

**The
Problem**

**What is
SOLOR?**

**Design
Principles**

**Let's make
it REAL!**

Keith E. Campbell MD, PhD
Director of Informatics Architecture
Veterans Health Administration



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A Health Services Platform Consortium Project

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System **O**f **L**ogical **R**epresentation?

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SNOMED, LOINC, RxNorm + extensions?

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SupercaLifragilisticexpialidOciuous?

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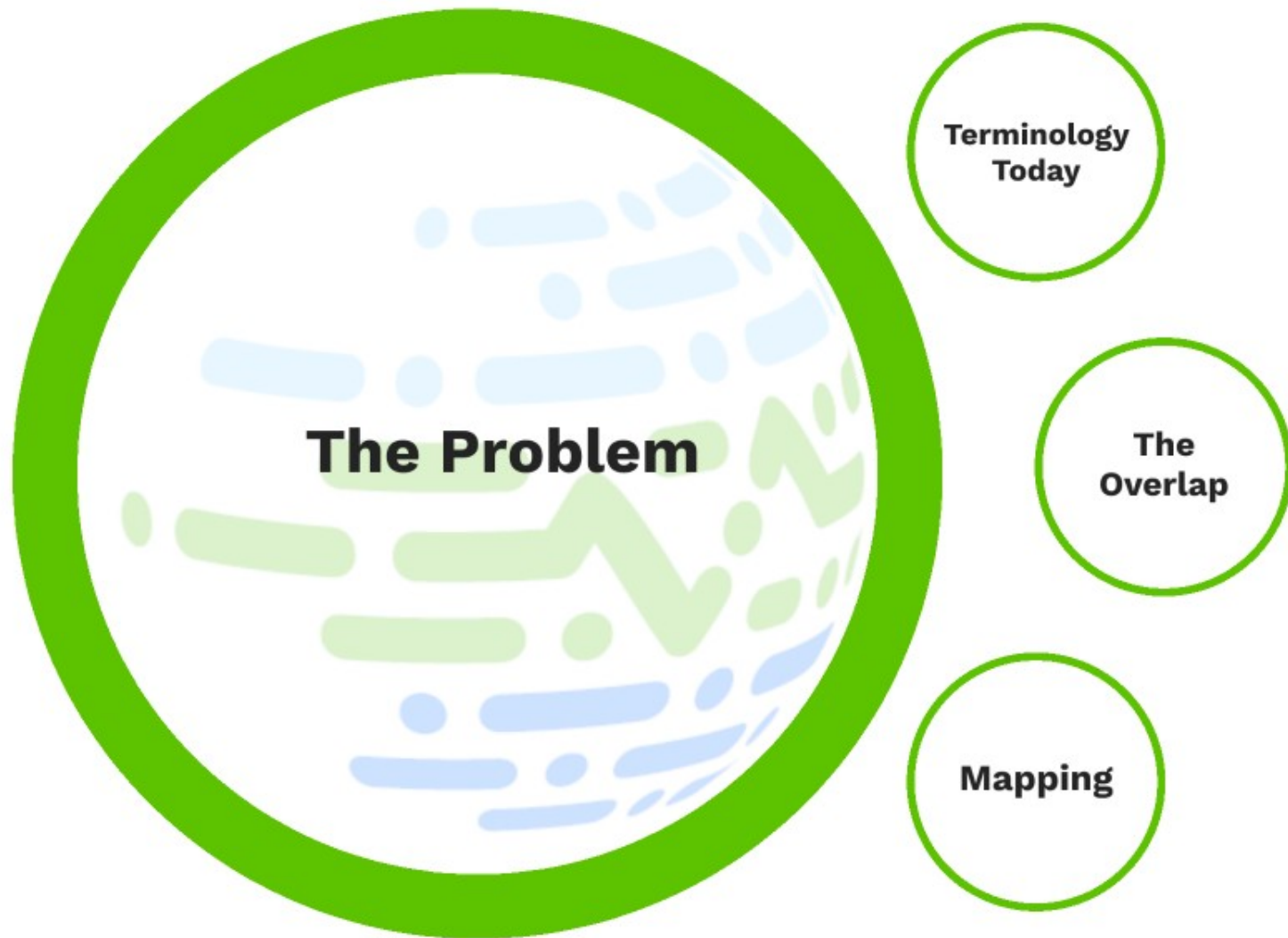
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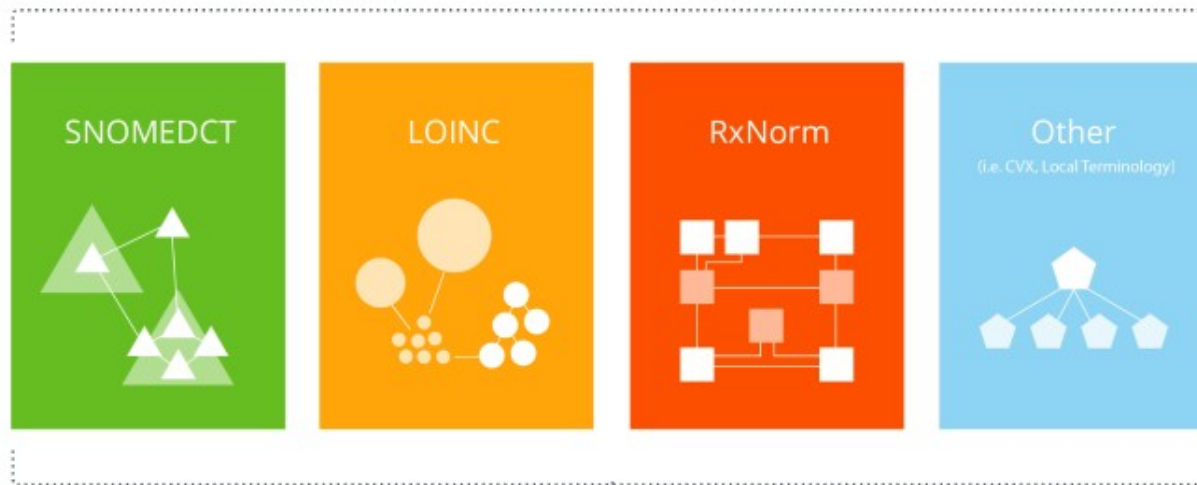


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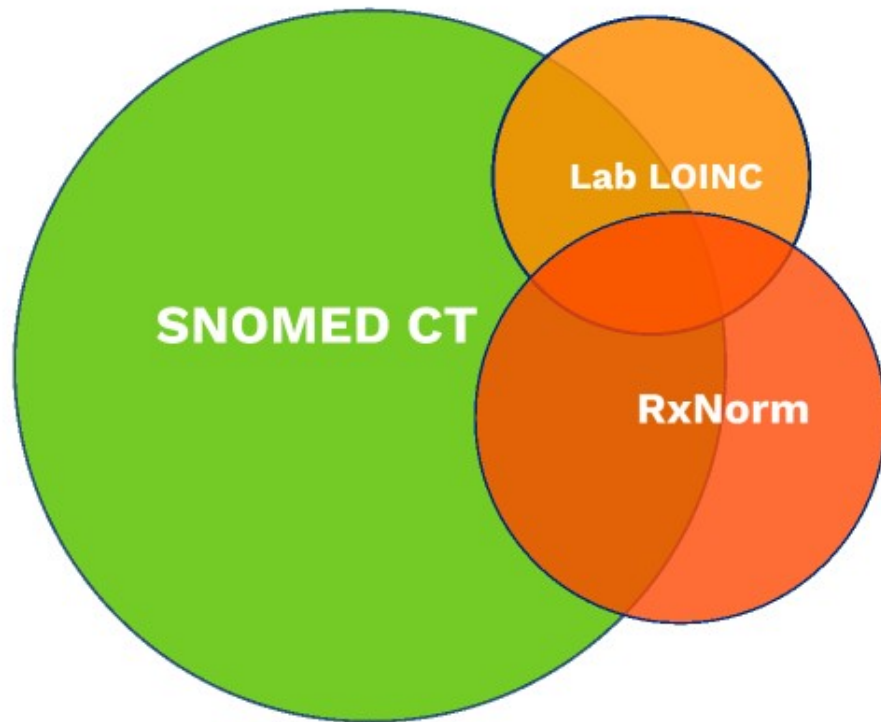


