Comprehension of Semantic Models

- User-oriented notations
  - usually graphical
    - *so that you can draw silly things!*
- (Some) rigorous foundations
  - which need to be kept .... as foundations!
- Transformation into well-engineered code
  - “lower CASE”
  - pervading assumption that ANY resulting design “needs” “improvement”...
- Detection of errors / omissions / surprises
  - Diagrams intended for communication-
    - *but even analysts may not understand them*
  - Interaction with client(s) tends to be confined to “early” stages
- CASE support
  - making the “waterfall” flow *both ways!*
  - more than just “clever diagrammers”

*David Bowers - 14th January 2002*
Primary Areas of Focus

• Entity Relationship Modelling
  – Relational Synthesis
  – Detection of Redundancies
  – Construction by analysis of textual descriptions
  – Generalisation to other notations with similar morphology

• Behaviour Modelling
  – State-based behaviour
  – Parallel composition
    • “Aggregation”
  – Emergent Behaviour

• Meta-CASE
  – Support for specific (partial) notations
  – Reasoning about models
  – Medium, rather than message

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Detecting Redundancy in an ER model

[Diagram showing relationships between Manager, Client, Project, and Contract_Employee]

- Manager
  - id
  - name
  - manages
  - sponsors

- Client
  - name
  - address

- Project
  - title
  - start_date
  - works_on
  - bills_time_to

- Contract_Employee
  - role
  - name
  - Project.title

Confirm
Is "reports_to" semantically equivalent to "manages","works_on"? [TRUE will delete "reports_to"]
TRUE FALSE

Confirm
Is "bills_time_to" semantically equivalent to "sponsors","works_on"? [TRUE will delete "bills_time_to"]
TRUE FALSE

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Parallel Composition of State-Based Behaviour - The Problem

• Parallel composition is exponentially explosive
  – Each component can, potentially, coexist in any state with every other component also in any state

• Need composition for encapsulation
  – An aggregate object behaves as a single object

• Would like state reduction
  – Identification of unreachable / specifically excluded states/transitions

• Constraints likely to be semantic
  – Require specification / verification by client

• Require medium comprehensible to clients
  – Graphical rather than mathematical