Models in collaborative design projects:

Boundary objects or make-believe?

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Where innovation starts

0. Topic

- Collaborative design work

- AEC industry:
  - Intensive, long-term collaboration
  - Multiple parties: divergent expertise, different interests
  - Premium on effective communication (failure costs)

0. Topic

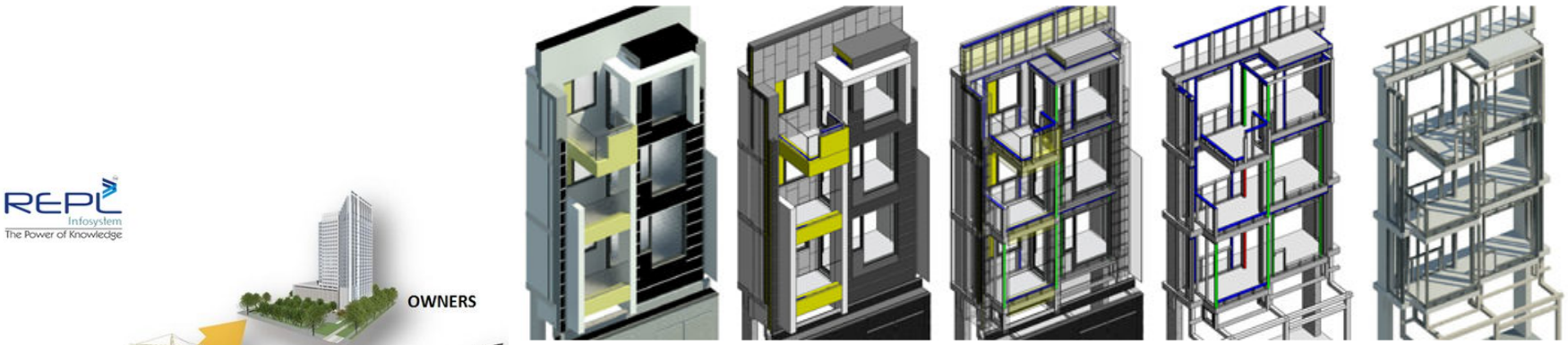
- Modelling facilitates
  - Collaboration in design
  - Working on individual tasks

- For AEC:

  Architectural drawings →

  CAD software →

  Building Information Modelling (BIM)