Terminology Today

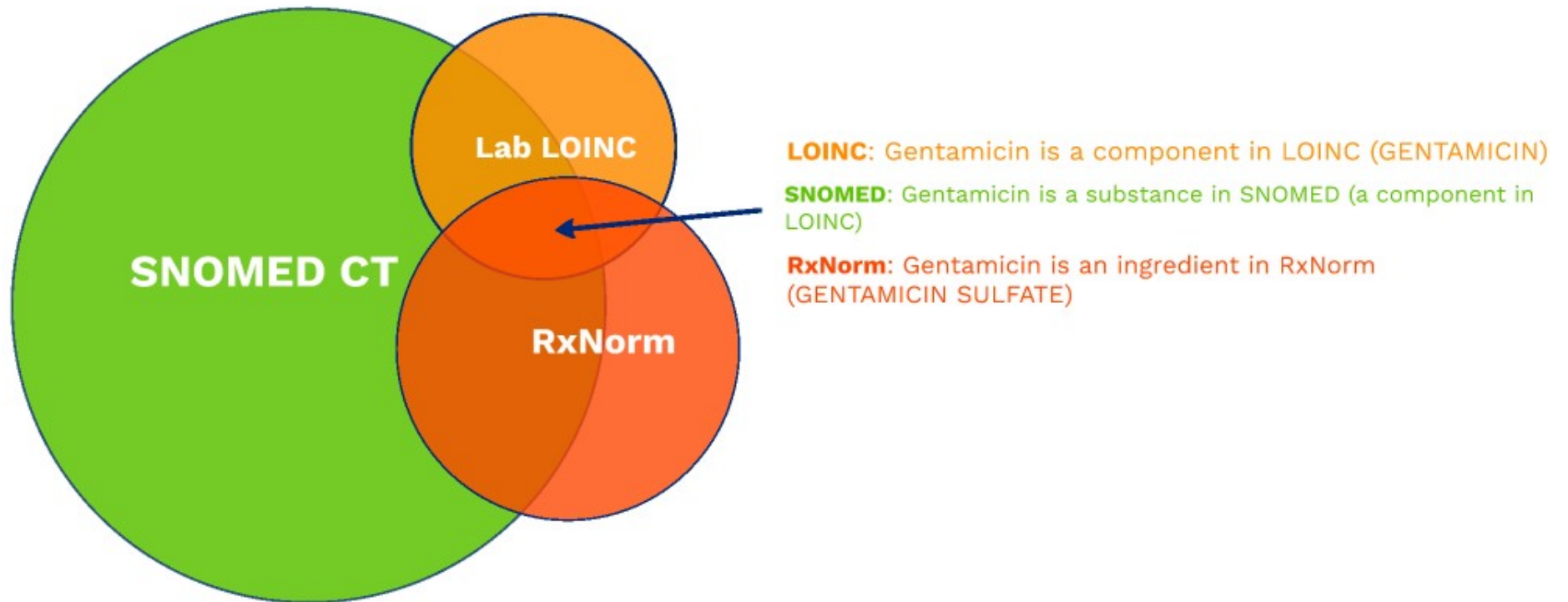


- Different Models
- Implementation Difficulties
- Update Cycles
- Mapping v. Creation of Content

