

Simple Graphical Representations of Ontology-based Clinical Decision Support Knowledge Assets

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Challenges in Healthcare (1)

- Healthcare knowledge is complex
- Knowledge assets serve a wide variety of clinical needs
 - Forms
 - Notifications & alerts
 - Decision rules
 - Guidelines
 - Order sets
 - Dose calculators

Challenges in Healthcare (2)

- Users have different needs in terms of understanding ontology-based clinical content
- Need simple representations for modeling and curating complex clinical knowledge
- Convey the necessary information for users to piece together the individual (simpler) parts of a composite model
- Essential for ensuring quality, safety and efficacy of healthcare.

Why Such a Complex Model?

If we represent the logic of a rule as a string, we cannot

- Validate the elements of the expression
- Use elements as semantic tags indexed to reference terminologies
- Use concepts from reference terminologies as part of the logic
- Share clinical content and ensure other parties will capture the same meaning
- Search for similar assets

If “Cholesterol > 30 mg/dL” then Alert level 2

Why Such a Complex Model?

Our model allows us

- Validate the elements of the expression
- Use elements as semantic tags indexed to reference terminologies
- Use concepts from reference terminologies as part of the logic
- Share clinical content and ensure other parties will capture the same meaning
- Search for similar assets

If [Cholesterol] [>] [30] [mg/dL] then [Alert level 2]

EVERYTHING SHOULD BE MADE AS SIMPLE AS
POSSIBLE, BUT NOT SIMPLER

ALBERT EINSTEIN

Simple Graphical Representations

- “Simple is better”
- Data visualization is a medium for presenting content
- Identify the purpose of the graph
- Separate crucial information from ‘noise’
- Right level of detail
- Avoid overload, clutter and confusion

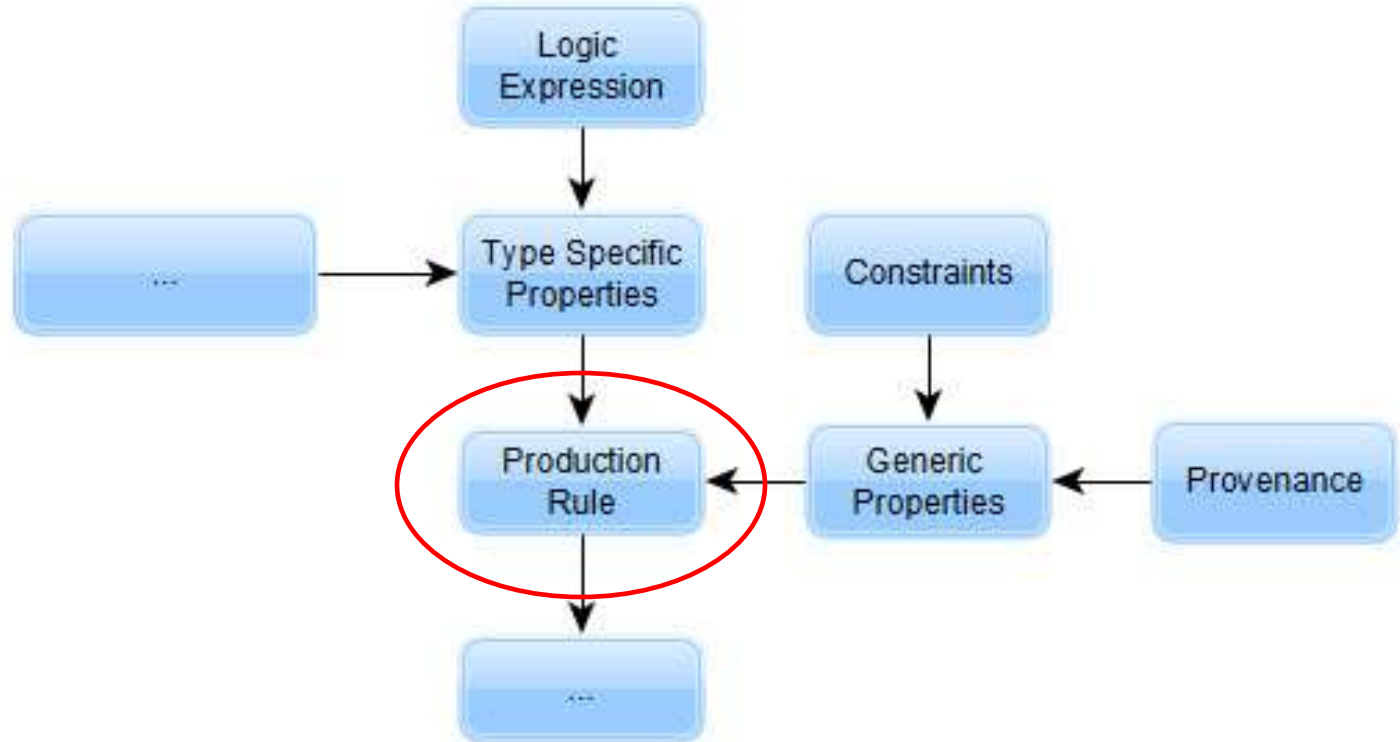
Clinical Decision Support Production Rule Schema