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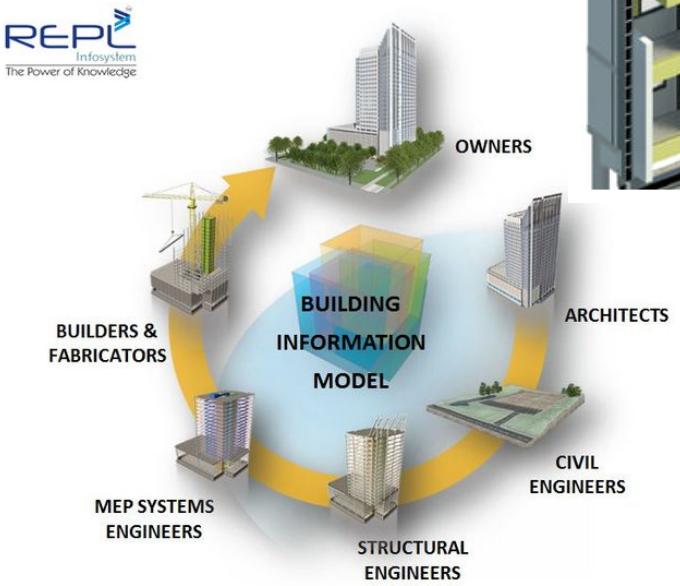
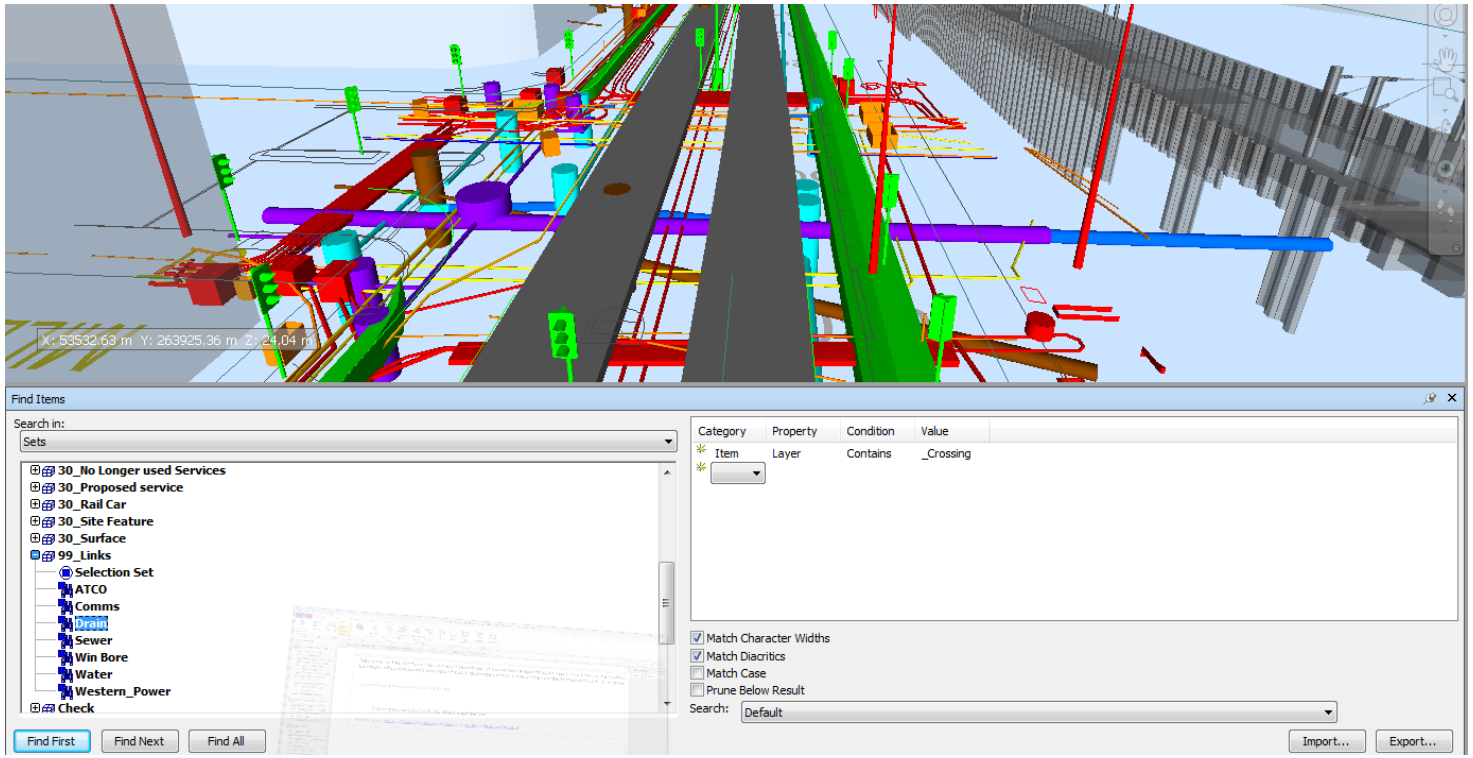


"seamlessly bridge communication among different parties" (MARTINRILEY Architects)

https://www.pinterest.com/replinfosys/archicad-building-information-modeling-bim-service/



Information layers, connected to relevant databases ‘Clash detection’

0. Topic and aim

- Prior work on modelling in collaborative design work (organization studies)
- Added value of philosophical analysis is not self-evident!