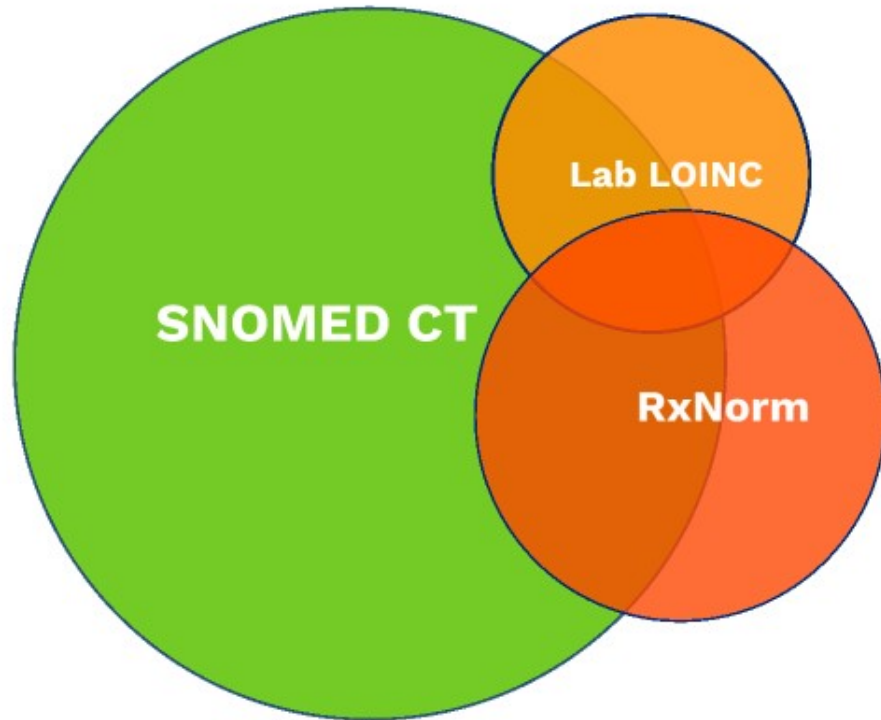
The Overlap



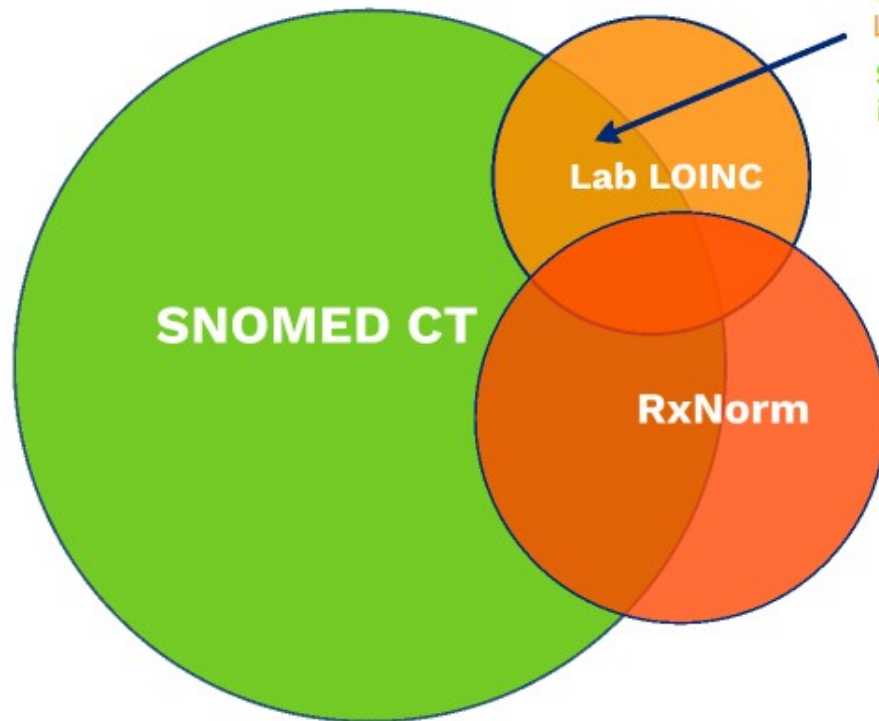
The Overlap



The Overlap



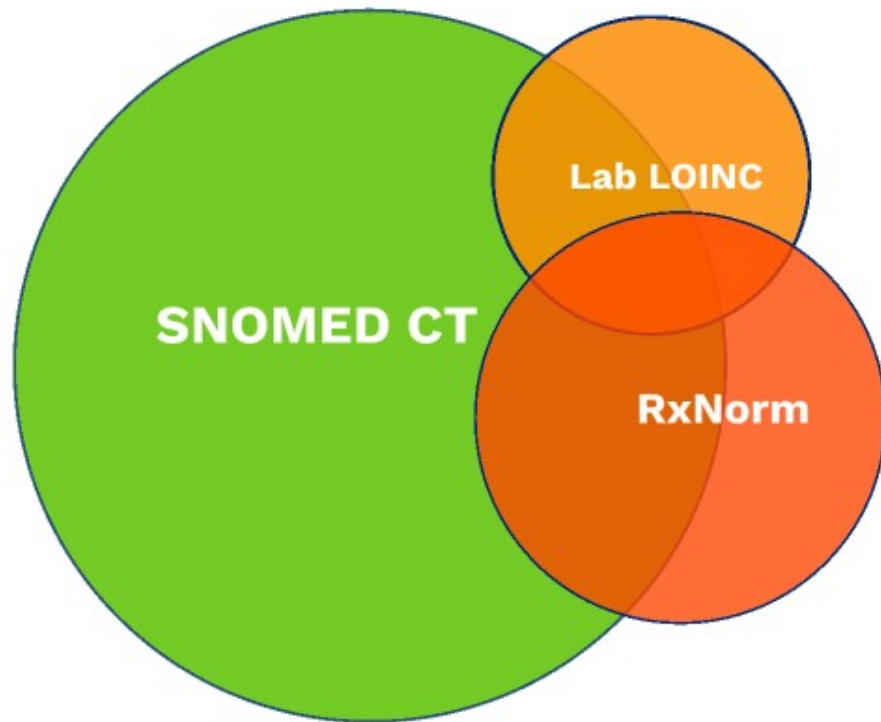
The Overlap



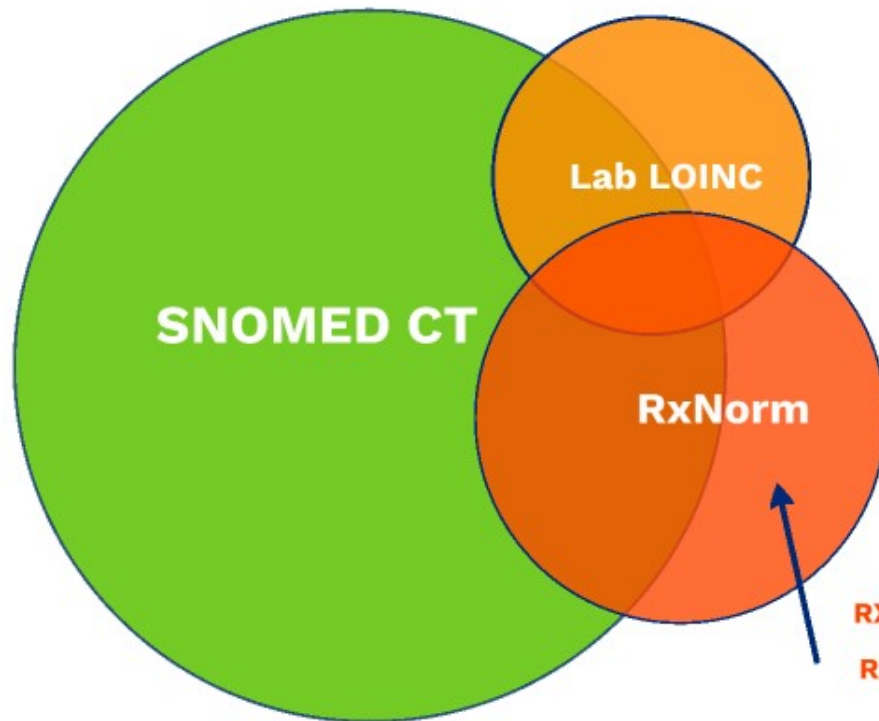
LOINC: Gentamicin is a component of a laboratory tests in LOINC (Gentamicin^peak)

SNOMED: Gentamicin is a component of a laboratory test in SNOMED (Gentamicin^peak)

The Overlap

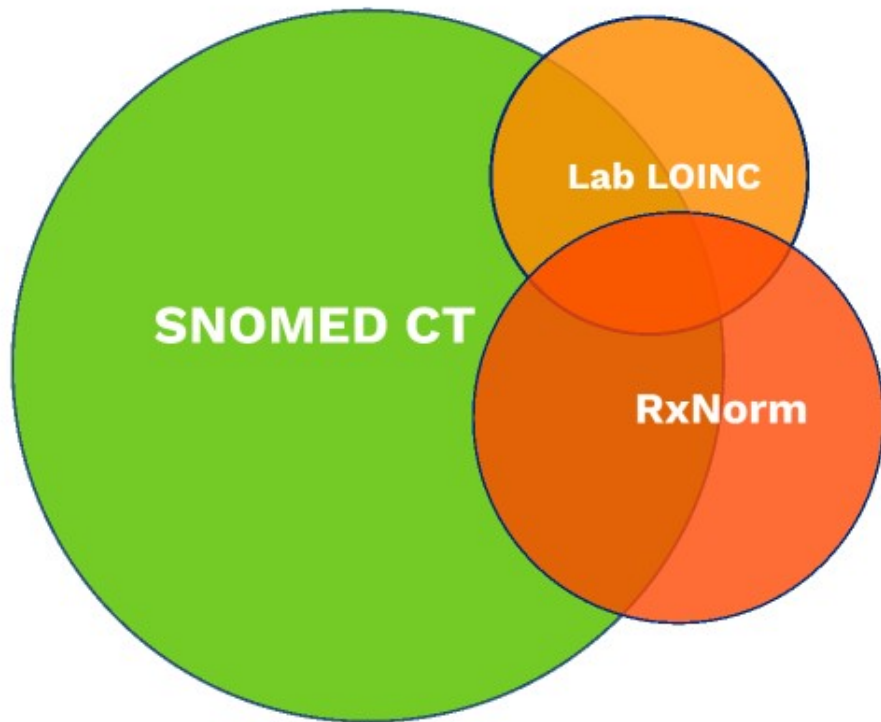


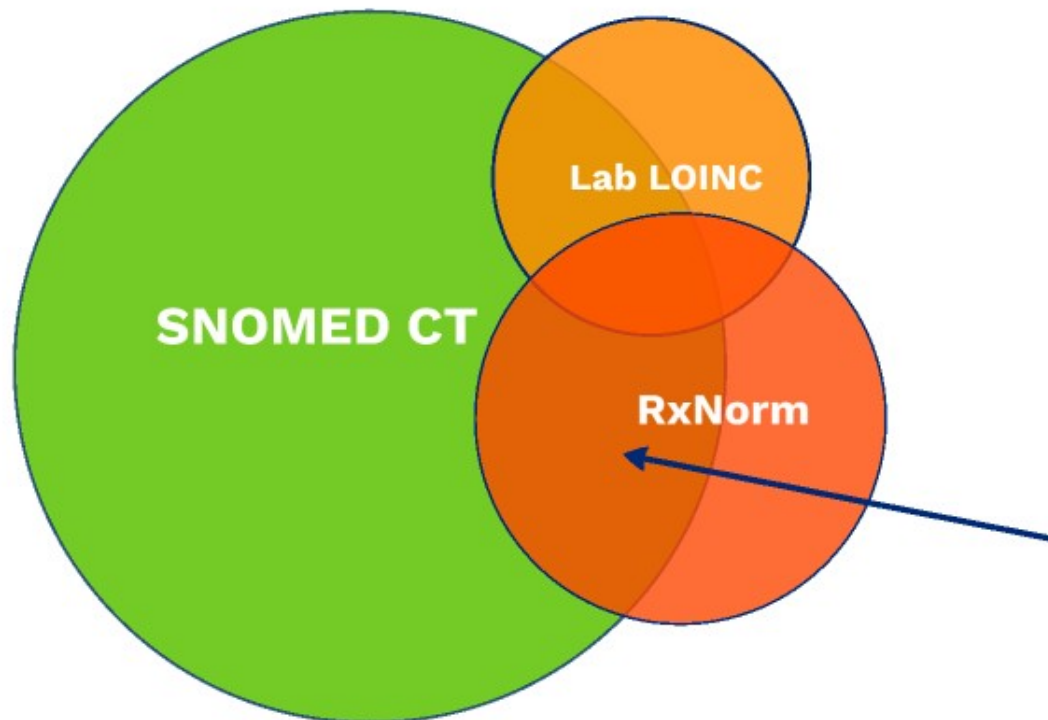
The Overlap



RX-Norm: Gentamicin is a basis of strength in RxNorm (GENTAMICIN)