- Too 'crowded'
- Better to show only high level nodes

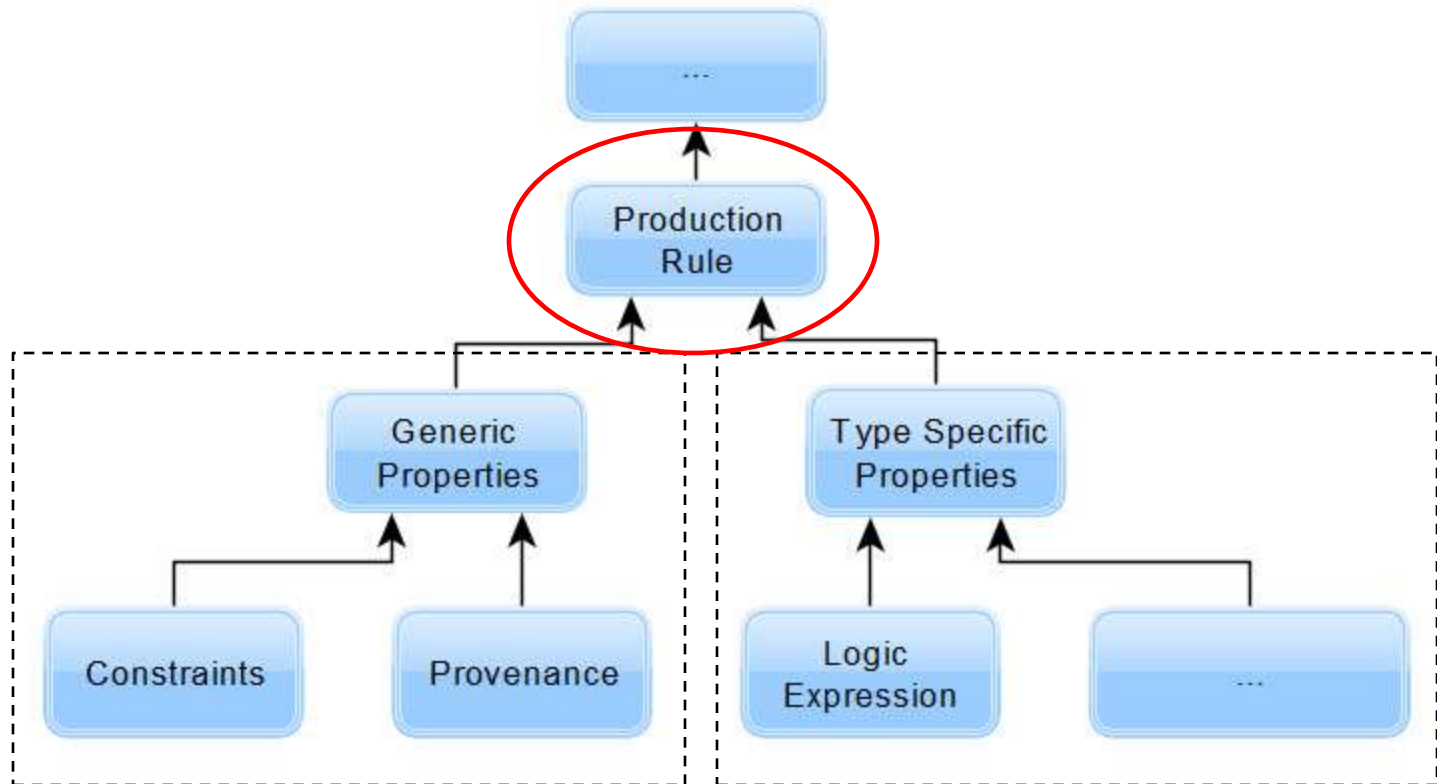
Clinical Decision Support Production Rule Schema

- Less nodes, but if the schema is a type hierarchy...
- Is this the right display?



