

Partial Instances via Subclassing

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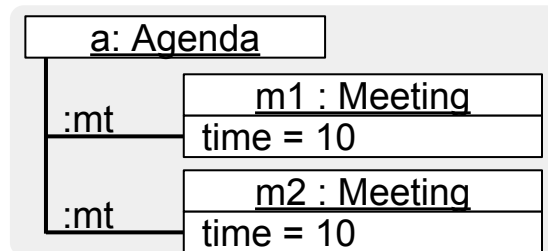
IT University of
Copenhagen

Oct 28, 2013

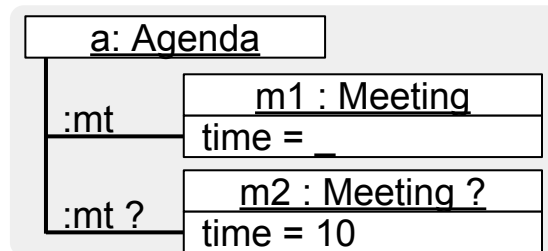
OOM is popular and useful

Main components: Class and Object Diagrams

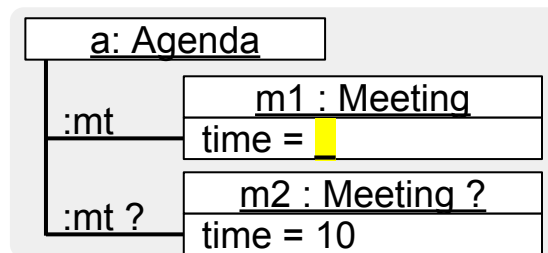
Fully specified instances in OOM



Partial instances also useful!

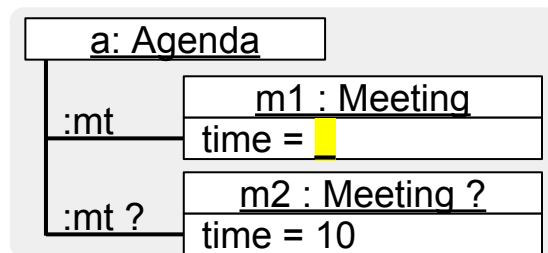


Partial instances also useful!



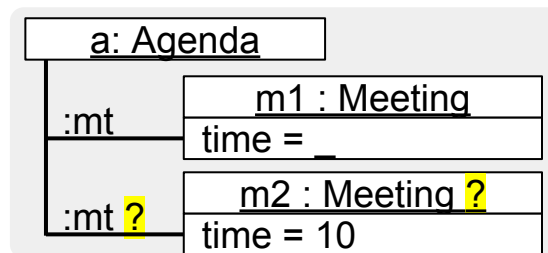
Uncertainty - don't know

Partial instances also useful!



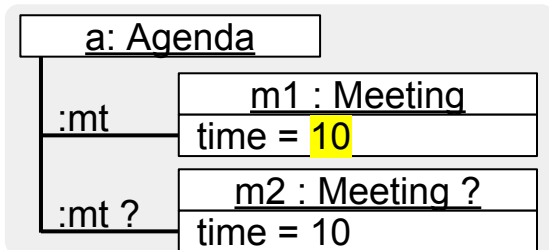
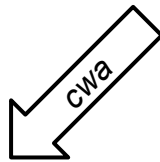
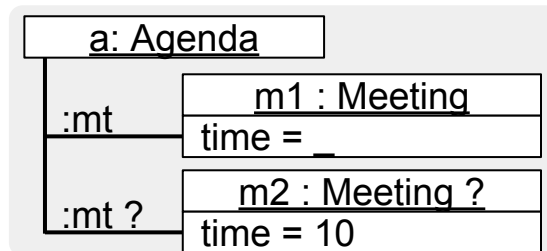
Underspecification - don't care

Partial instances also useful!