RX-Norm: Gentamicin is linked to Structured Product Labels



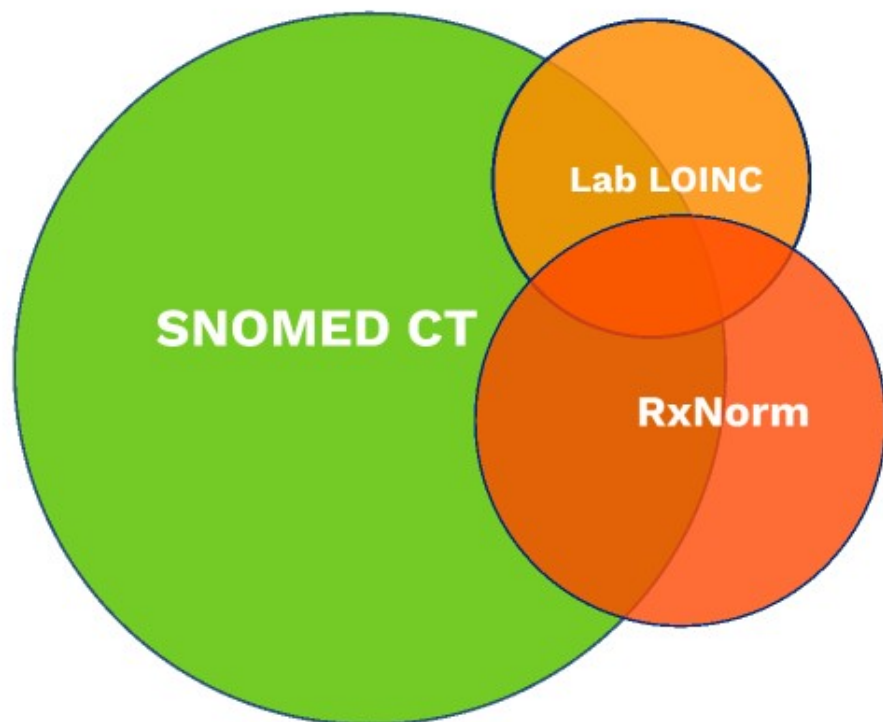


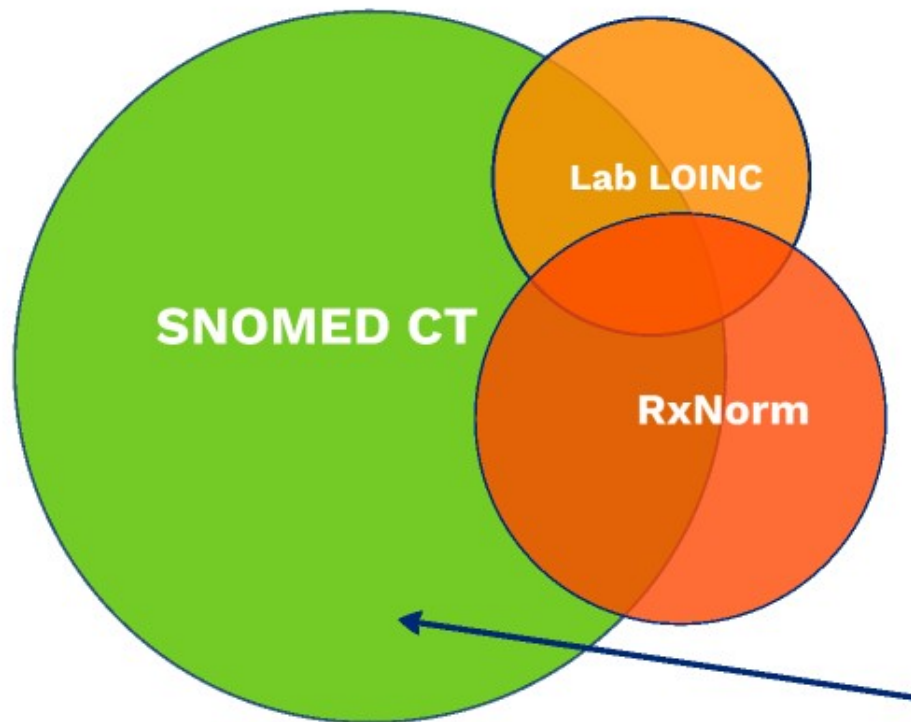
SNOMED: Gentamicin is a PRODUCT in SNOMED (a substance manufactured and sold)

SNOMED: Gentamicin is a presented in Prescribeable/Dispensable forms in SNOMED (Gentamicin bone cement; Gentamicin 0.3% preservative-free eye drops)

RX-Norm: Gentamicin is a presented in Prescribeable/Dispensable forms in RxNorm (Gentamicin sulfate 0.3% Ophthalmic Solution)

RX-Norm: Gentamicin is a PRODUCT in RxNorm (a substance manufactured and sold)





SNOMED: Gentamicin is an ALLERGEN in SNOMED

SNOMED: Gentamicin is specified in SNOMED administration and removal procedures (Insertion of Gentamicin beads into bone; Removal of Gentamicin beads from bone)

SNOMED: Gentamicin is a presented in Prescribeable/Dispensable forms in SNOMED (Gentamicin bone cement; Gentamicin 0.3% preservative-free eye drops)

SNOMED: Gentamicin is specified in poisonings/overdoses

SNOMED: Gentamicin allergic reactions are defined clinical situations

SNOMED: Acute drug-induced renal failure is a disorder in SNOMED

Mapping

- A "best match" to a system you can't change
- Broader than, narrower than, equivalent
- Always out of date
- Increases the opportunities for errors
- Errors can mean fatality

Does Mapping Work?

- 9% round trip match for document names
- 63% round trip match for medications
- “Hepatitis B vaccine needed” mapped to “Procedure needed”

Mapping is a retrospective effort at interoperability that will always be out of date and introduces new opportunities for errors.

Patients deserve better!

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What is SOLOR?

SOLOR is an integration of terminology content delivered in a single model



**How is
SOLOR the
Same?**



**How is
SOLOR
Different?**

How is SOLOR the Same?

- SOLOR is founded on an integration of SNOMED, LOINC, and RxNorm
- Extensions follow a standard model
- SOLOR's data model builds on SNOMED's model
 - OWL EL++ semantics
 - Chronicled & uniform history
 - Chronicled & uniform extension model

"Standing on the shoulders of giants"

– Isaac Newton

(and later quoted by Stan Huff)



How is SOLOR Different?

- Transformation of SNOMED, LOINC, and RxNorm into compatible modules
- Emphasis on modularity
- Addition of Author and Path to SNOMED chronology model

Mapping

**SOLOR
Model**

Identifiers

Mapping

Eliminate Mapping?
YES!

- Implement standards natively
- Add new meaning to local extension when necessary
- Share the extension with care partners
- Contribute extension to standards

**The
SOLOR
Approach**

**Mapping
Example**

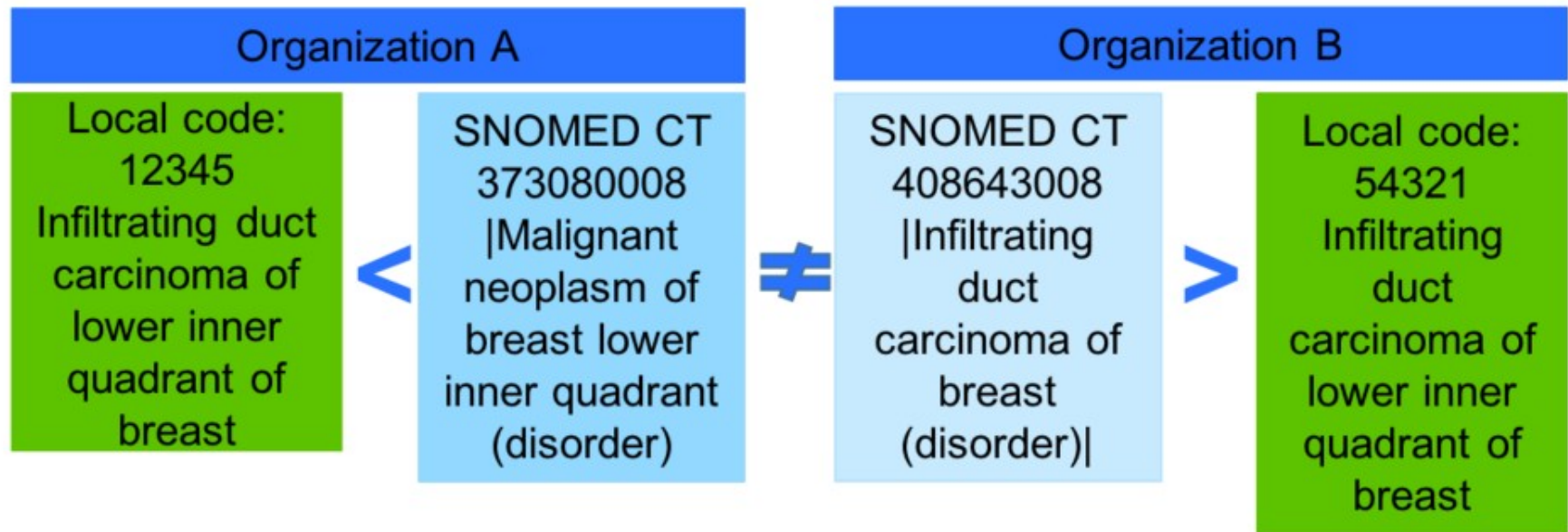
The SOLOR Approach

Mapping now is an external link to a system that is independent and may irrespectively change the mapped content.

