Selective Backtracking of Model Changes

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Why Backtracking?
- Exploring design alternatives
- Recovering from dead ends
- Rolling back inconsistencies
(from soft to hard constraints)

Problem
1) traditional mechanisms (e.g. undo or version control) are chronological (also undoing unrelated, intermittent changes).
2) recovering a design change requires the recovering of all logically related design changes.

Approach
The designer selects model element versions for backtracking and our approach
1) automatically identifies related design changes that need backtracking also and
2) recovers all of them without having to undo other changes that happened since.
It works for both new and legacy designs.

Pre-Requisite
Change History: We require a model and previously existing versions of model elements.
1) automatically recordable in new designs
2) automatically computable out of version-controlled models for legacy designs

Selective Backtracking in Principle
The designer initiates the backtracking by selecting the versions of model elements:

- Our approach automatically creates, deletes, or modifies the model element(s) selected for backtracking.

We compute the constraints affected by the changes caused during backtracking. The backtracking is complete if the changes do not cause new inconsistencies.

Our approach investigates every inconsistency caused during backtracking. The goal is to eliminate them by exploring additional model element versions to backtrack.

=> explore cross-product of all their versions to find the ones that fix the inconsistency
- User selected elements excluded
- Unchangeable elements excluded

Sample Constraints
Constraint 1 (play message) is affected
All versions of model elements that affect the truth value of constraint 1 are considered.

Model Analyzer Tool
Detecting Inconsistencies
Backtracking Design Changes

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