Clinical Decision Support Production Rule Schema

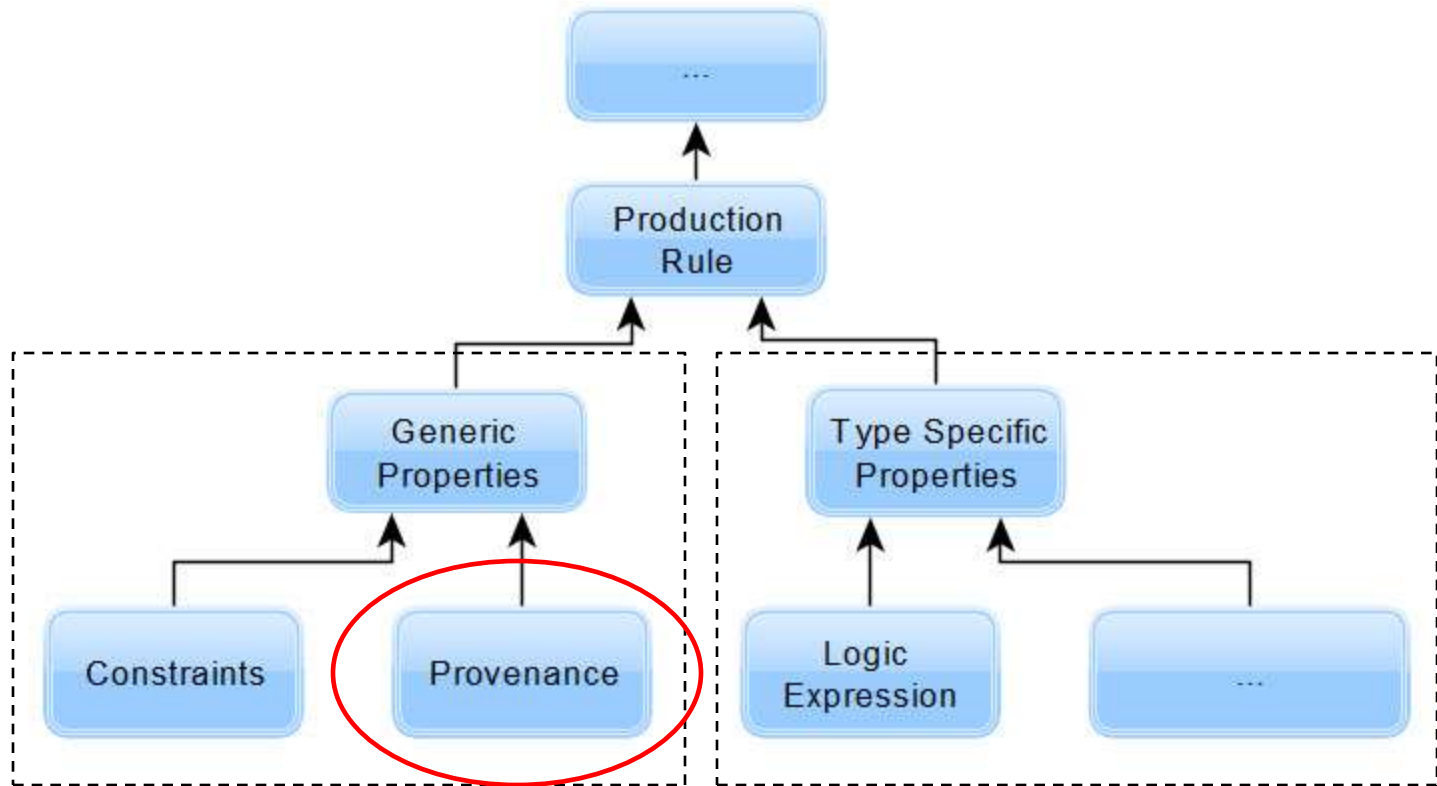
This is more intuitive and shows a hierarchical order



