Harmonization of Arden's expression syntax and the RIM

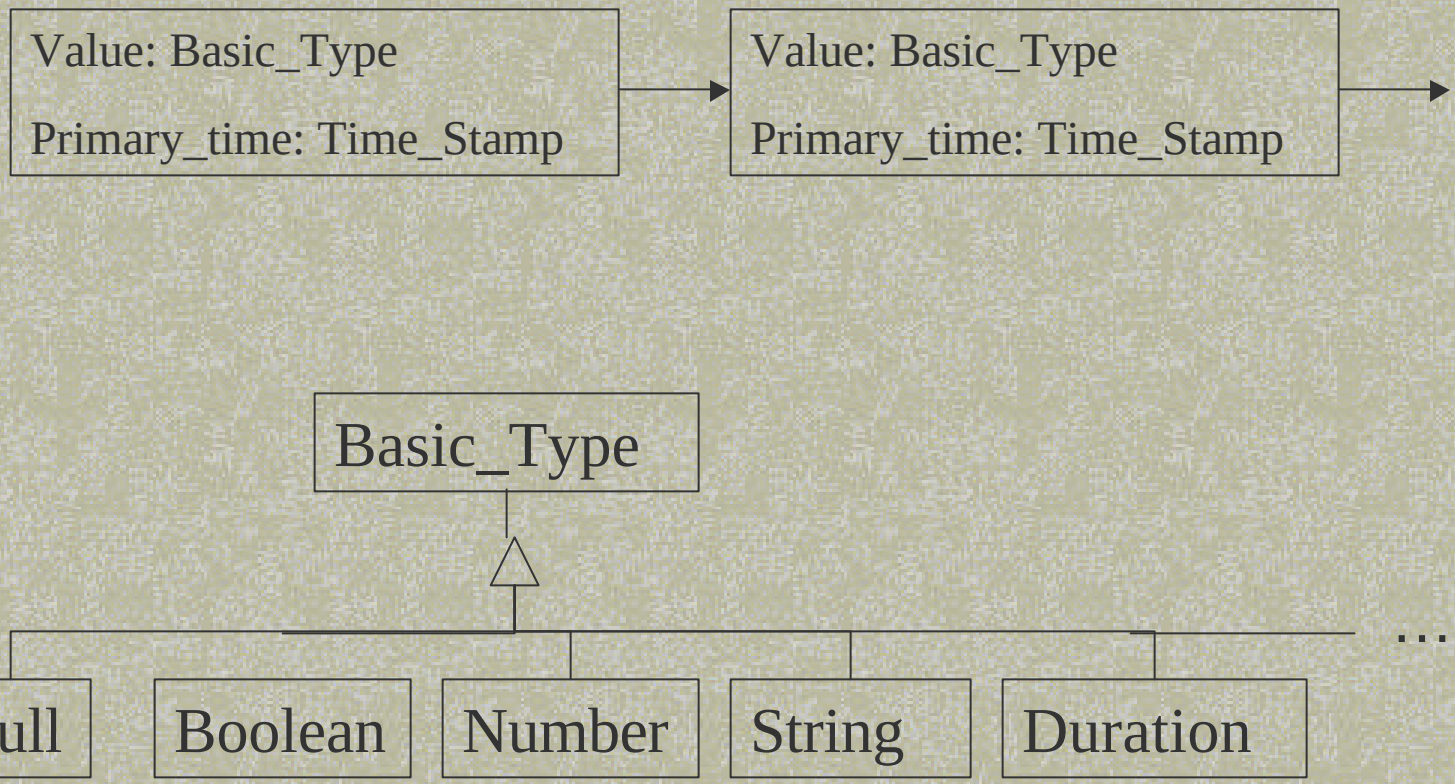
Aziz Boxwala

Mor Peleg

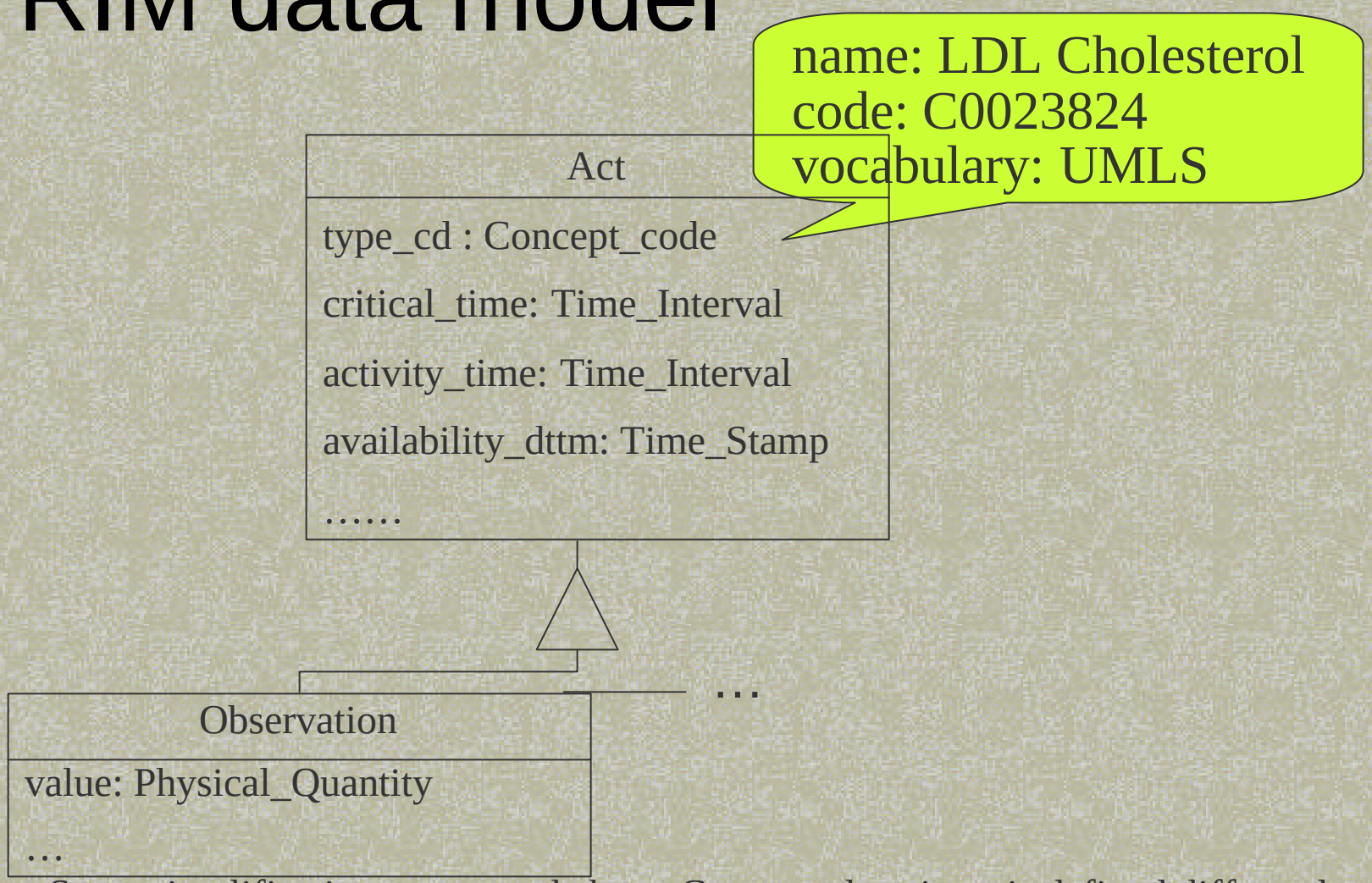
Samson Tu

Lola Ogunyemi

Arden data model

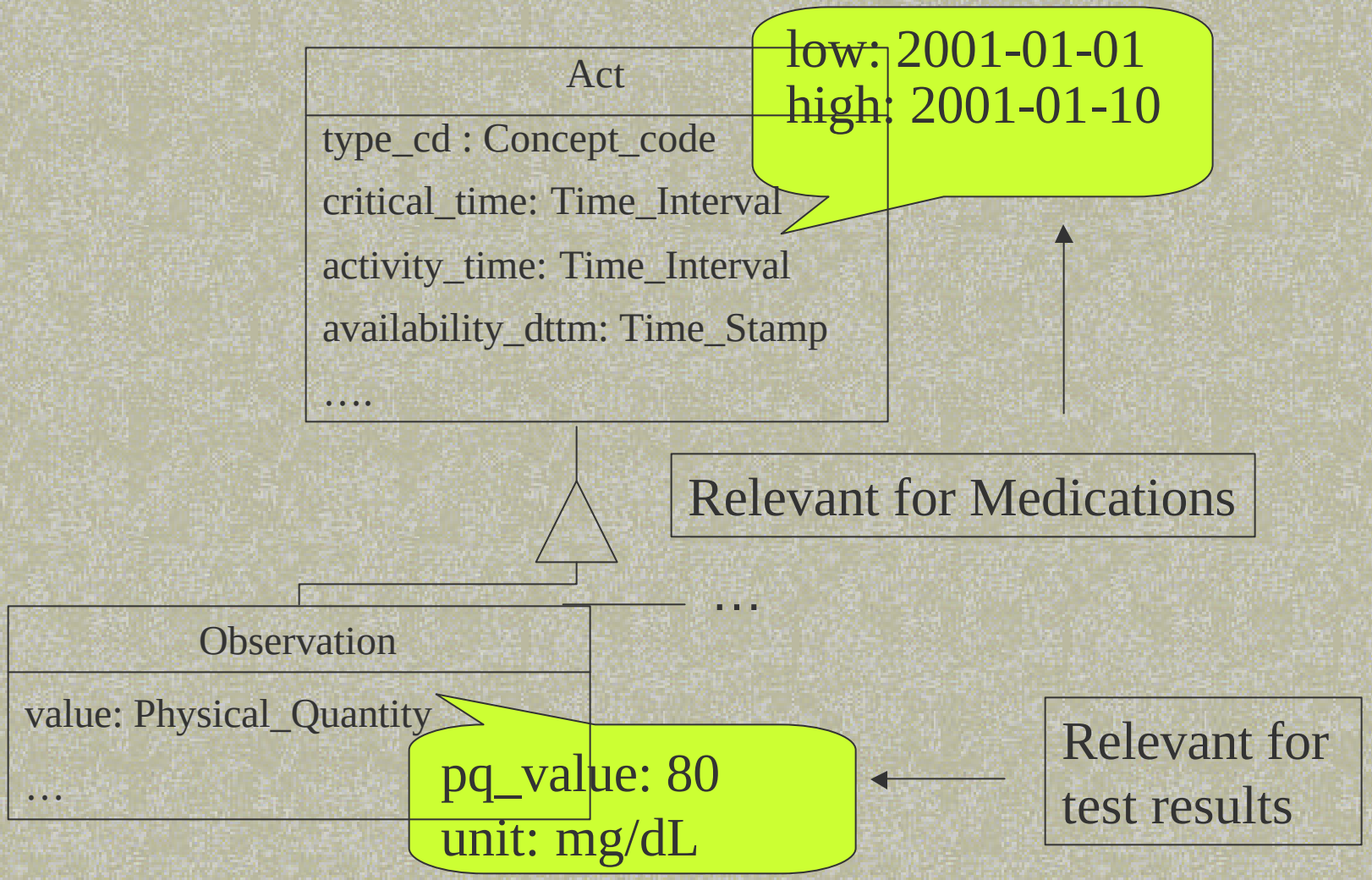


RIM data model



Some simplifications were made here. Concept_descriptor is defined differently.
critical_time and activity_time can be any function of a timestamp.
value can be of other types too, such as a range of PQ, or a ratio.

RIM data model



Incompatabilities

- OO RIM objects need to be mapped to Arden types. You cannot write:

  (last LDL_cholesterol).value.pq_value > 160 mg/dL
- Arden has a single primary timestamp; RIM Act has associated time intervals
- RIM Act can have several associated times
  Latest by availability time?
  By critical_time.high?
- Numbers in Arden represent physical quantities, yet they do not contain units (200 mg/dl? Mg/mL? mM?)