1. Review influential line of work ("boundary object")
2. Identify shortcomings
3. Explore alternative: Waltonian fictionalism
4. Identify joint shortcomings

PART 1. Models as boundary objects

http://www.atlasobscura.com

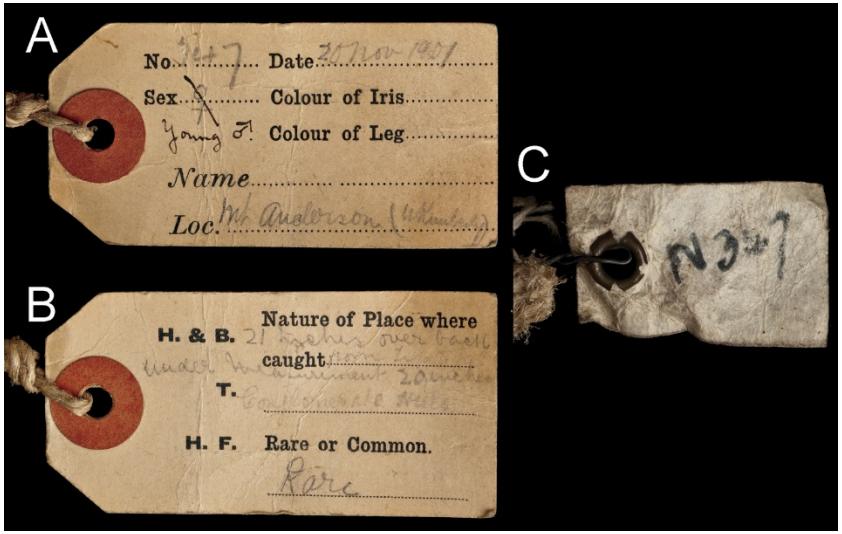
1. Boundary objects

Home discipline: STS

Some items enable effective problem-solving despite disciplinary/professional differences among ‘allies’

“[boundary objects] inhabit different social worlds and satisfy the information requirements of each of them” (Star and Griesemer 1989: 393)

E.g., repositories; standardized forms; flowcharts; sketches.



Natural history museum (Star and Griesemer 1989): specimens and standardized labels

“Allies”: amateur collectors; trappers; professional biologists; museum administration; …

1. BO-models: What's not to like?

Applications to team design, new product development, … (Henderson 1991; Carlile 2002; …)

Focus on models as *effective* BOs

1. Flexible and focused: "taps individual expertise for socially distributed work"
2. Enable 'perspective taking'
3. 'Conscription devices': focal points in work practice
4. Provide relative closure: settle conflicts, while leaving 'wiggling space'
5. Establish control over task areas.