Clinical Decision Support Production Rule Schema

Generic Properties

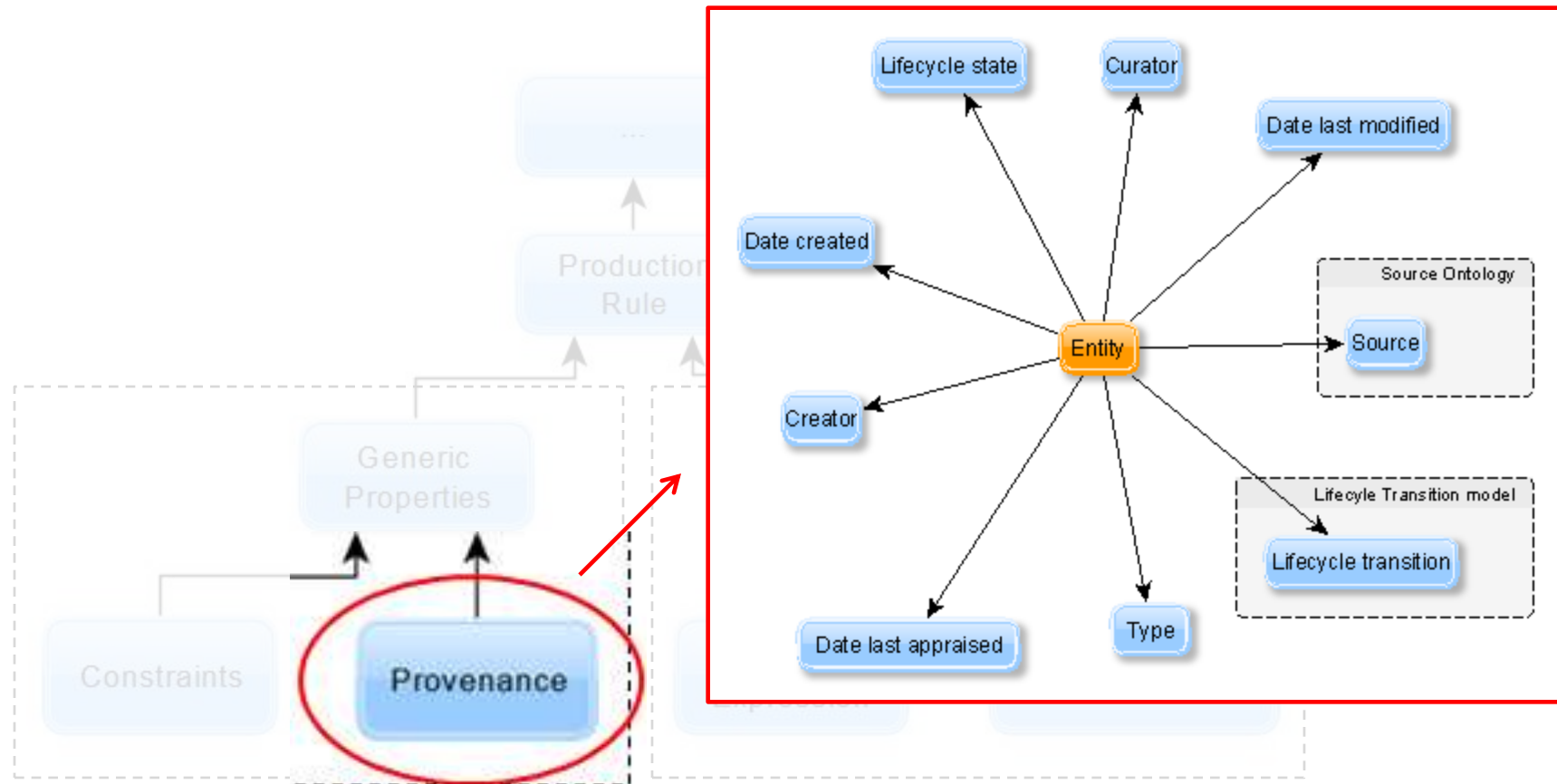
We focus on Provenance



Clinical Decision Support Production Rule Schema