Two solutions

- Overloading Arden operators for the RIM Act class and its subclasses
- An OO expression language that organizes the Arden operators as methods

Overloading Arden operators

- Allow lists of RIM Act classes and its subclasses
- Overload Arden operators for the RIM Act class and its subclasses
- Map one of the Act times to Arden's primary time

is in (anemia, Problem_List)

Observation List of Observations

Problems with this approach

- Still need to enable extracton of simple values from Act objects
  - Because we want to refer to the different attribute values of the Act (dose_quantity and route of a Medication)

Problems with this approach

- "Where" can be used to select a simple value (with a timestamp), based ONLY on that value and timestamp
  - select Amoxycillin where the route_code is oral and the dose is > 200 mg cannot be done
  - May be solved by introduction of dot notation within identifiers. The Arden parser can send these identifiers to an extractor

    Medication where it.type_cd = *amoxycillin_cd* and it.route_cd = "PO" and it.dose_qty.pq_value > 200 and it.dose_qty.unit = "mg"

Object-oriented expressions

- Classes in RIM provide methods that have operators associated with class
- Examples:
  - problem_list. where(it.value =*anemia_cd*)
  - medication_list.where(it.type_cd = *amoxycillin_cd* and it.route_cd = “PO” and it.dose_qty(“mg”)>200)

OO expressions - Pluses

- Language always conforms to data model
- Operations can perform semantic interpretation
  - last_sodium.isInterpretation(normal_cd)
- Provides a way of organizing general operations
  - List.merge(…)
  - Math.sin(x)
  - Fuzzy.fuzzy_op(x,y)

OO expressions - Minuses

- Backward compatibility - not syntactically similar to current Arden logic grammar
- “Not easy to use”