Flexible and focused

Perspective taking

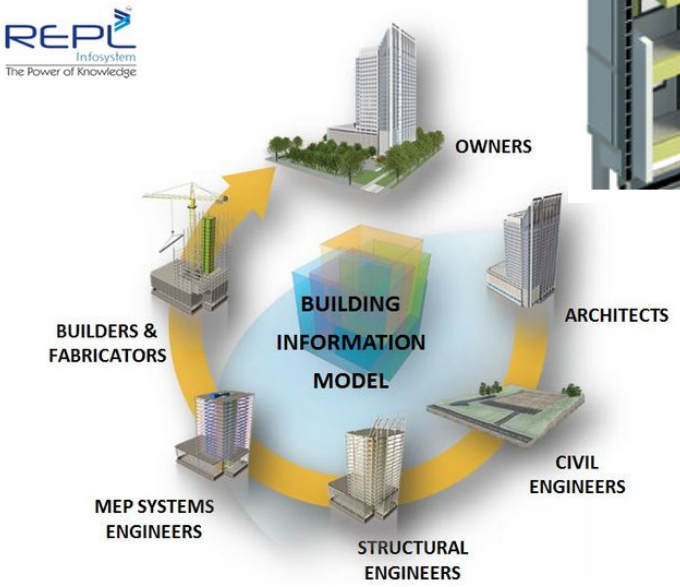
Conscription of allies

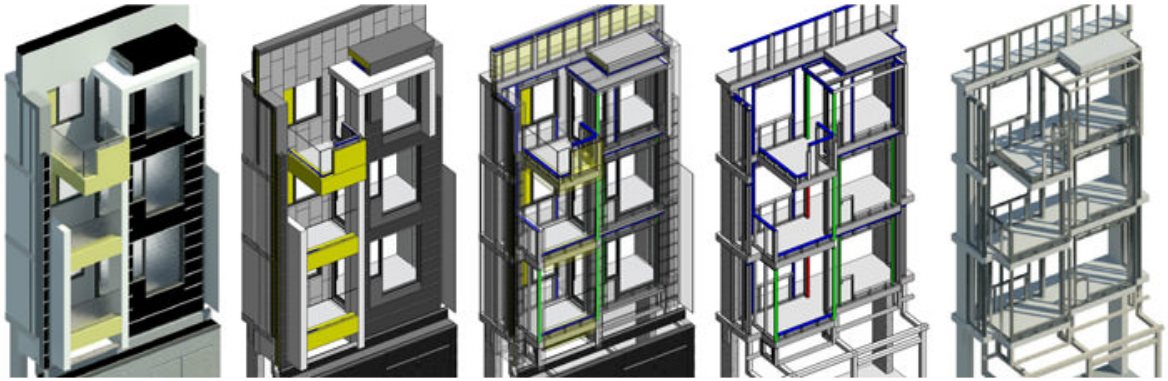
Relative closure

Control

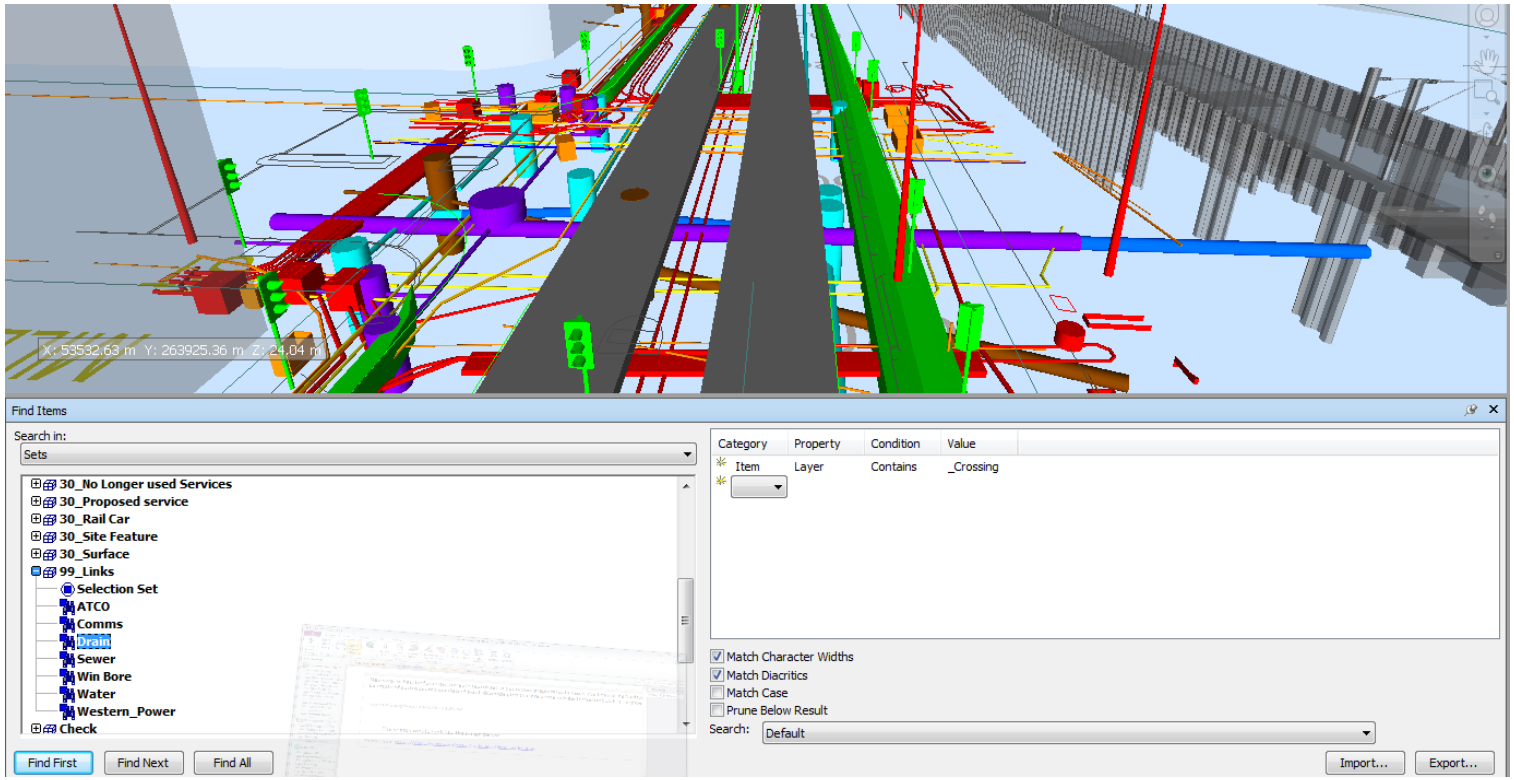
1. BO-models: what's NOT to like!

