
The Secret Life of a Process Description

A Look Into the Evolution of a Large
Process Model

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Motivation

V-Modell XT

Comparing

Results

Summary

Motivation

Are Software Processes Software Too?

- Short answer: not really.
 - We still strongly rely on natural-language text.
- Long(er) answer:
 - Process descriptions are often large and complex.
 - We use formalization in order to keep complexity under control: process entities connected by relations.
 - Many entity types, attributes, relations...

Slide 3

Central Question

Motivation

**Is process
description
evolution similar to
software evolution?**

Slide 4

The Study

- Object: Development history of a large process description: the German V-Modell XT.
- Exploratory:
 - No formal hypotheses (yet!)
 - Observation and visualization in order to recognize interesting patterns.
 - We plan to use this as the basis for a more formal empirical study in the near future.

Slide 5

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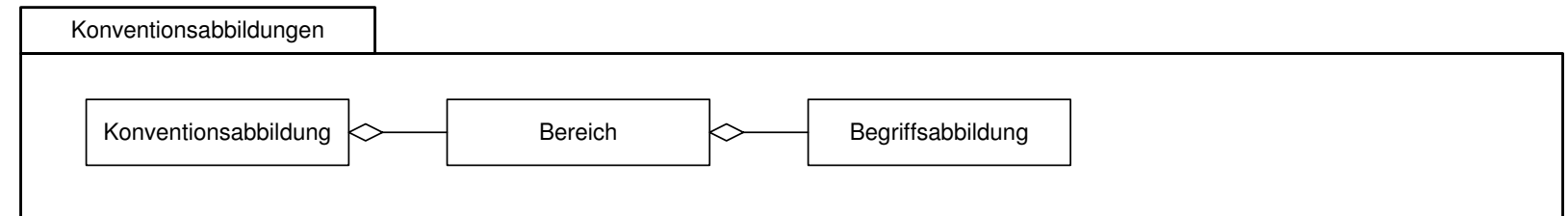
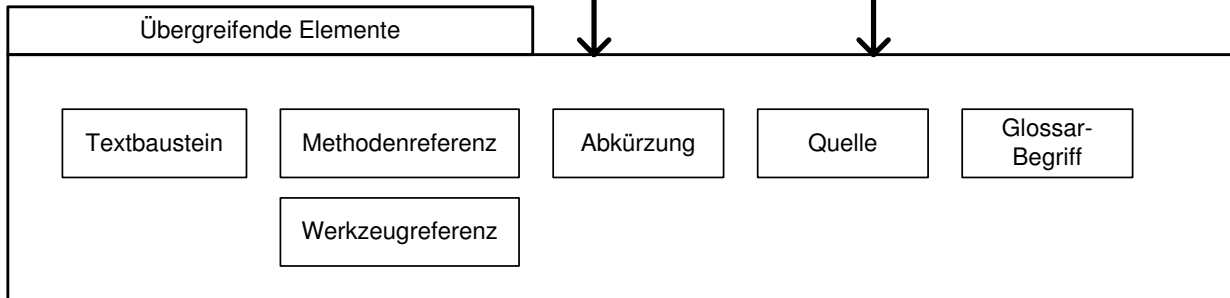
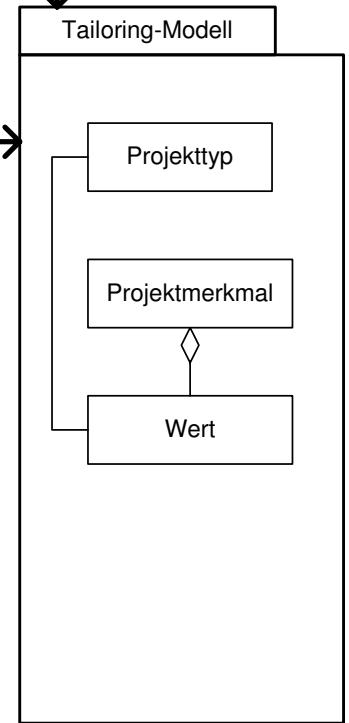
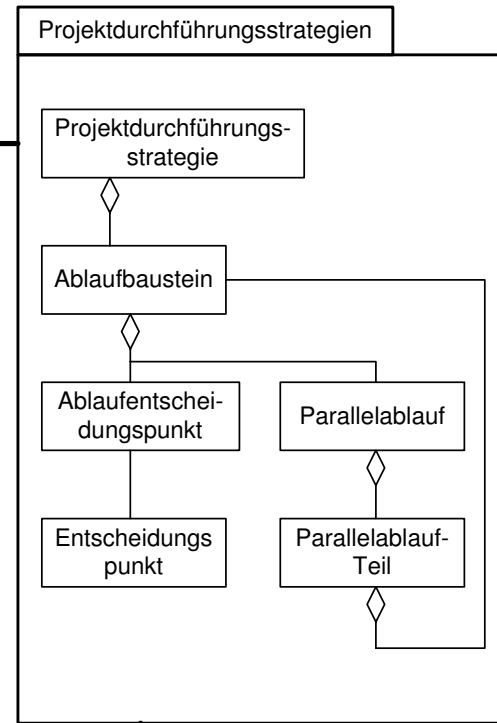
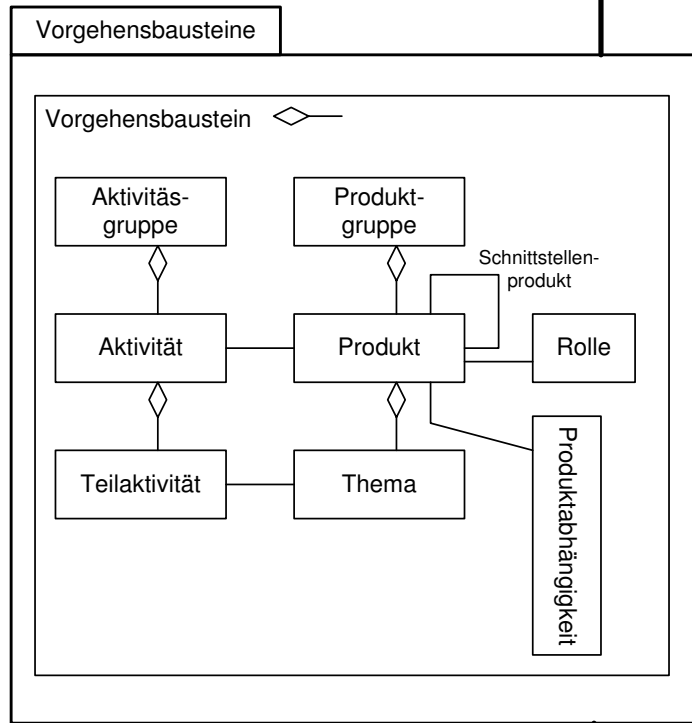
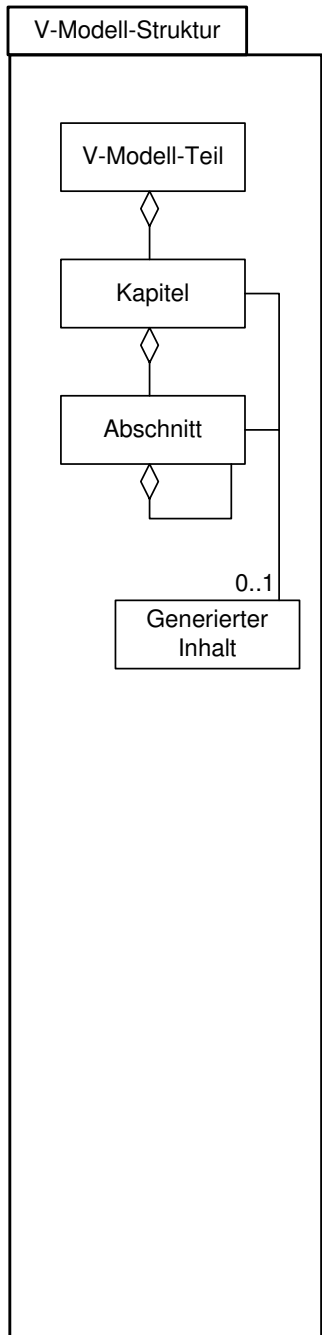
The German V-Modell XT