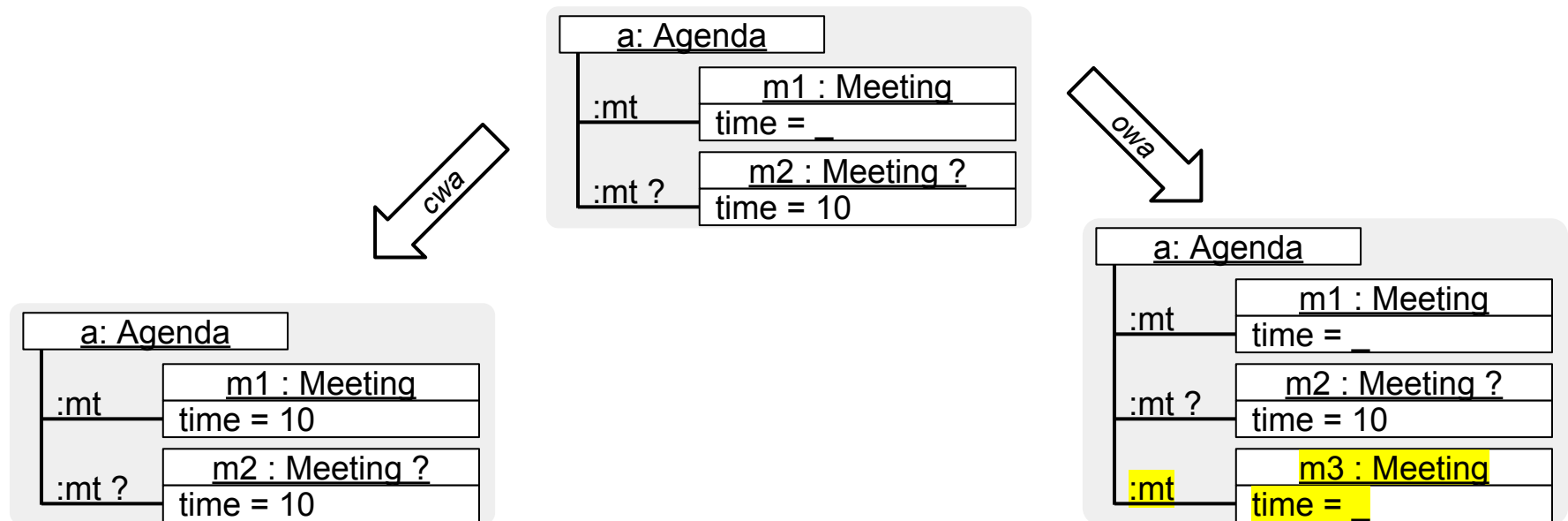


Variability - need them all

Partial instances completion



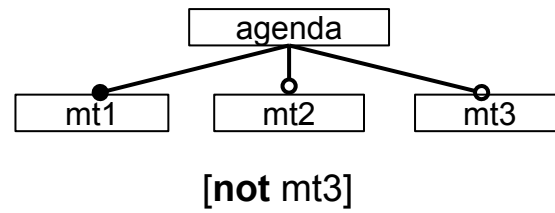
Partial instances completion



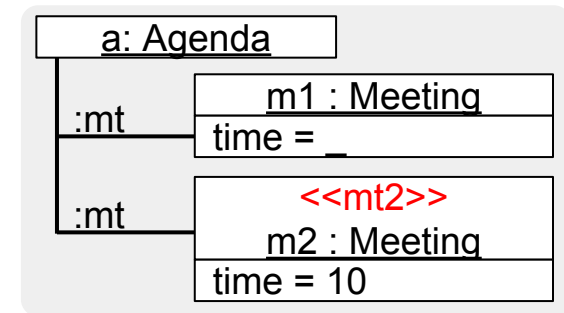
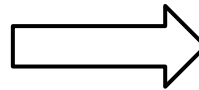
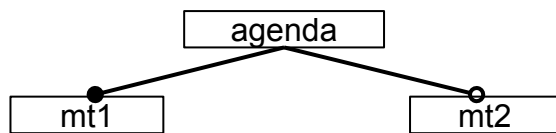
Applications

ID	Name	Address
0	John Doe	NULL

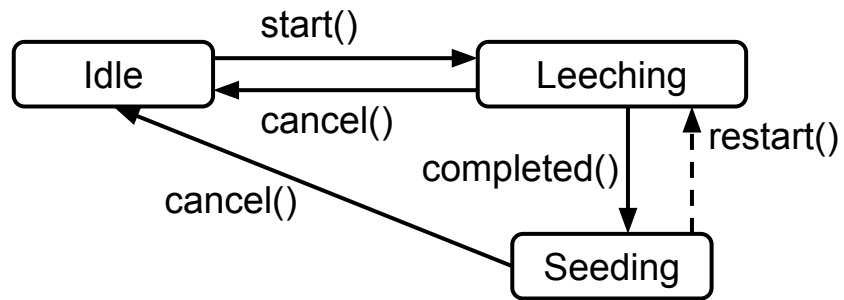
Data with uncertainty
(relational databases)



Variability models (feature models)



Models with variability (feature-based model templates)



Models with uncertainty (partial models)

Problem: Limited support in OOM languages

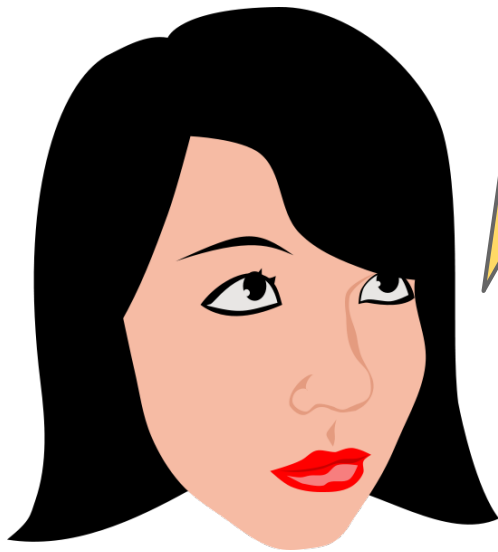
UML and MOF - no optional elements

Alloy - no concrete syntax for (partial) instances

Example 1:
Conflict Resolution with Partial Instances

Completion under the **CWA**

Explicates what is known and **unknown** given current knowledge



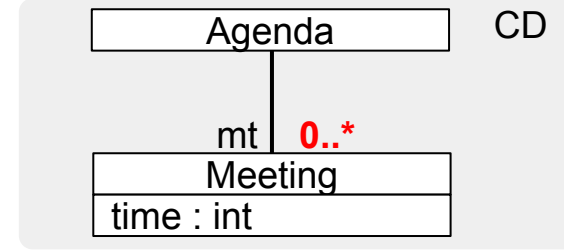
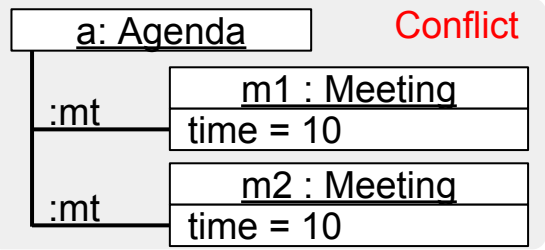
Alice

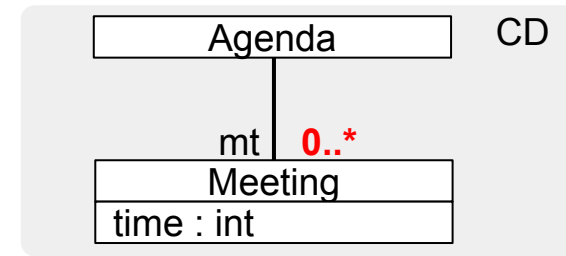
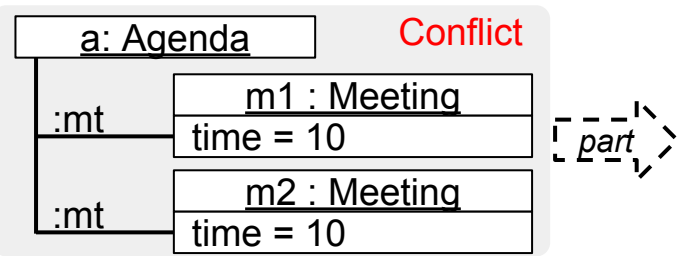
We need to keep track of bookings to ensure that rooms and people are not double-booked.

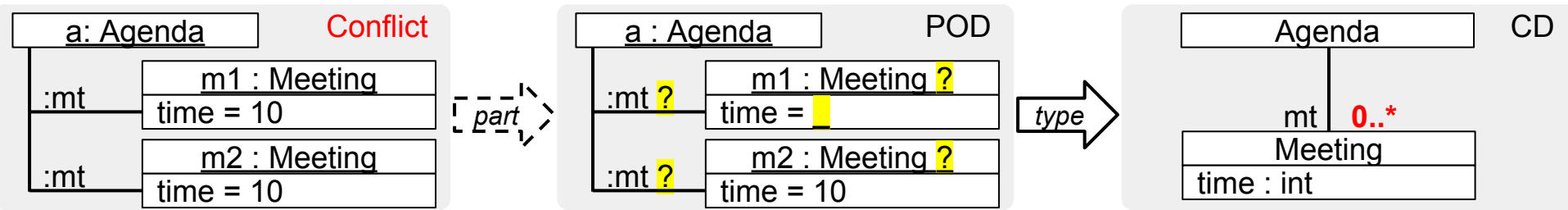
How do you deal with conflicting meetings?



