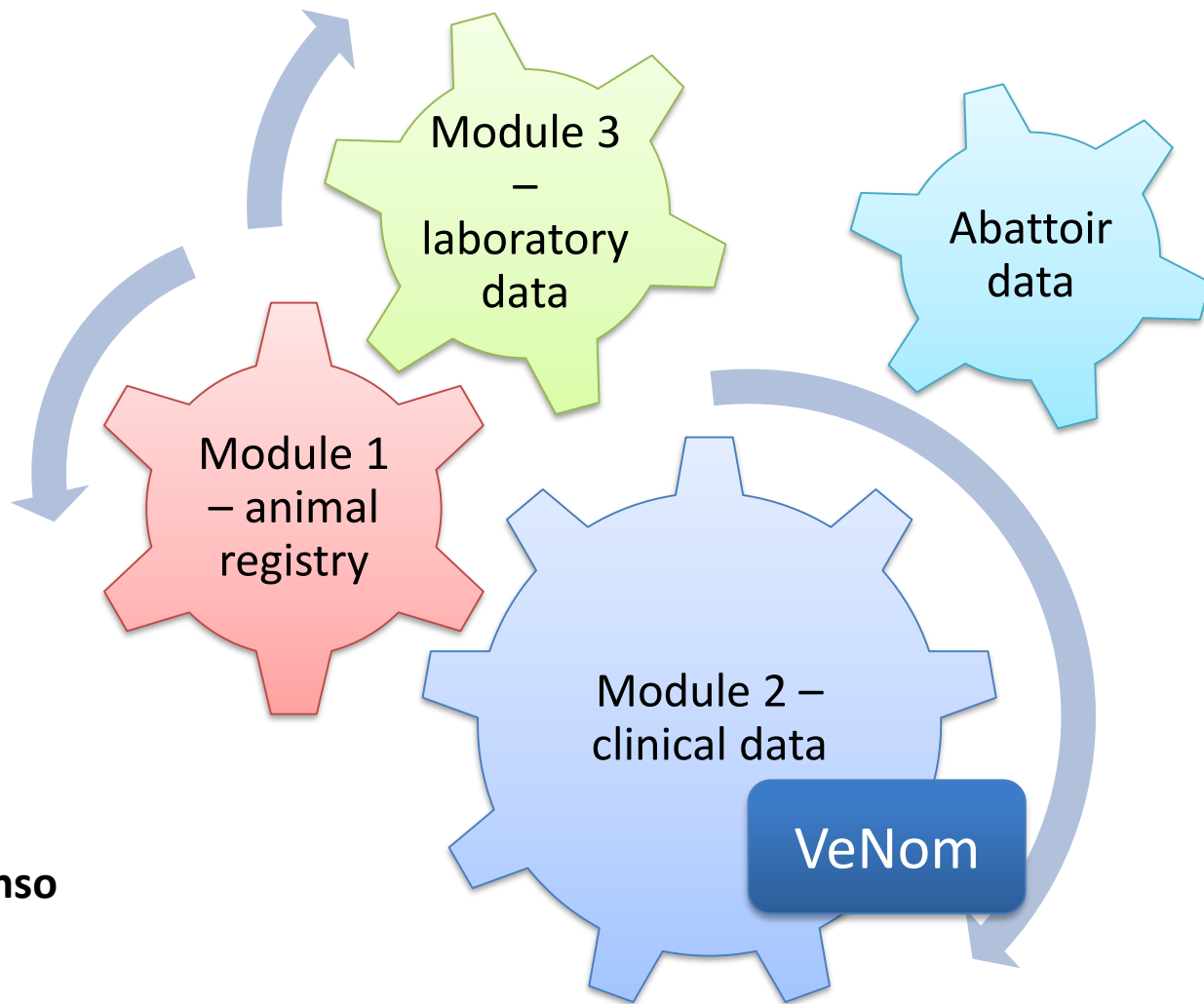
- Convert health data into information in real-time
- Use medical knowledge to infer surveillance relevant information from data collected for other purposes
- Provide a *permenant* source of term mappings that are open and can be shared/expanded by community (**IRI**)