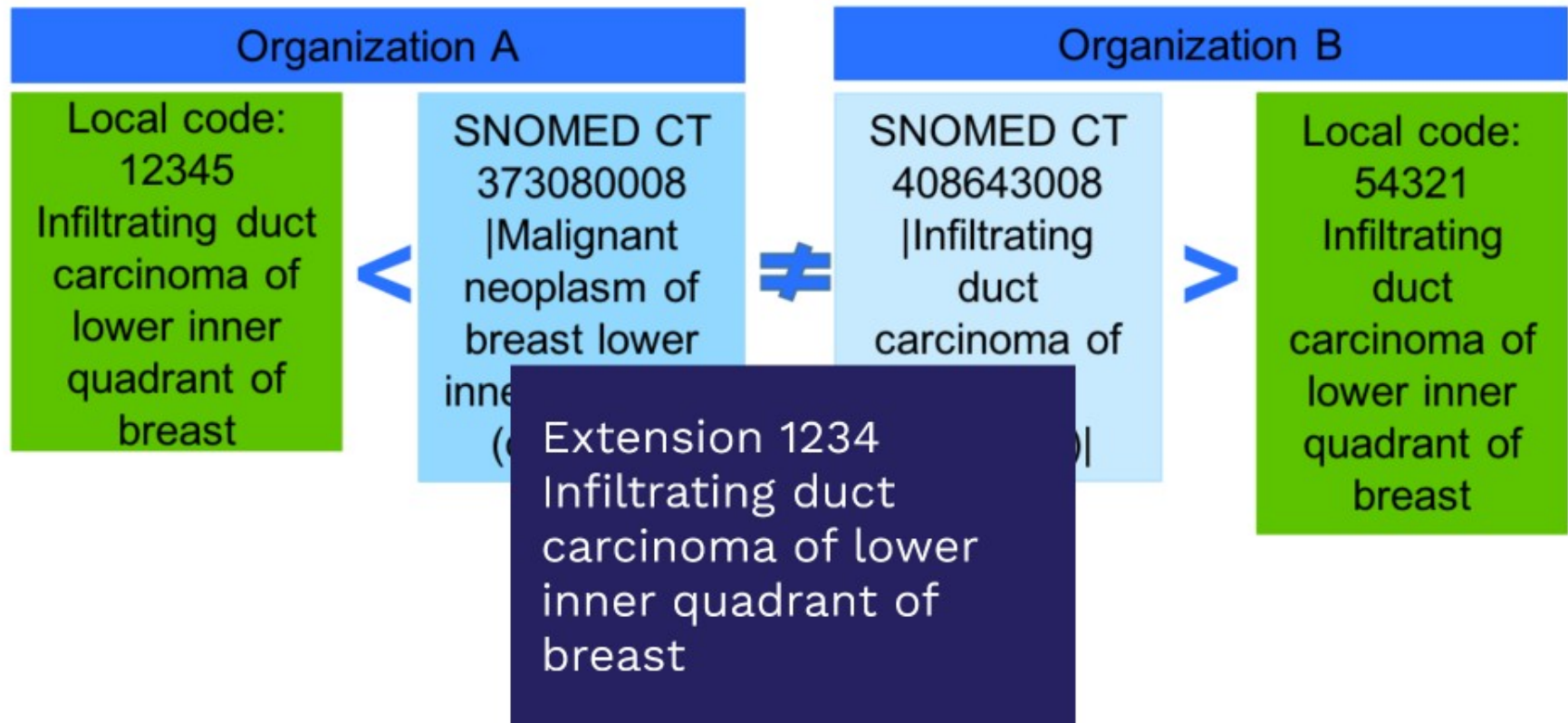
Approach:

- Add that concept as a first-class citizen if it does not already exist.
- When making changes to terminology, explicitly account for the effects on this added concept.