Generic Properties

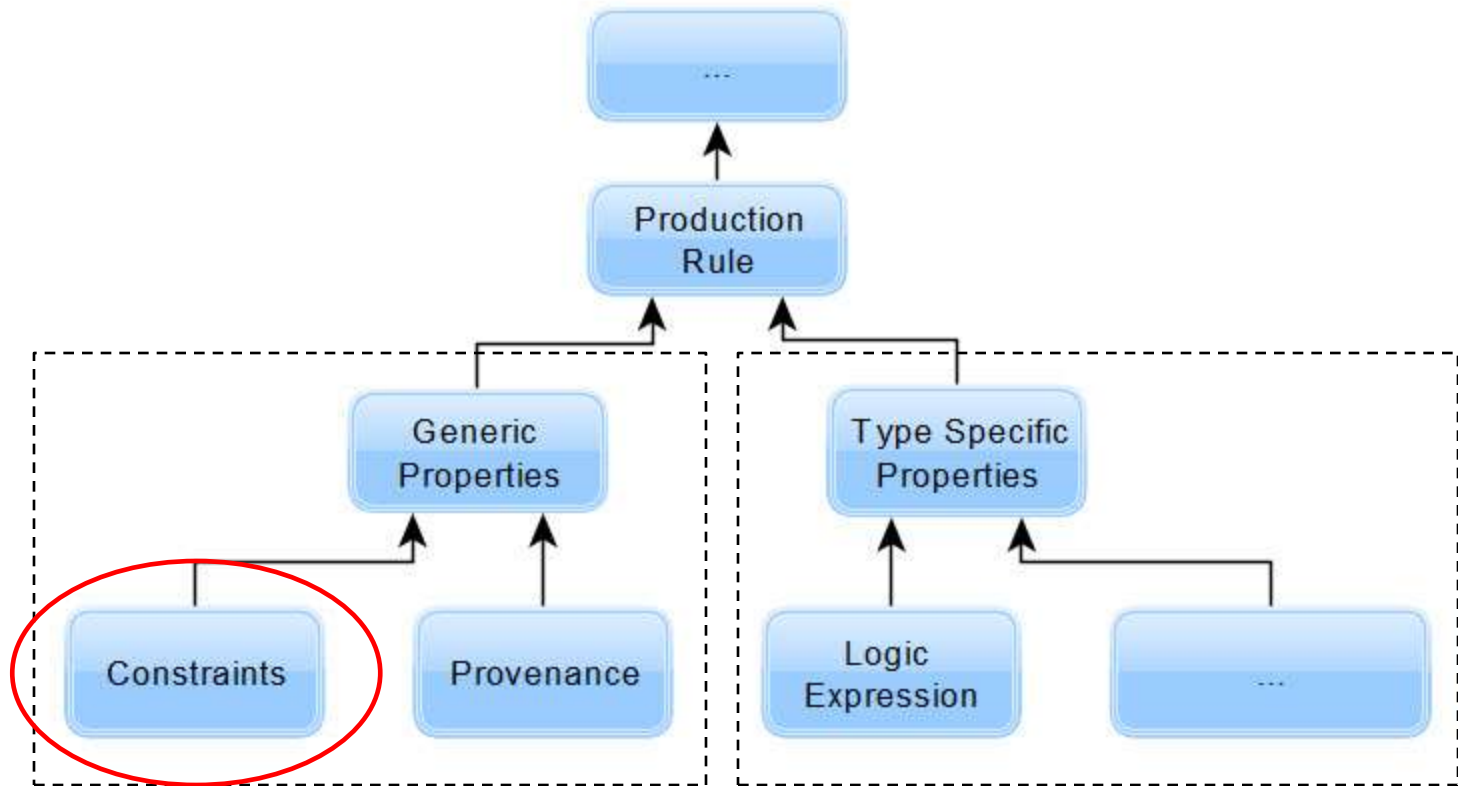
We focus on Provenance



Clinical Decision Support Production Rule Schema