A Process Description for the German Industry

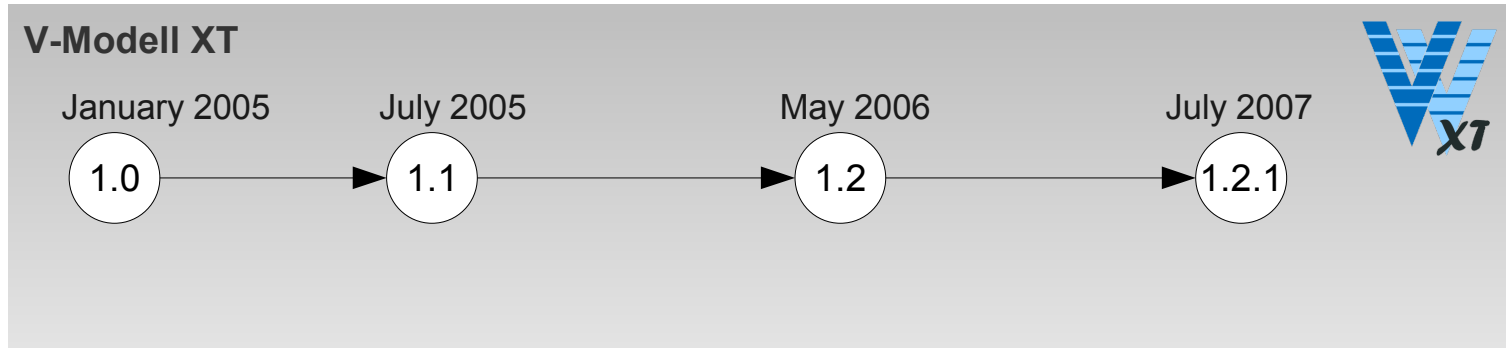
V-Modell



- German public standard software process description.
- Being increasingly adopted by the private sector.
- A real process model, not just requirements.
- Very large and complex (over 1.000 entities, 600 documentation pages)