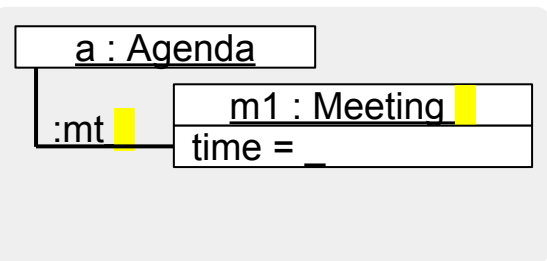
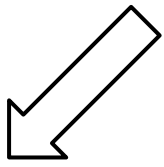
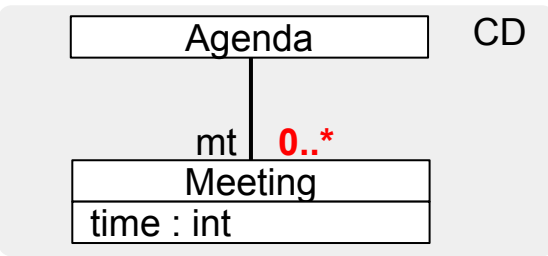
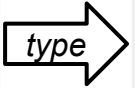
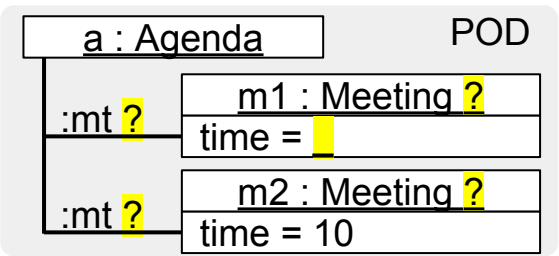
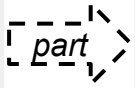
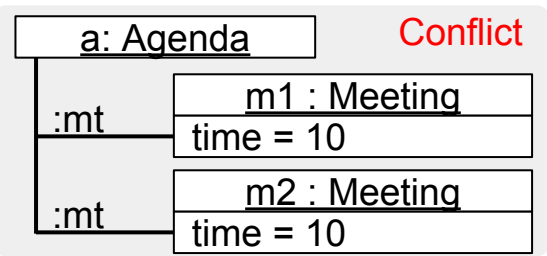
Charlie