Generic Properties

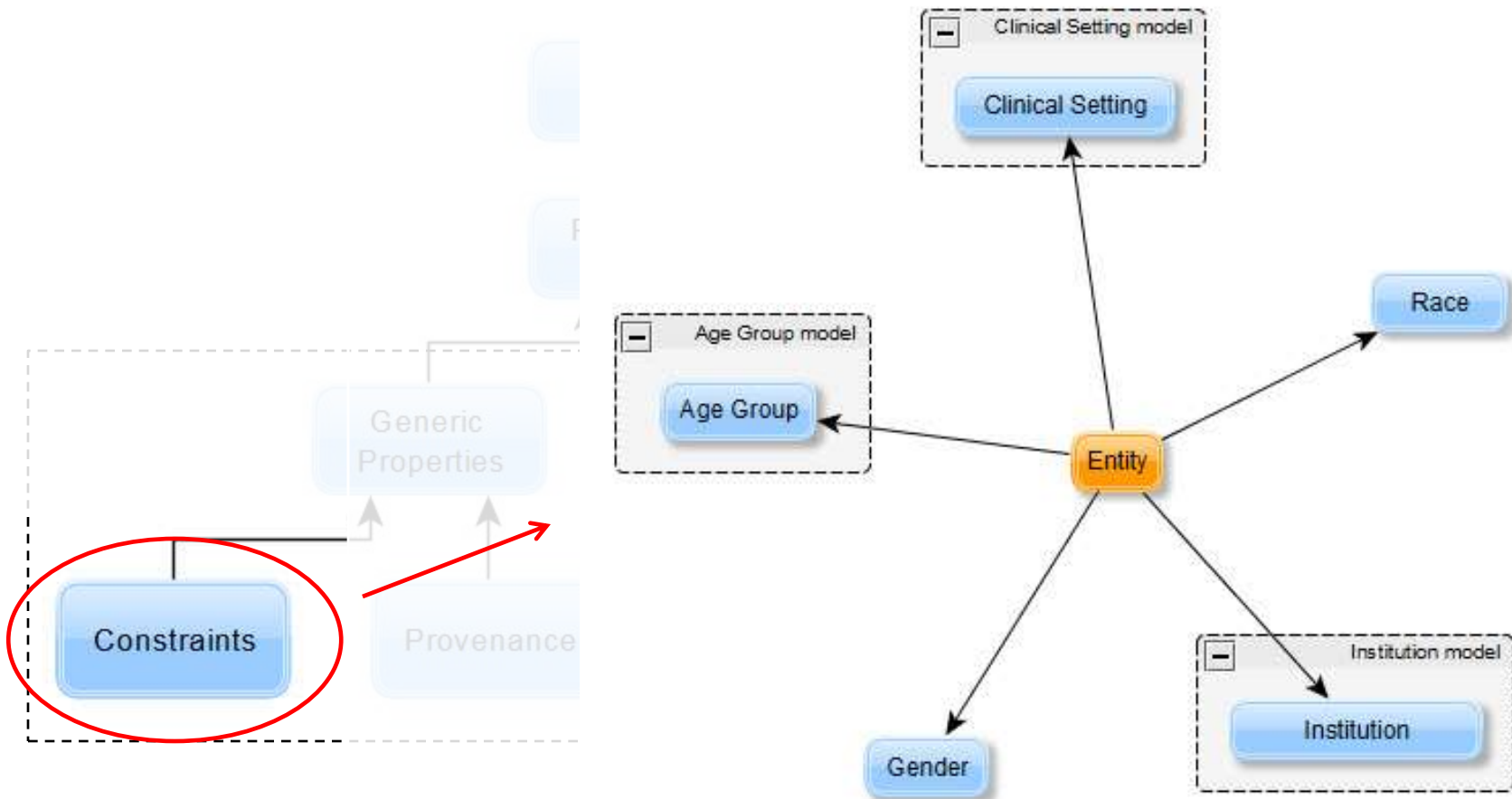
Then on Constraints



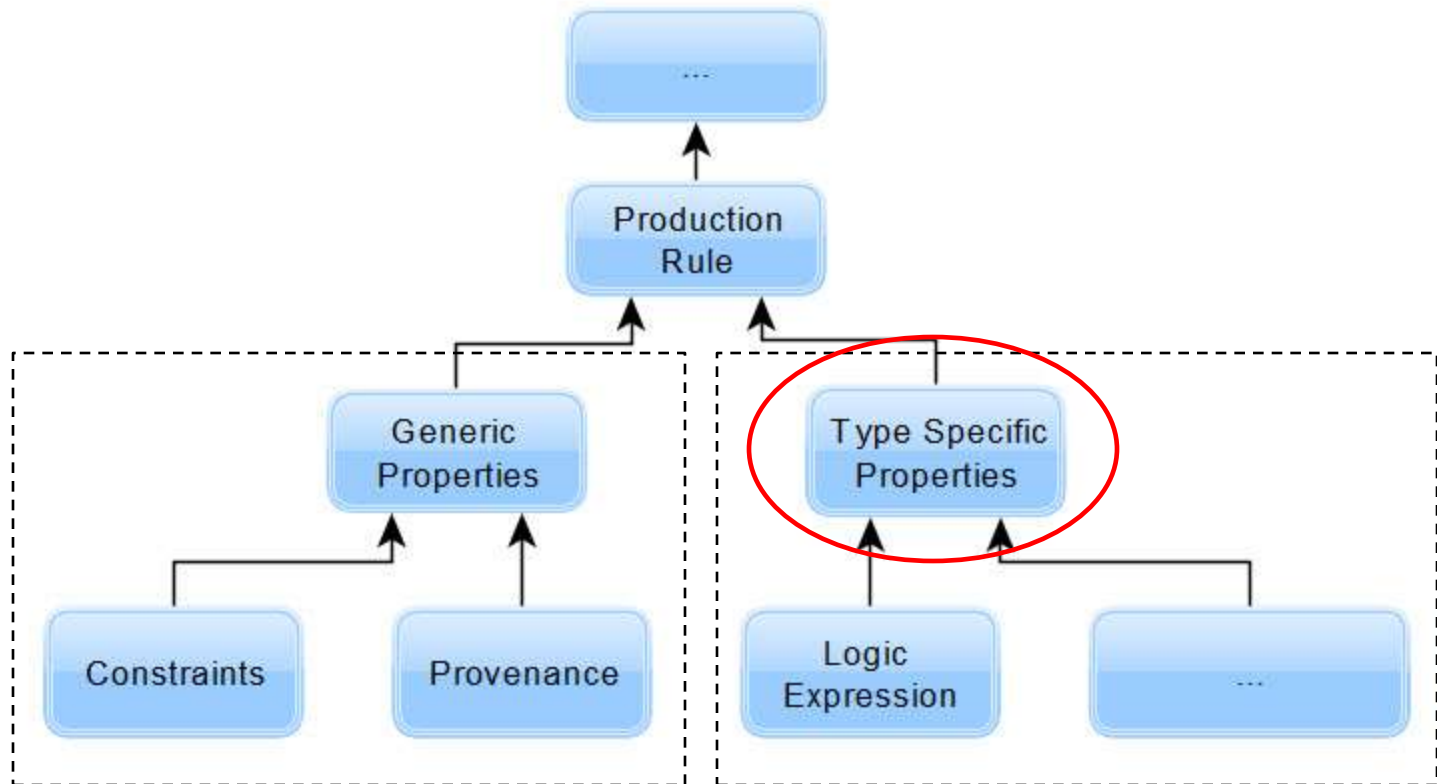
Clinical Decision Support Production Rule Schema