1. How (or only that), not why of alignment → "epistemic object" (Nicolini et al. 2012)
2. Leaves dynamics unexplained → "epistemic object", "technical object" (Ewenstein and Whyte 2009)
3. What is in different cognitive models, not how translation is achieved → "prototype" (Subrahmanian et al. 2003)
4. Mistaken assumption: flexibility and focus through 'virtuous' ambiguity (cf. Stacey and Eckert 2003)
5. Too many 'objects' for effective analysis





How many objects do we need here?



Where are the virtuous ambiguities?

PART 2. Models as Make-Believe

2. Waltonian fictionalism

- Home discipline: aesthetics (Walton 1990)

- Representation: prop in authorized games of make-believe
- Prescriptions to imagine, for participants in game
- Conventional or explicit ‘principles of generation’ (PoG), fleshing out the fictional world / developing the game.
- Action/practice-oriented, not object-oriented.

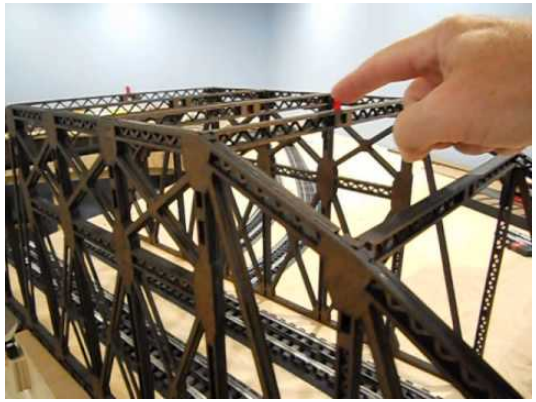
2. Example

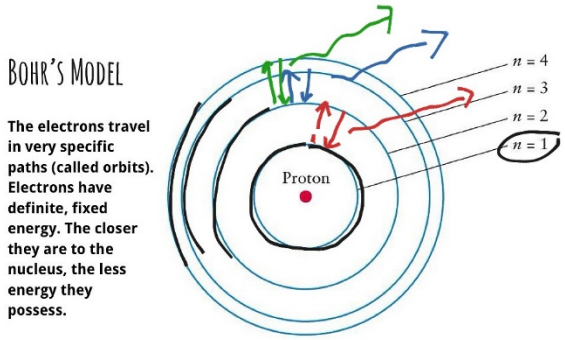
“Tree trunks are bears”

“The floor is lava!”