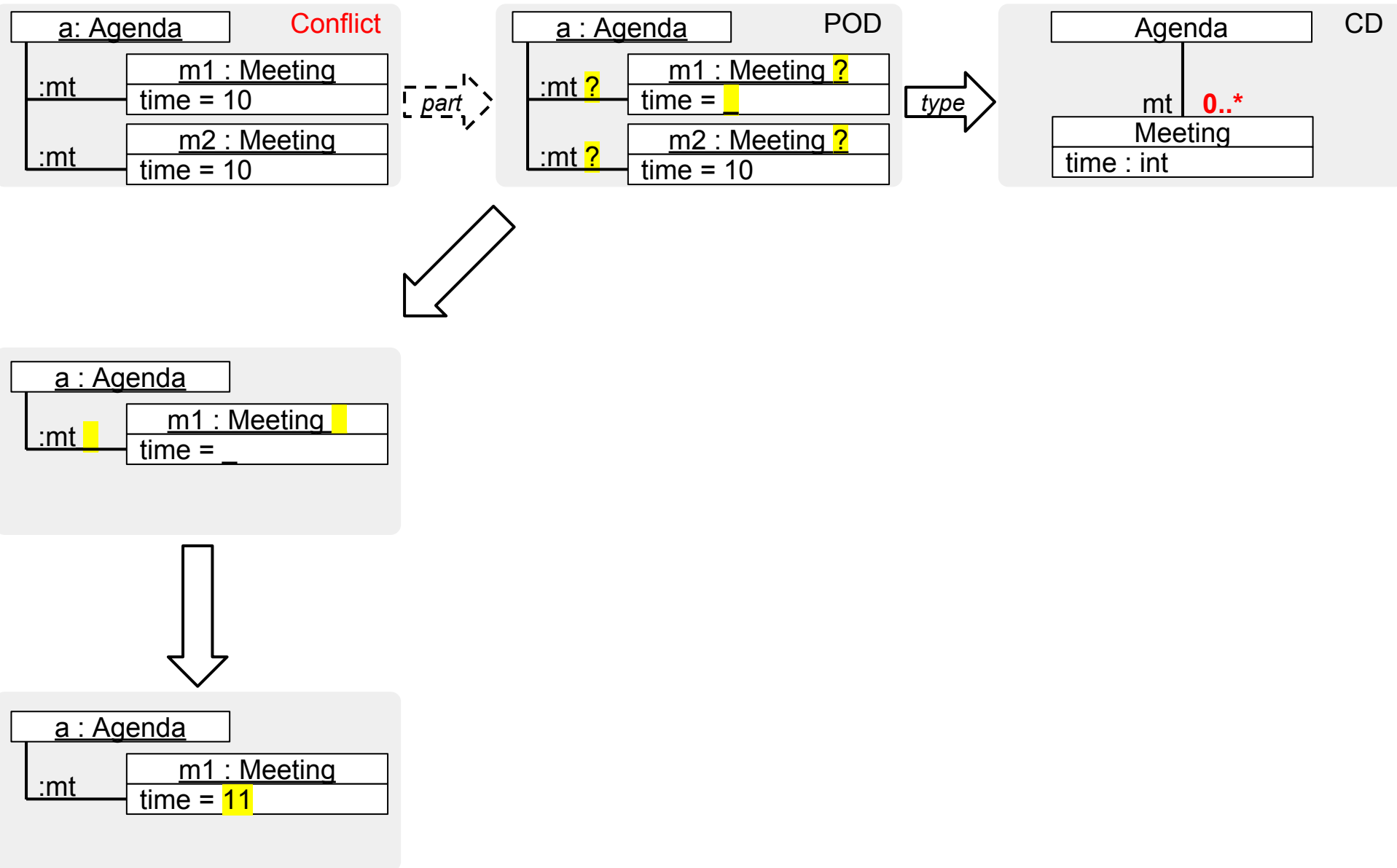


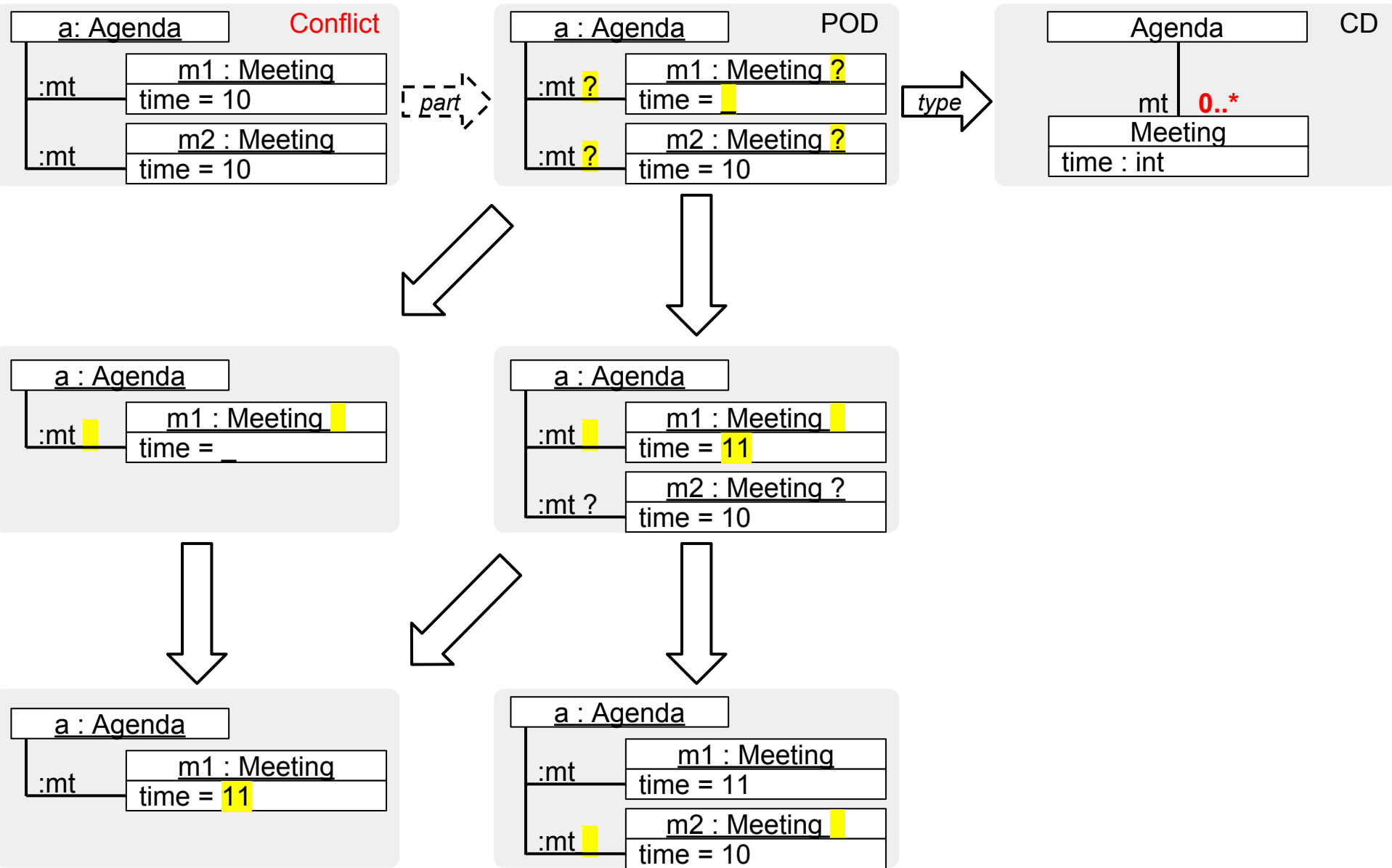


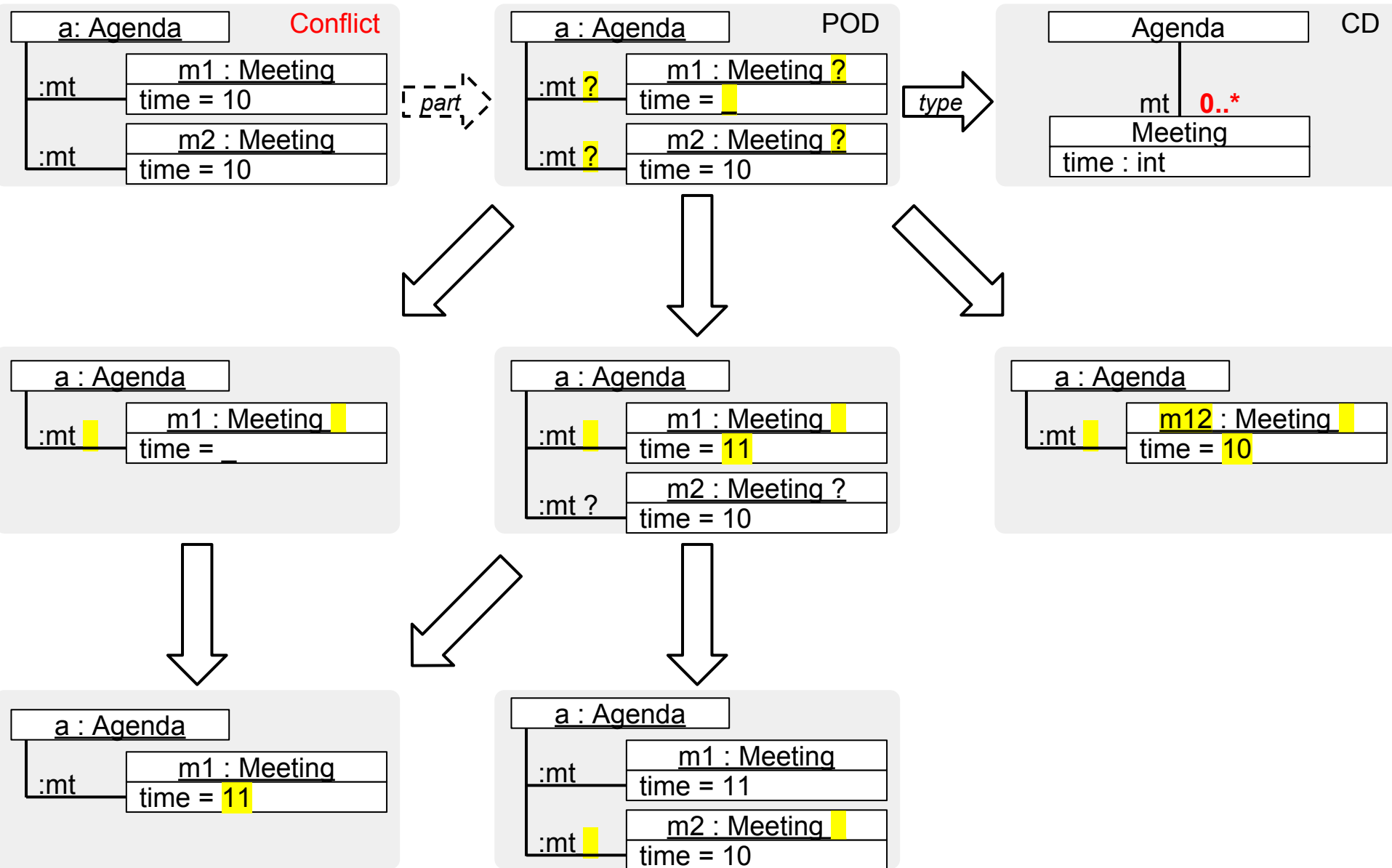


Template for solutions









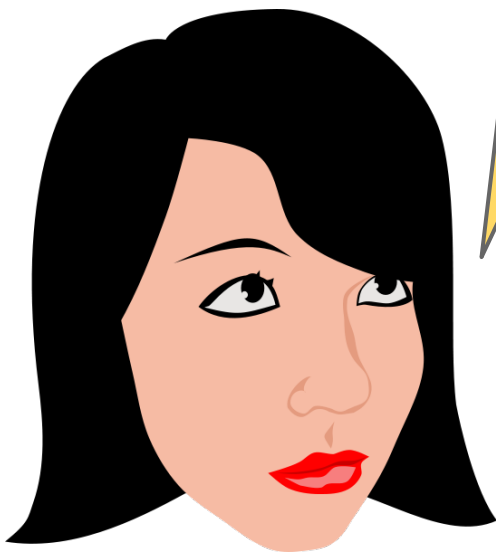
Example 2:
Requirements Elicitation with Partial Instances

Completion under the OWA

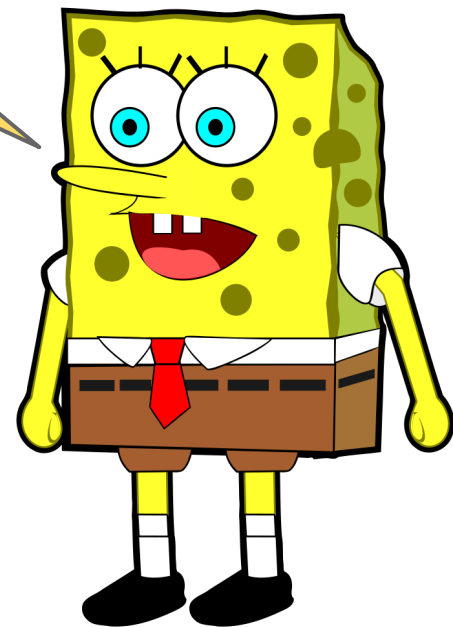
Naturally express stakeholder's **partial view** of the world

Each meeting is organized by a chair who is responsible for booking the room. Rooms have different equipment, and obviously, different numbers.

Could you give me an example of room booking? What equipment is used?



Alice



Bob

SM : Meeting
chair = "Sue"
wb = Electronic

:room

r : Room
num = _

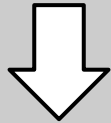
Bob I

SM : Meeting
chair = "Sue"
wb = Electronic

:room

r : Room
num = _

Bob I



SM : Meeting
chair = "Sue"
wb = Electronic

:room

r : ERoom
num = _

Bob II

SM : Meeting
chair = "Sue"
wb = Electronic

:room — r : Room
num = _

Bob I



SM : Meeting
chair = "Sue"
wb = Electronic

:room — r : **E**Room
num = _

Bob II

SM : Meeting
chair = "Sue"
rep = Weekly
time = 10

Charlie

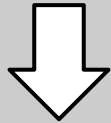
SM : Meeting
chair = "Sue"
wb = Electronic

:room

r : Room

num = _

Bob I



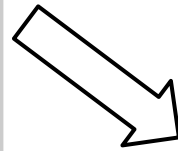
SM : Meeting
chair = "Sue"
wb = Electronic

:room

r : ERoom

num = _

Bob II



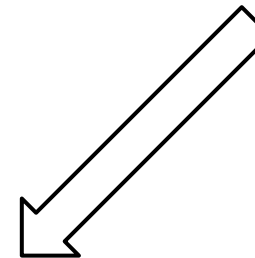
SM : Meeting
chair = "Sue"
rep = Weekly
time = 10
wb = Electronic