Generic Properties

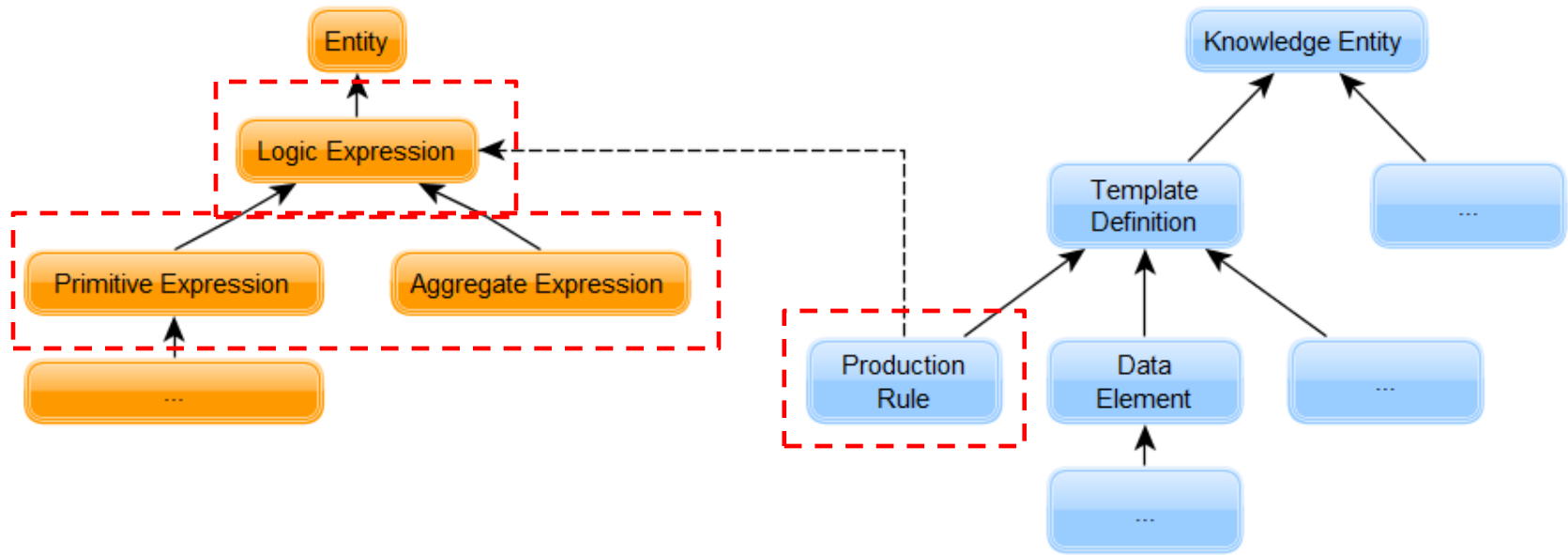
Then on Constraints



Clinical Decision Support Production Rule Schema Specific Properties

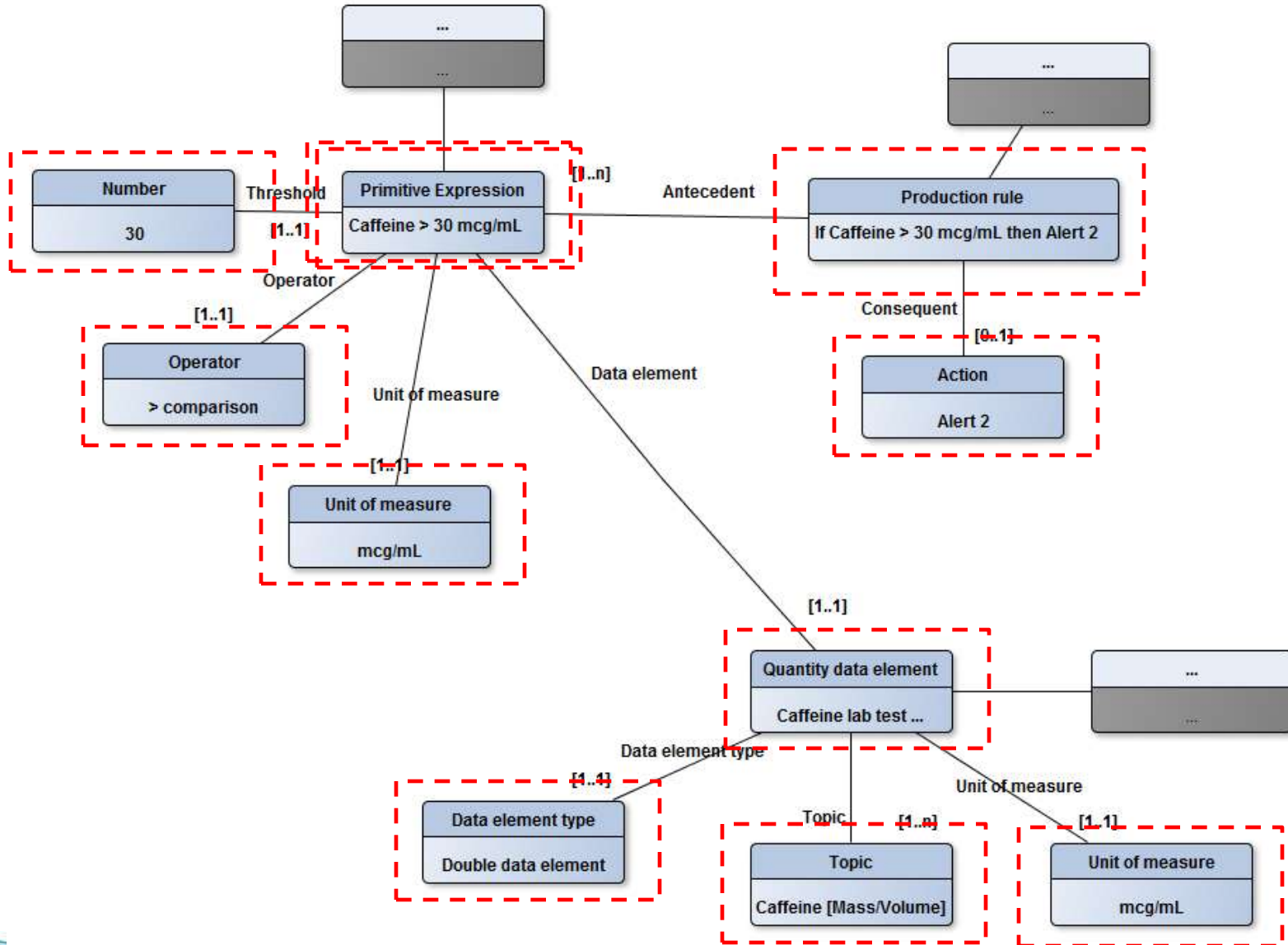


Clinical Decision Support Production Rule Schema



If <Logic Expression> then <Action>

Viewing an Instance of a Production Rule



Summary

- Simple graphs focus on what is being communicated
- Removed “spurious” information
- Balanced level of detail
- Avoid visual and cognitive overload

Thank you!