2. Fictionalism for models

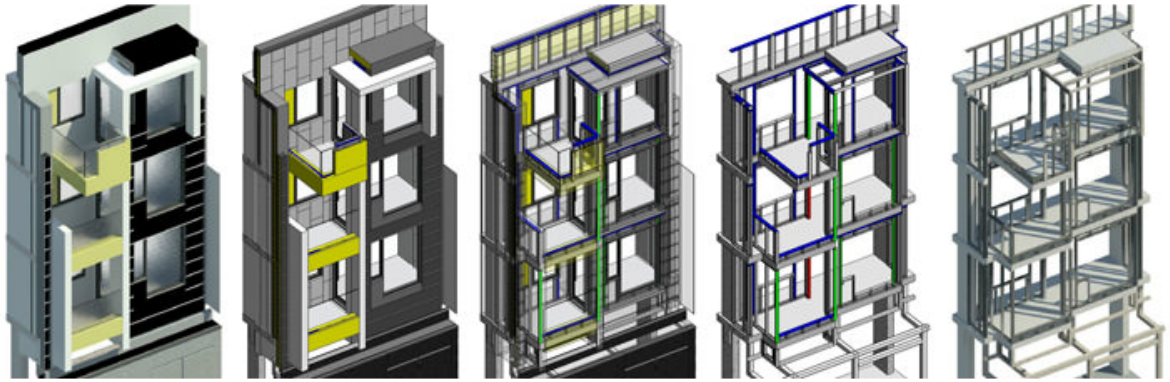
- “Direct” version (Toon 2012): models are representations of real-world targets
- E.g., scale model of a bridge. Designed prop, generating fictional truths – can, but need not apply to real bridge (accuracy conditions).
- Constrain imagination of **informed** participants.
- PoGs: laws of nature, local regularities





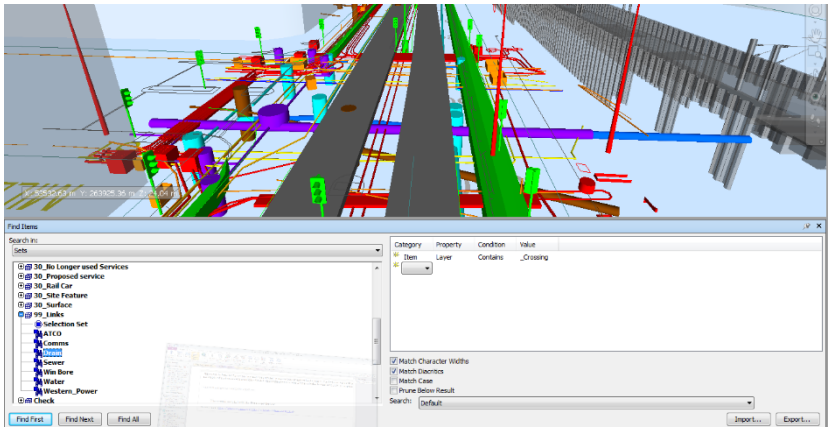
2. MB-models: what's to like?

1. No 'virtuous ambiguity', but clear role for constraints.
2. Room for divergent knowledge base, including tacit knowledge (shared and individual PoGs)
3. Room for development, without multiplying objects.
4. Accuracy / reliability conditions: scope for 'correction'
5. Can be ineffective: ambiguous prescriptions; 'poverty' of representation; 'rule bloat'



- Development and divergence within constraints

- Divergent PoGs
- Accuracy conditions
- Failure by ambiguity or ‘overload’: “rules management”



2. MB-models: what's not (yet) to like?

- What is the point of the game? Walton: "understanding"; needs to be broadened
- Dynamics discussed cursorily: focus on product, little explicit attention for / analysis of process
- "Authorization" and "design" mostly brute facts
- "Ally" and "participant" are misnomers: AEC games of make-believe are partly antagonistic

- No reason to prefer BO-models: mostly shared shortcomings + room for improvement

3. Conclusions

- “Boundary object” does not allow sufficient understanding of modelling in collaborative design work (e.g., use of BIM in AEC)
- Further headway can be made through fictionalist analysis
- More attention needed for authorization mechanisms, potential antagonism, and process aspects

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