:room

r : ERoom

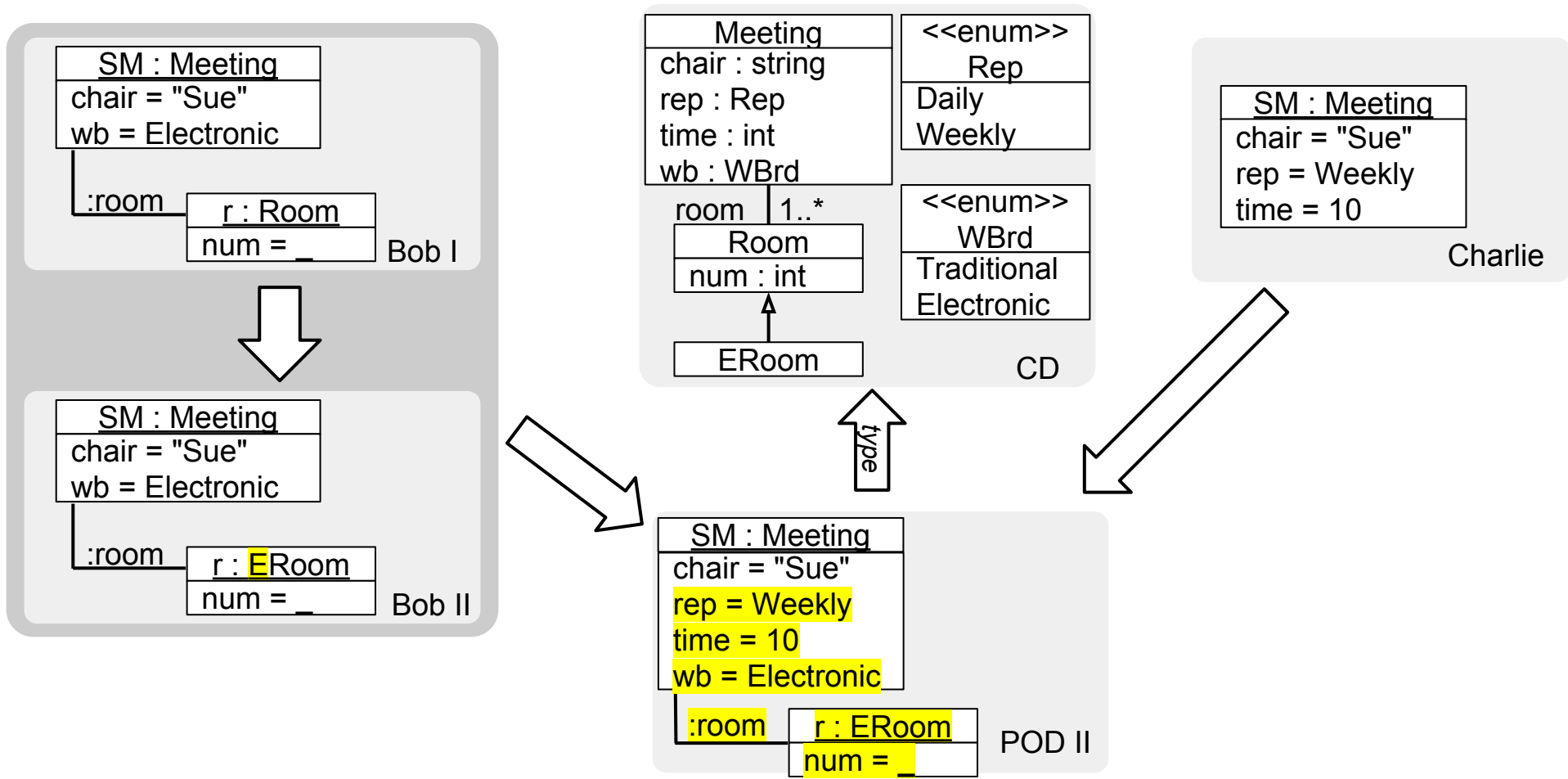
num = _

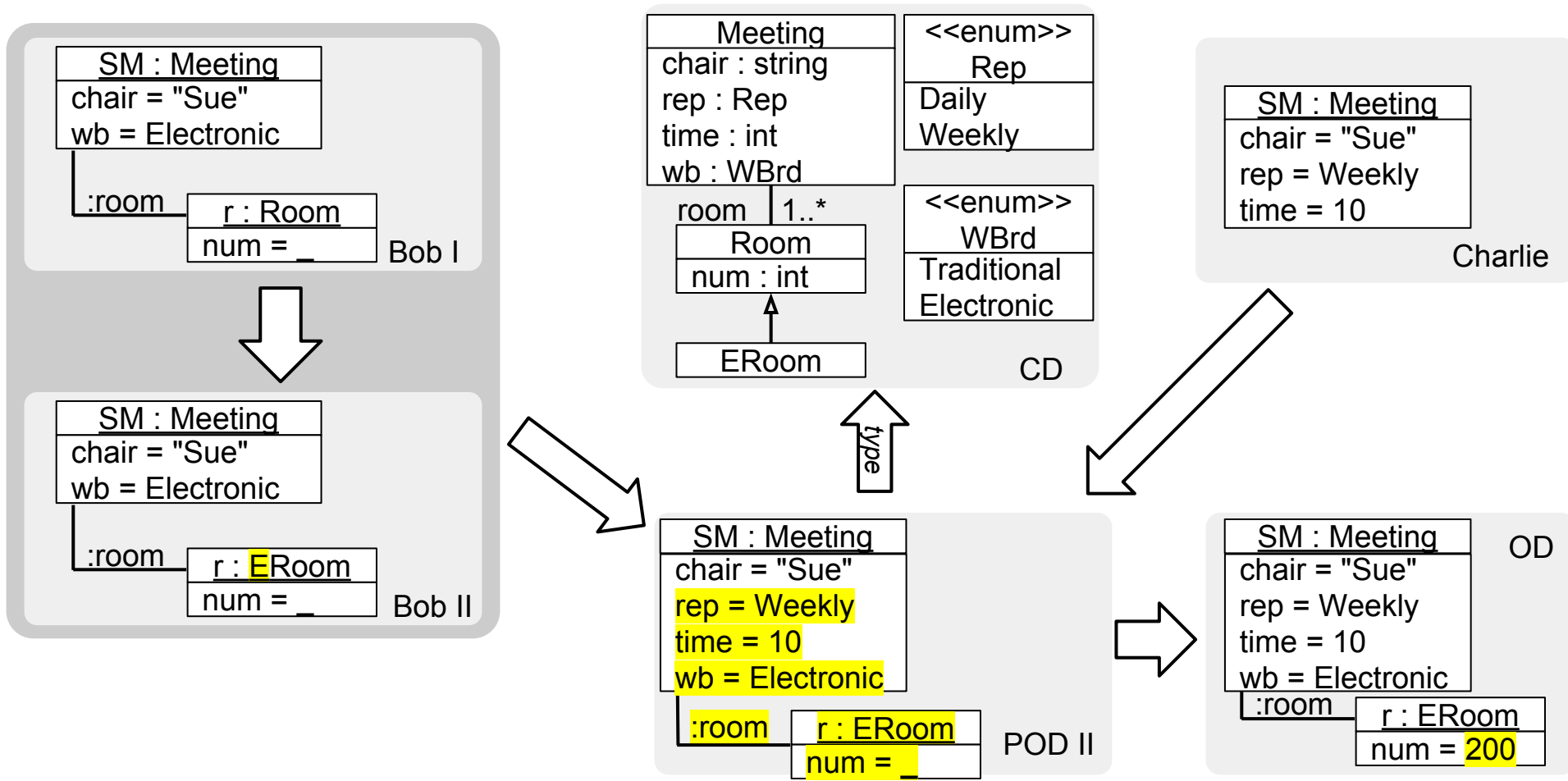
POD II

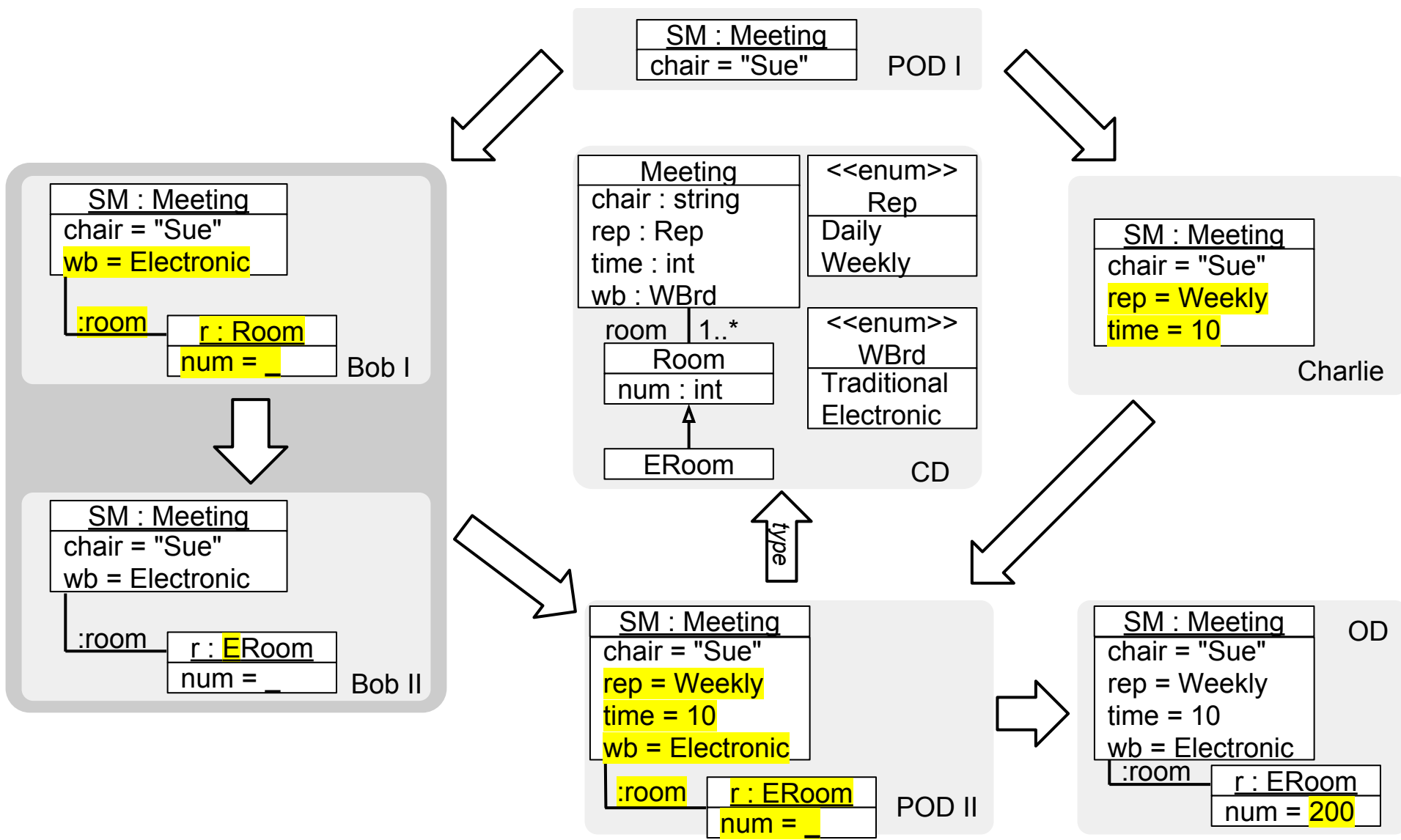


SM : Meeting
chair = "Sue"
rep = Weekly
time = 10

Charlie





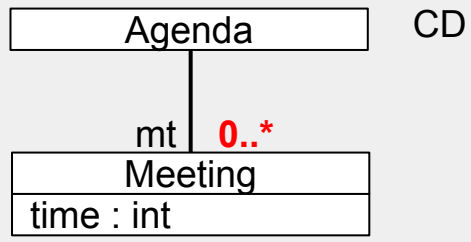


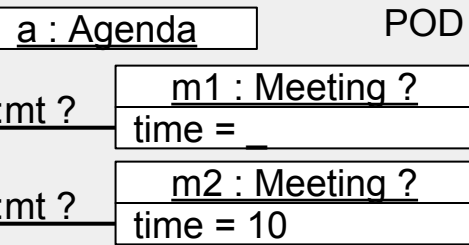
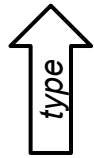
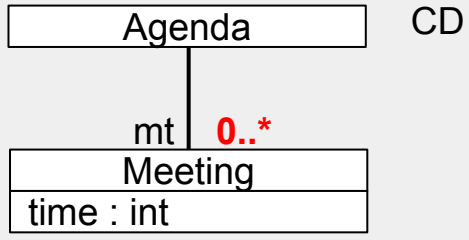
How to **express** partial instances in OOM languages?