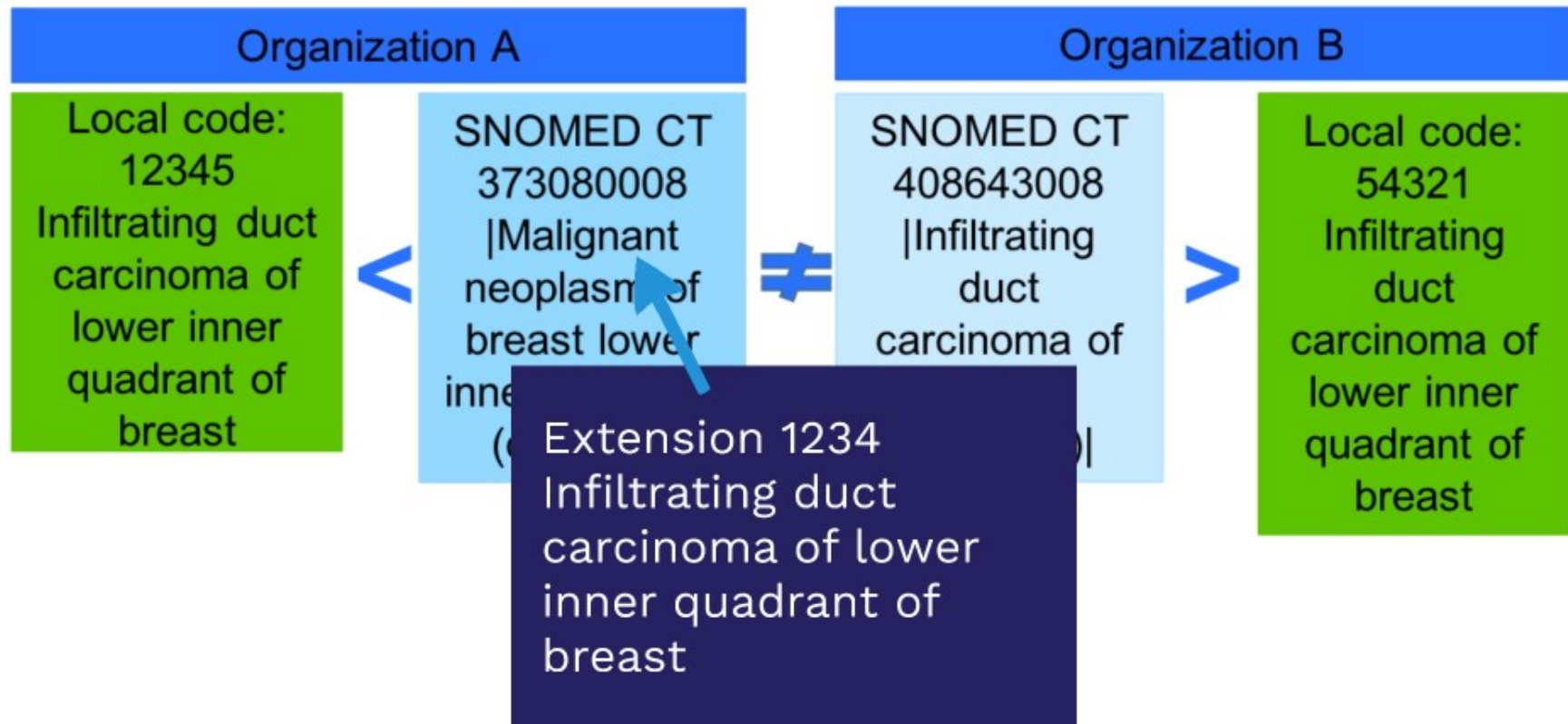
Mapping Example



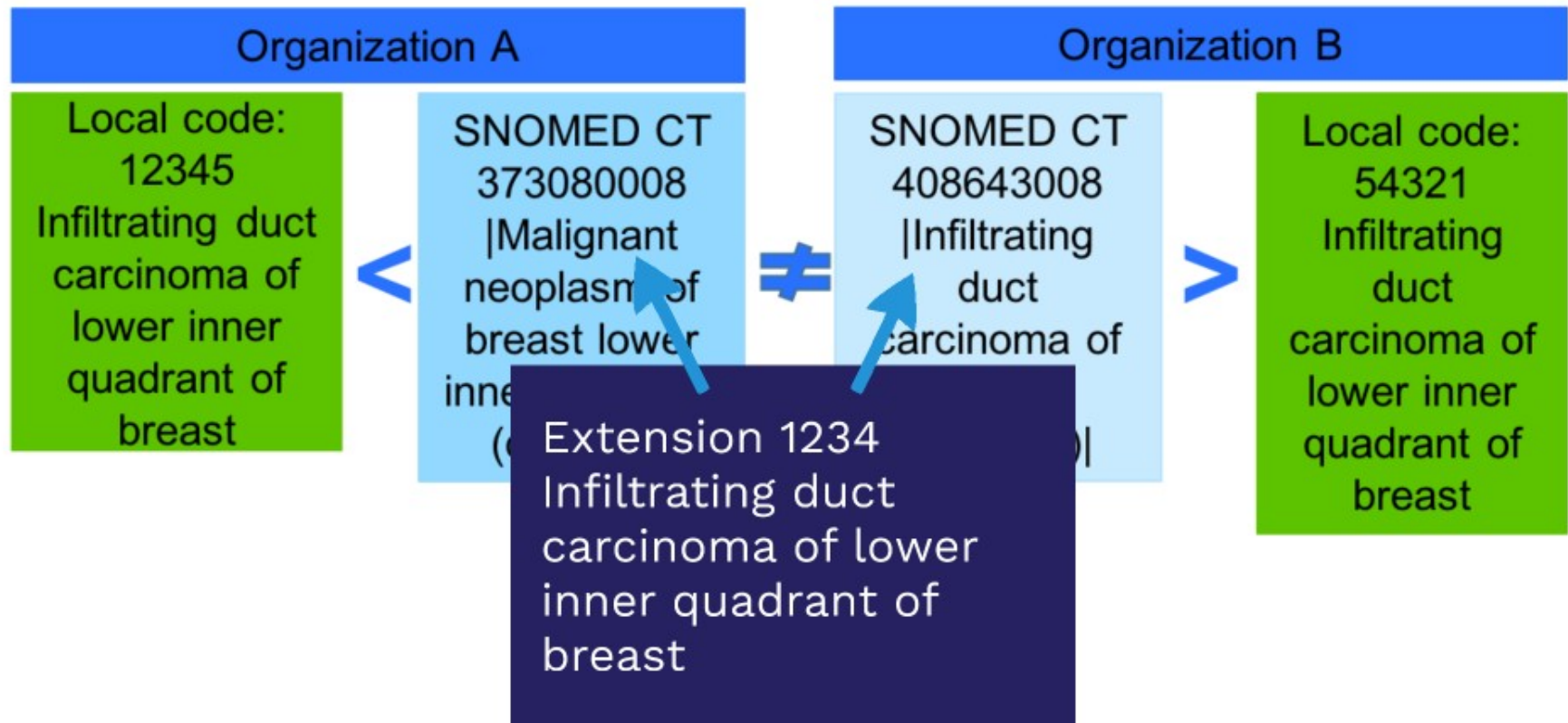
SOLOR Extension Approach



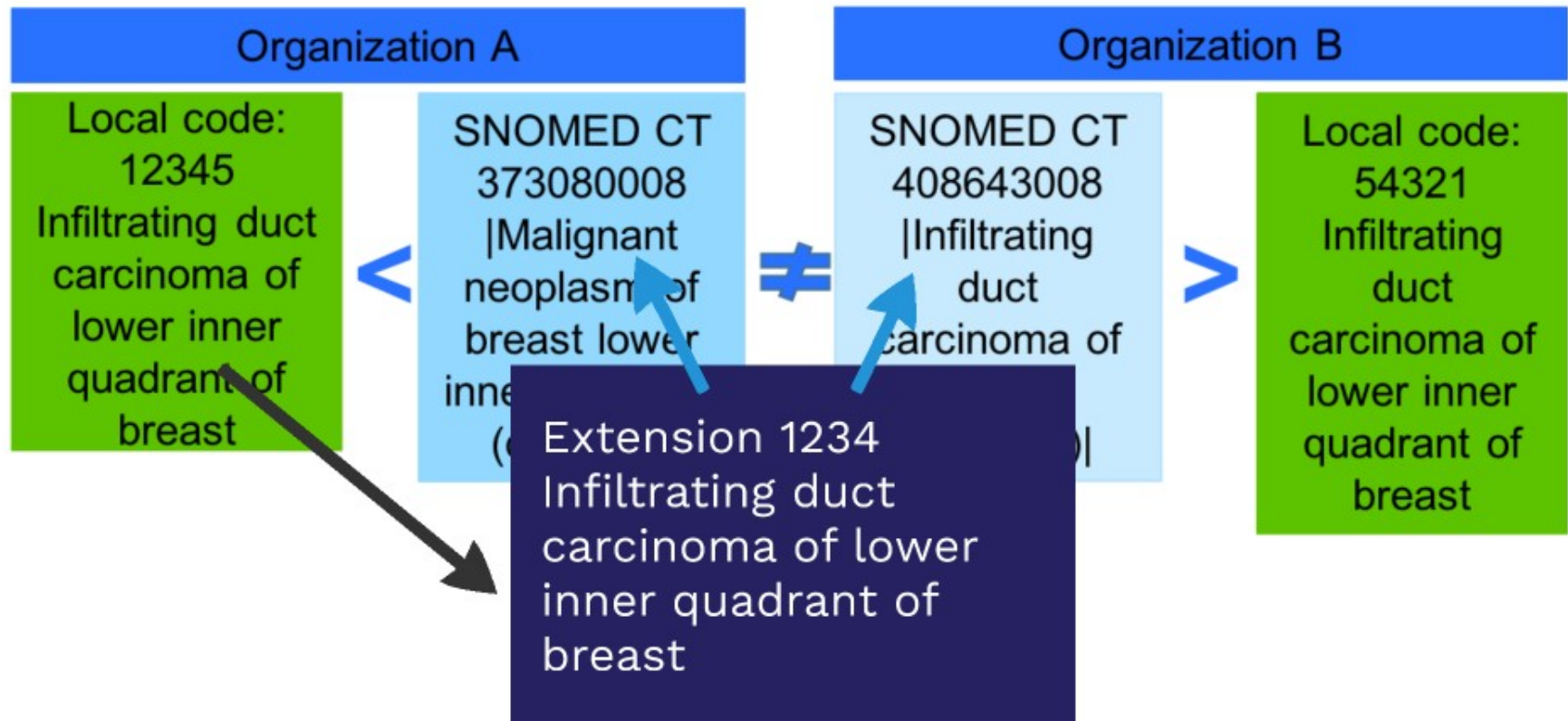
SOLOR Extension Approach



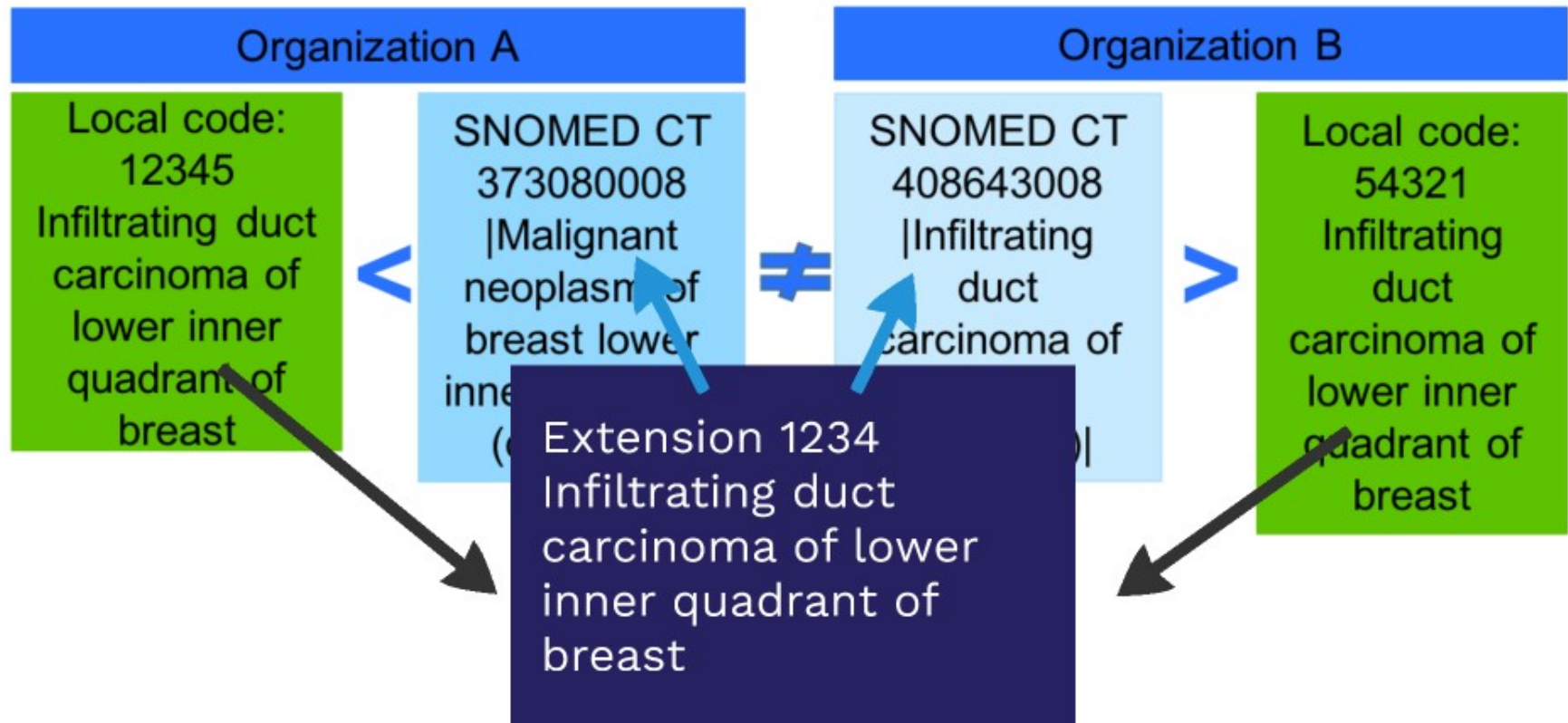
SOLOR Extension Approach



SOLOR Extension Approach

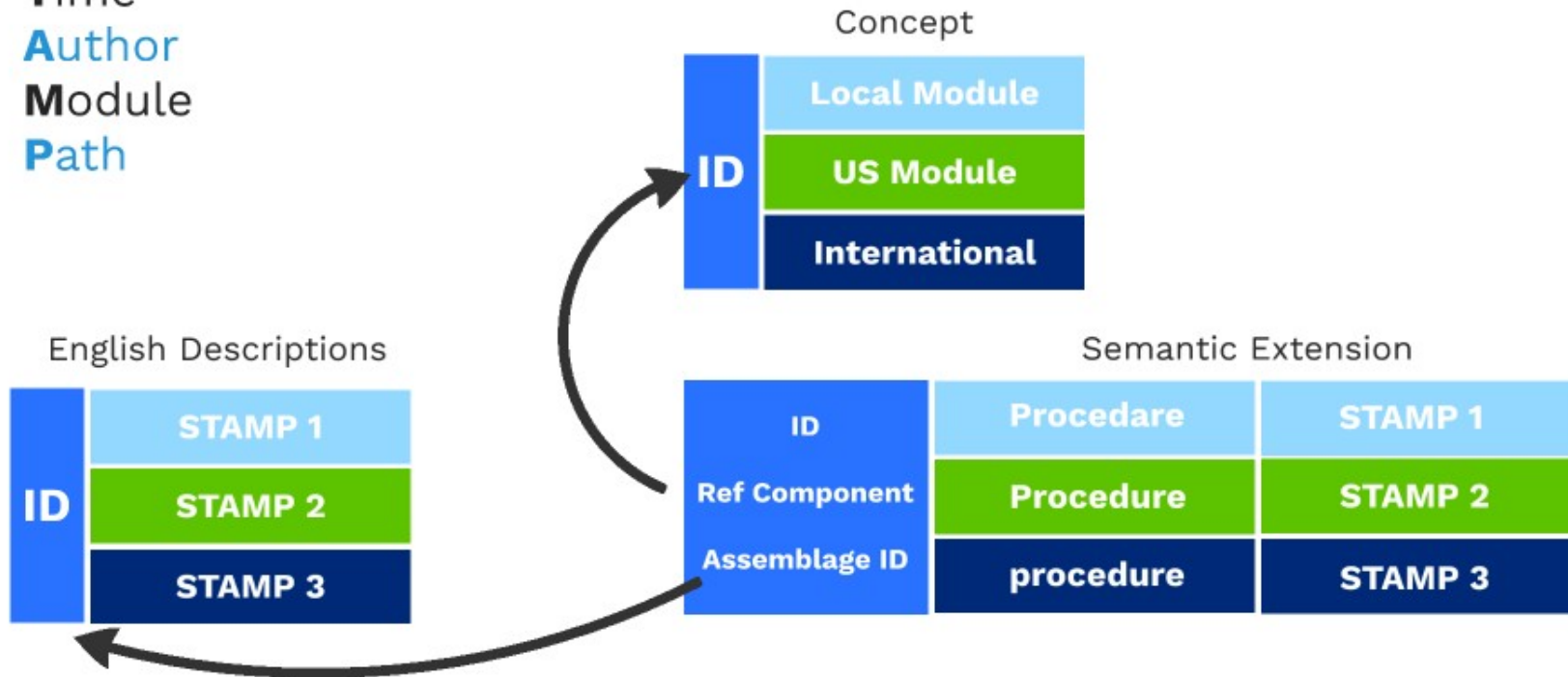


SOLOR Extension Approach

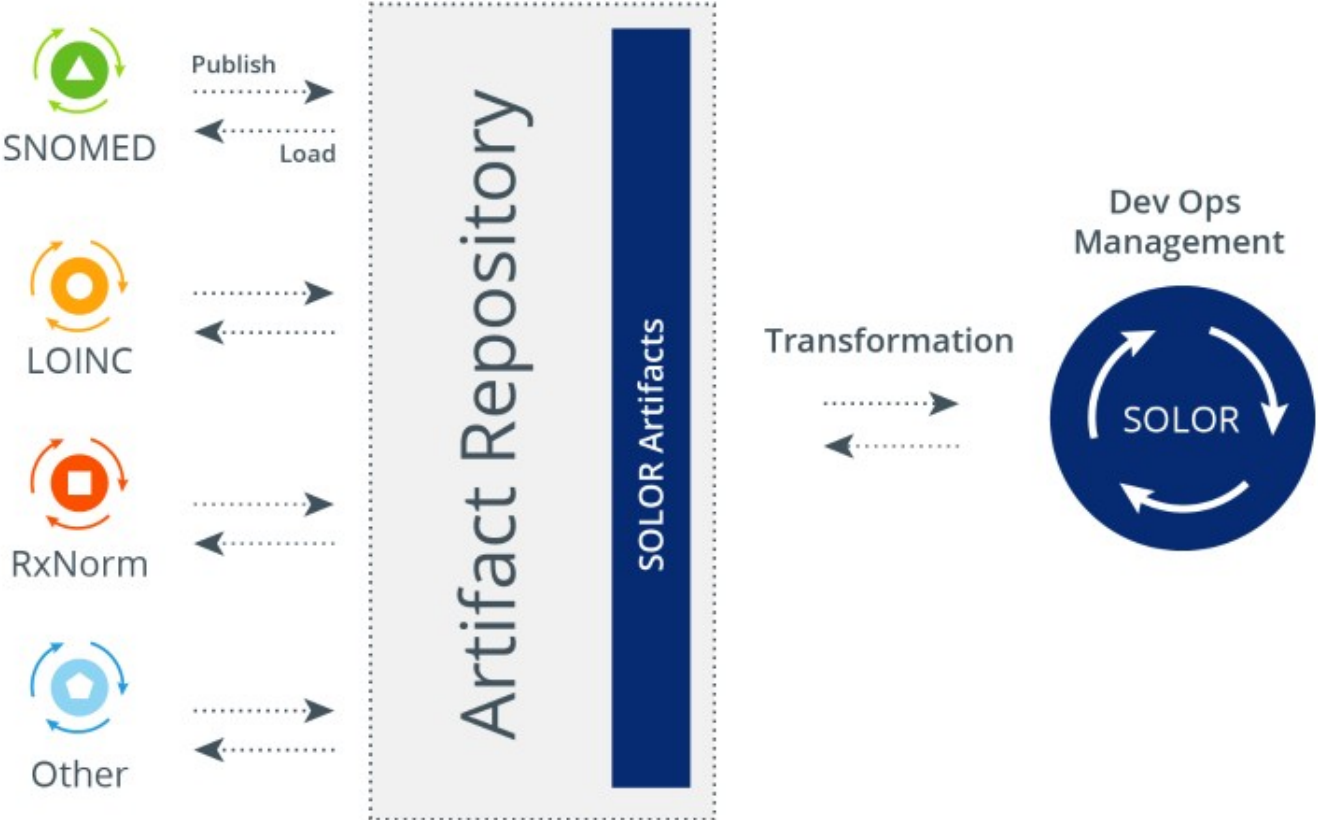


SOLOR Model

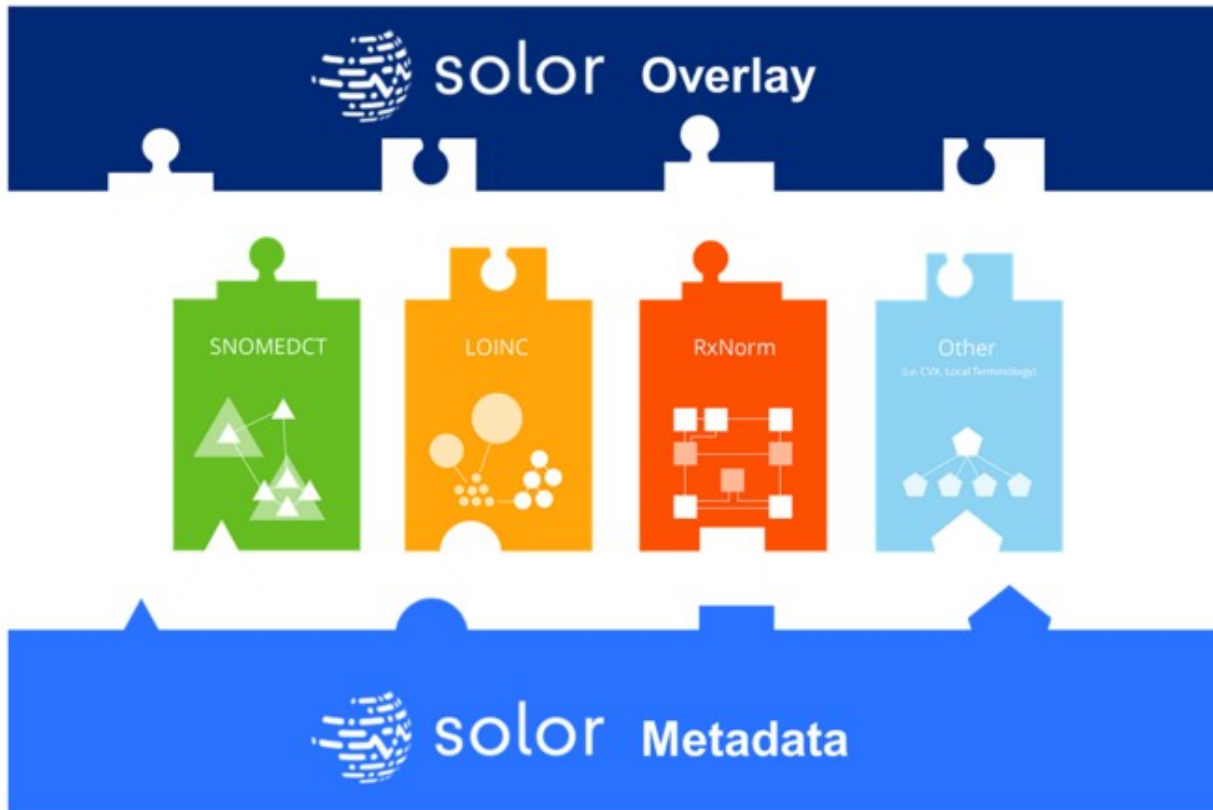
Status
Time
Author
Module
Path



Data Normalization



Semantic Normalization



Separation of Concerns

Enable enhanced separation of concerns

- Modules become a unit of collaboration
- Use cases define the concerns of a module
- One module does not have to meet all concerns of all users
- Clean separation of concerns is aspired between modules & models



Identifiers

- Support for distributed allocation of identifiers with no requirement for central control
- Uses Internet-era & distributed computing UUID standard
- Eliminates coordination challenges & opportunity for error
- Standards identifier added when accepted

