

II. Conceptual Modeling

Models in Engineering
Why not English?
What is Conceptual Modeling?
Origins



Engineering Software

- Models in Engineering (Civil, Electrical, Mechanical, Computer,...)
- Models need to be understandable by engineers and end users (e.g., blueprints)
- What are appropriate models for software?

Conceptual Models!

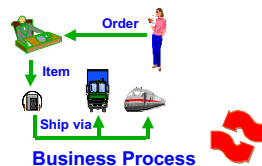
Why not English?

- This is clause 4 from the UN Security Council resolution 1441: [on Iraq]
"Decides that false statements or omissions in the declarations submitted by Iraq pursuant to this resolution and failure by Iraq at any time to comply with, and cooperate fully in the implementation of this resolution shall constitute a further material breach of Iraq's obligations and will be reported to the Council..."
- The US apparently interpreted this as meaning a material breach occurs if the declaration submitted by Iraq contains any false statements. Other security council members interpreted it as meaning the breach only occurs if Iraq also does not cooperate with the inspection process.

What's the Problem?

- The clause has the following logical structure:
(A or B and C and D) entails E
where
 - ✓ A = false statements...
 - ✓ B = omissions in the declarations...
 - ✓ C = failure to comply
 - ✓ D = failure to cooperate
 - ✓ E = a further material breach of Iraq's obligations
- So the two proposed readings are as follows:
 - ✓ ((A or (B and C and D)) entails E -- US
 - ✓ ((A or B) and (C and D)) entails E -- others

What is Conceptual Modeling?



Conceptual Modeling is
modeling using a standardized
graphical notation



Origins

- **Semantic networks** in order to model the structure of human memory (Ross Quillian, 1966)
- **Simula**, an extension of ALGOL 60, for simulation applications that require "world modeling" (Ole-Johan Dahl, 1967)
- **Semantic model** (Jean-Robert Abrial, 1974), followed by the **Entity-Relationship model** (Peter Chen, 1975) as advances over the relational data model.
- **Structured Analysis and Design Technique (SADT)** as a "language for communicating ideas" (Douglas Ross, 1977)