Inherent challenges to overcome

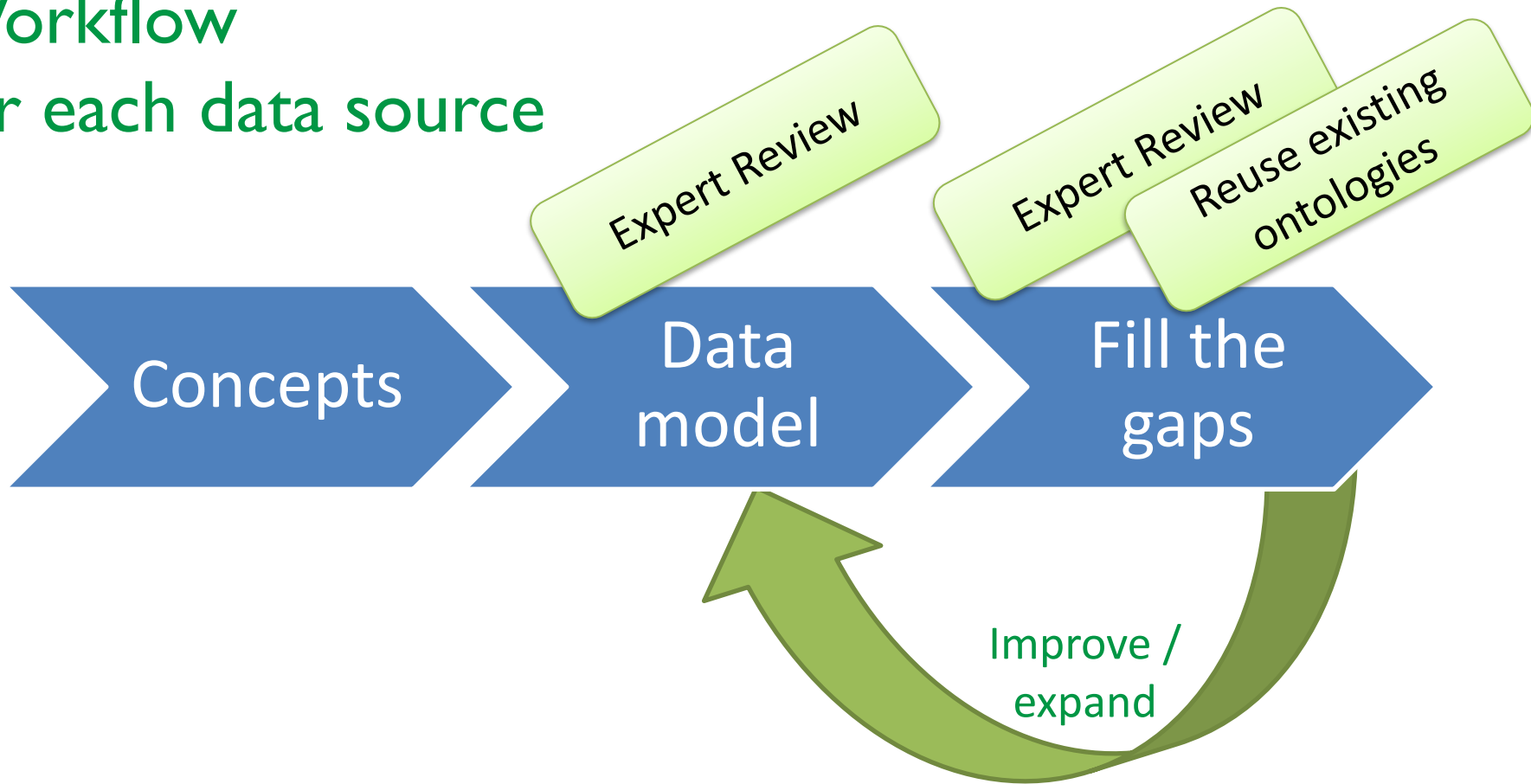
- Distributed data (not likely to be shared)
- Data non-coded or coded using different standards
- Solutions must work prospectively and retrospectively

Sustainability of solutions

- Maintenance
- Reviews and updates
- Scalability
- Transparency
- Interoperability



Workflow for each data source



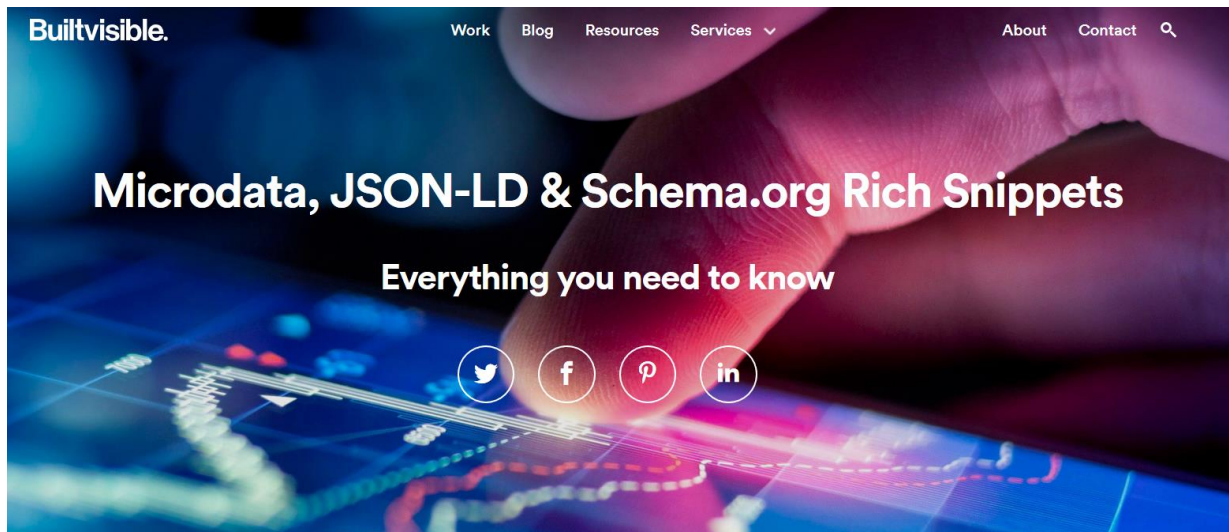
Community involvement



- Workgroups for each module/data type
- Review outputs and submit issues
- Google forum
- Github
- Home page
- Open edit book

[**datadrivensurveillance.org/ahso**](https://datadrivensurveillance.org/ahso)

Challenge to 'big data' epi teams



- microdata
- JSON-LD
- schema.org
- RDF
- OWL



Just when you
thought it was
safe to be a
quantitative
epidemiologist



datadrivensurveillance.org/ahso

<https://w3id.org/ahso>