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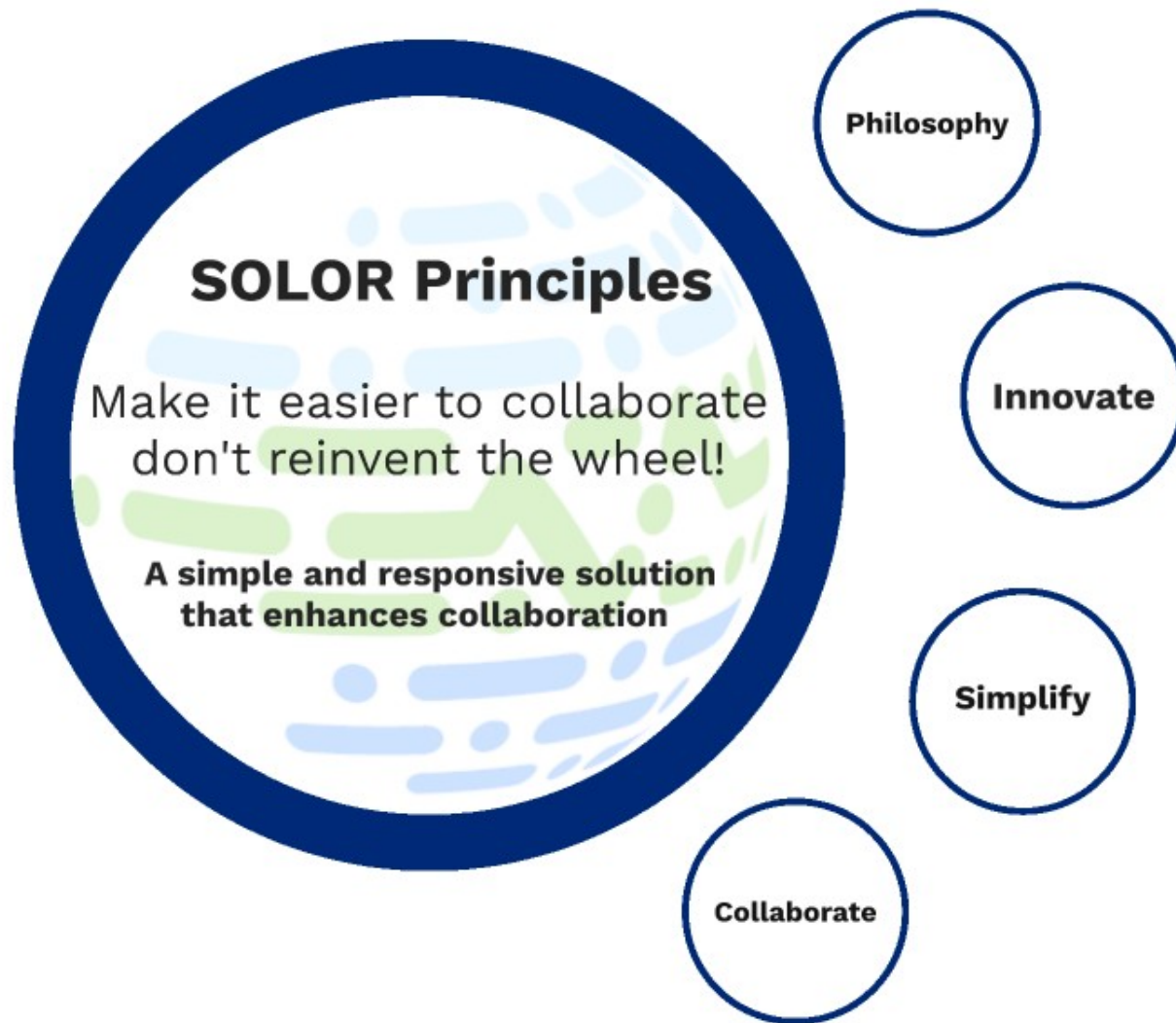
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Philosophy

- **Reuse**
 - Build on-top of existing terminology standards
 - Leverage existing software development tools, processes, methods
- **Evolve**
 - Support evolutionary change to information models (e.g., CIMI, HL7 FHIR)
- **Adapt**
 - Deliver continuously
- **Lower barrier of entry**
 - Make collaboration easy
 - Enable flexible licensing
 - Work with existing applications/environments

Make it the REAL Philosophy
– Steven Posnack, ONC

Innovate

- **Customize and Enhance**

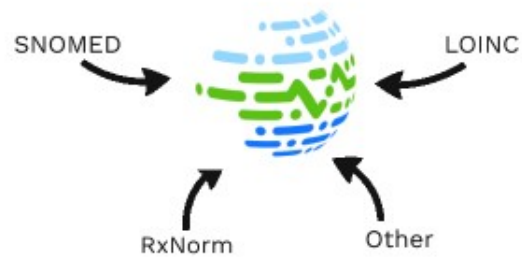
- Facilitate local extension of content
- Maintain integrity of standards
- Focus on new ways of using clinical data, instead of maintaining and managing independent ways of doing the same thing

- **Drive Faster Turnaround**

- Enable extended content for local use

Simplify

- **One Content Model**
- **Preservation of Clinical Meaning**
- **Determination of Equivalence**
 - **Less effort**
 - **Less risk**





Collaborate

- **Open System**

- Use Apache 2 open source
- Extend and integrate terminology standards and other terminologies

- **Data Exchange Between Parties**

- Enable knowledge representation to be shared
- Drive towards healthcare interoperability

- **Leverage Efforts**

- Reduce costs
- Improve curation/quality

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**Looking
Forward**

**Get
Involved**

Looking Forward

- SOLOR Viewer application
 - Downloadable from solor.io on Tuesday, Dec 5th
- SOLOR Learning Series webinar
 - Hosted by ONC on January 18 @1:30pm eastern

Get Involved

- SOLOR project information on HSPC Confluence
 - <https://healthservices.atlassian.net/wiki/spaces/SOLOR/overview>
- Sources for documentation and tools
 - KOMET - <https://github.com/OSEHRA/komet>
 - ISAAC - <https://github.com/OSEHRA/ISAAC>
- SOLOR JIRA on HSPC JIRA
 - <https://healthservices.atlassian.net/projects/SOL/summary>
- SOLOR Website – Live TODAY!
 - <http://solor.io>
 - <http://solor.io/blog/>
- Follow us on Twitter @Keith_ECampbell



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