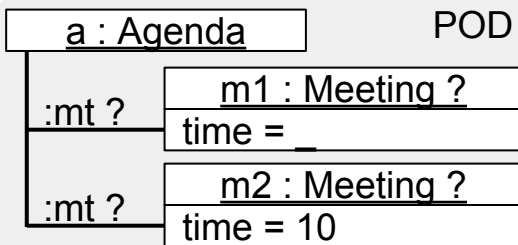
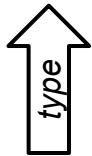
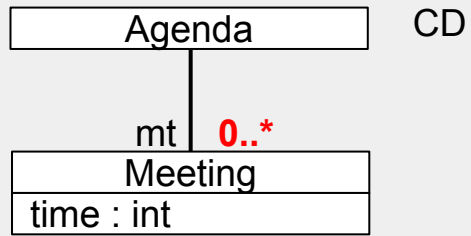


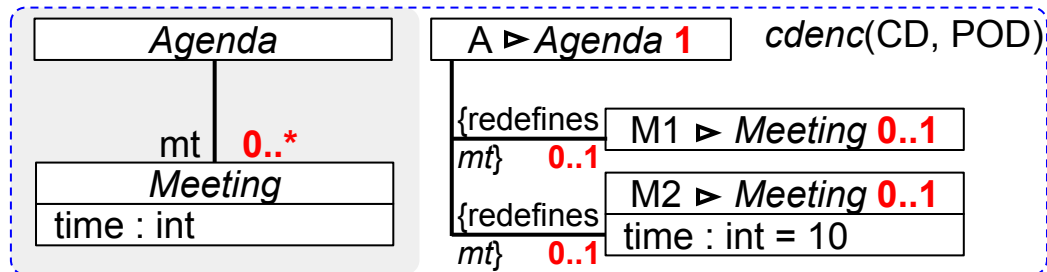
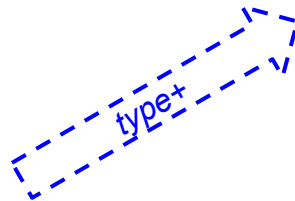
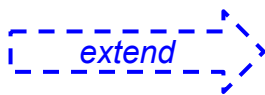
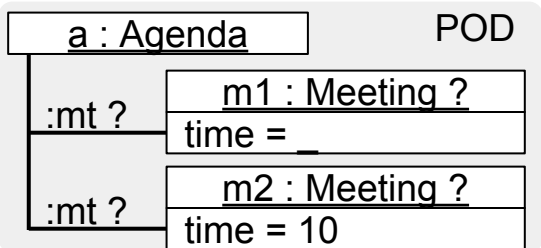
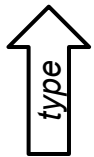
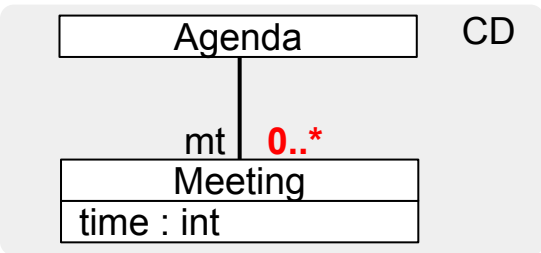
Encode objects as singleton classes via
subclassing

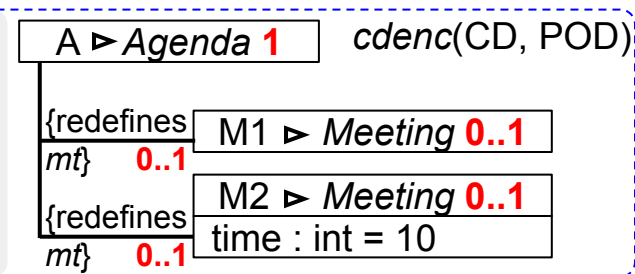
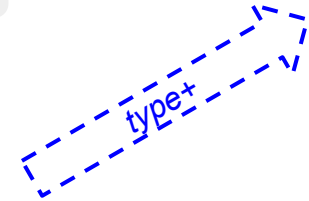
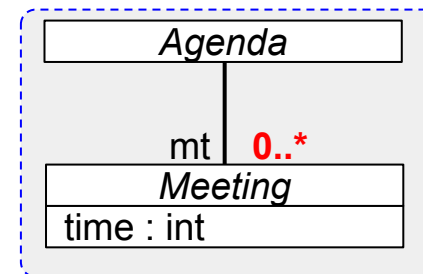
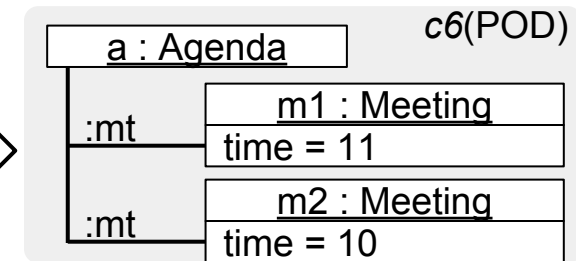
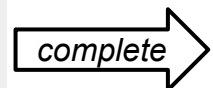
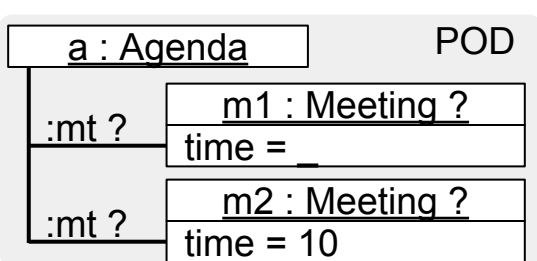
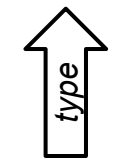
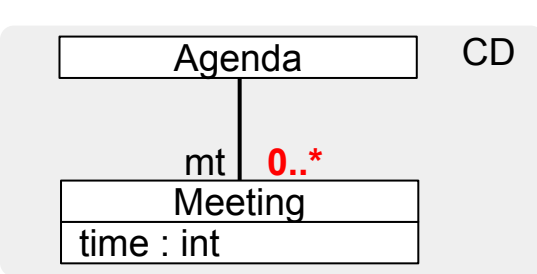


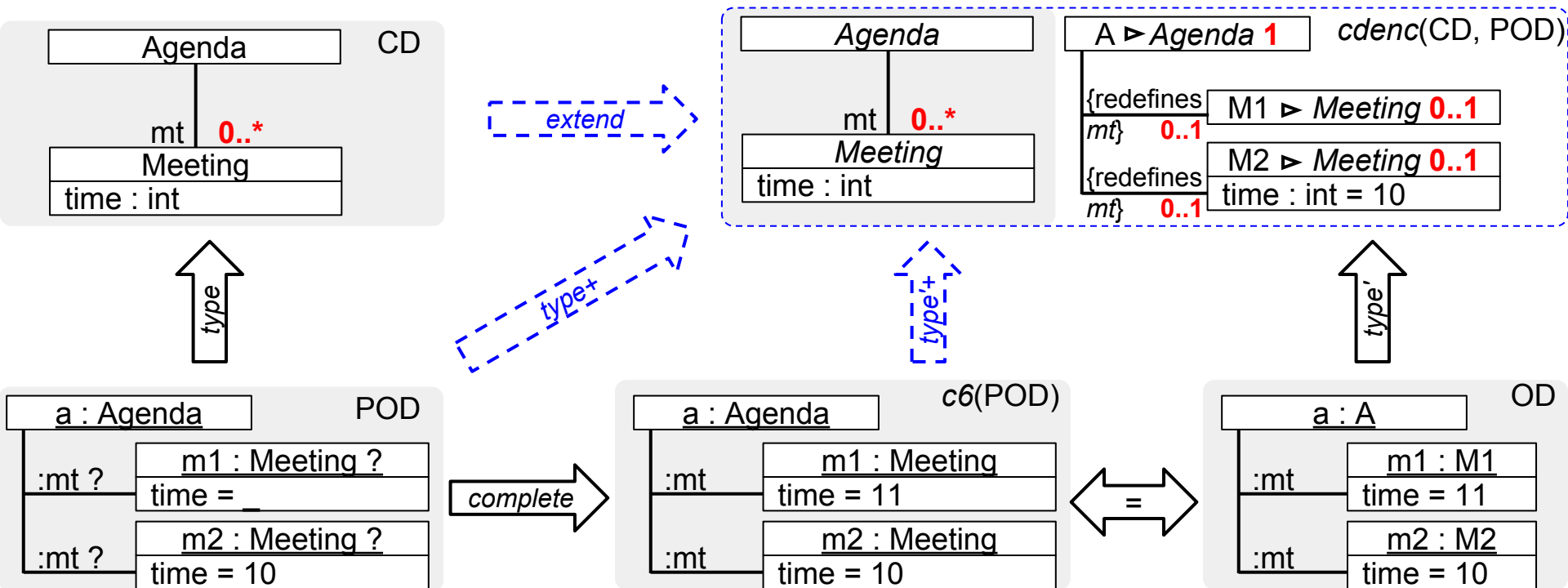












compl(POD) isomorphic to *inst*(CD+)

Tradeoffs

Support for PIs in **any OOM** language

Mixing of abstractions and instances

instances with constraints

cross-referencing

facilitates Example-Driven Modeling (EDM)

Fewer concepts to learn

Potential for **confusion** between types and instances

Bulky and “degenerated” class diagrams

can be mitigated by

- a UML profile

- a suitable syntax design, e.g., Clafer

Conclusion

Modeling with **uncertainty**,
underspecification, and **variability**

Limited support in OOM languages

Partial instance and type **equivalence**

Generic and **widely** applicable

Backup Slides

CD