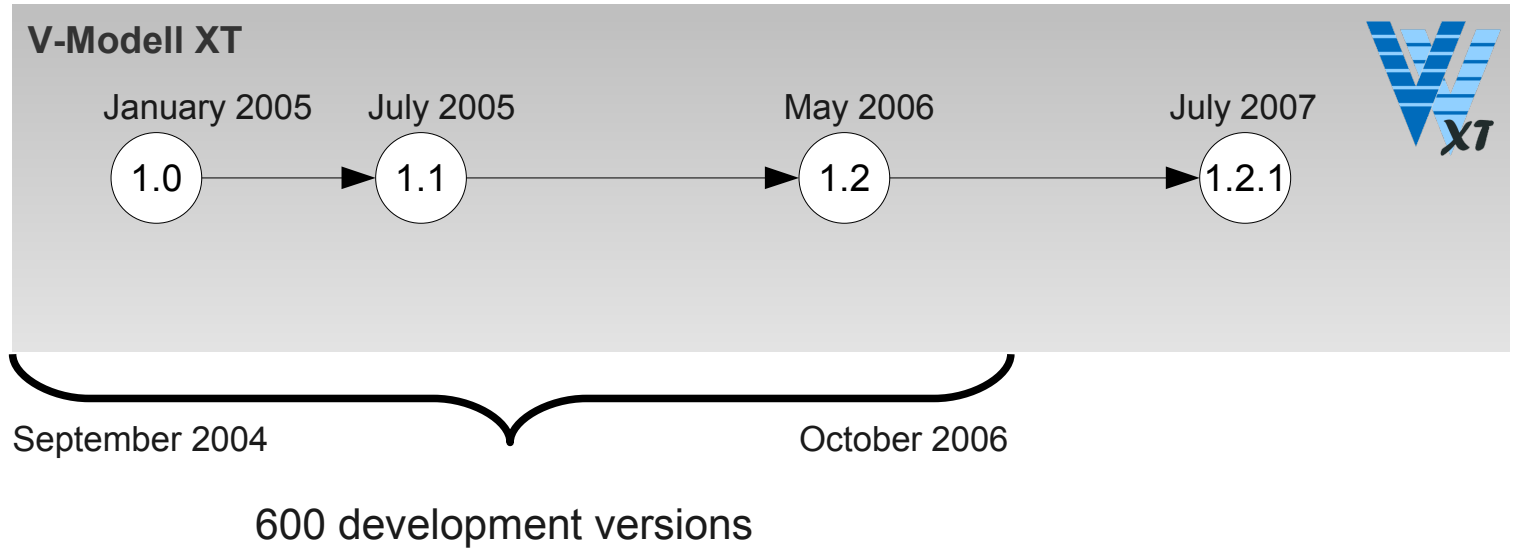


The Evolution of the V-Modell XT



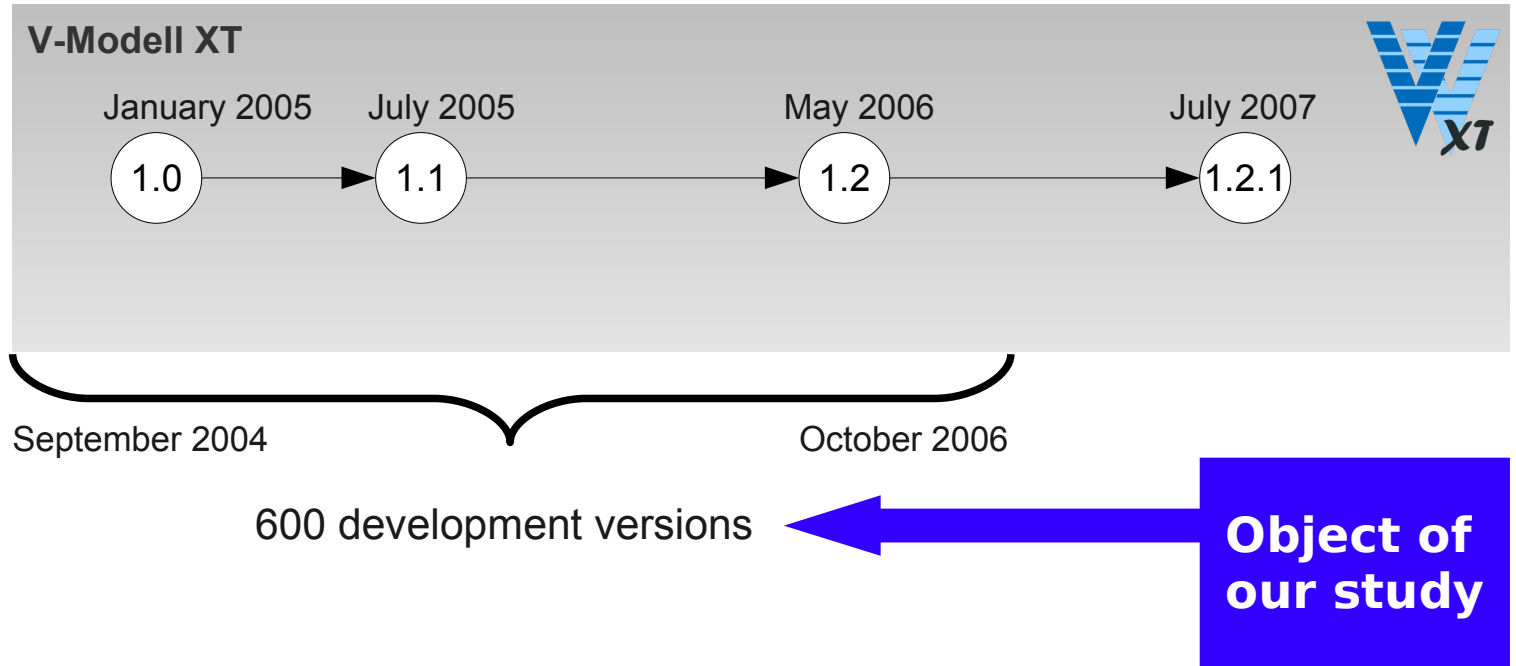
The Evolution of the V-Modell XT

V-Modell



The Evolution of the V-Modell XT

V-Modell



Version History

Versioning Repository (CVS)



1



2



3



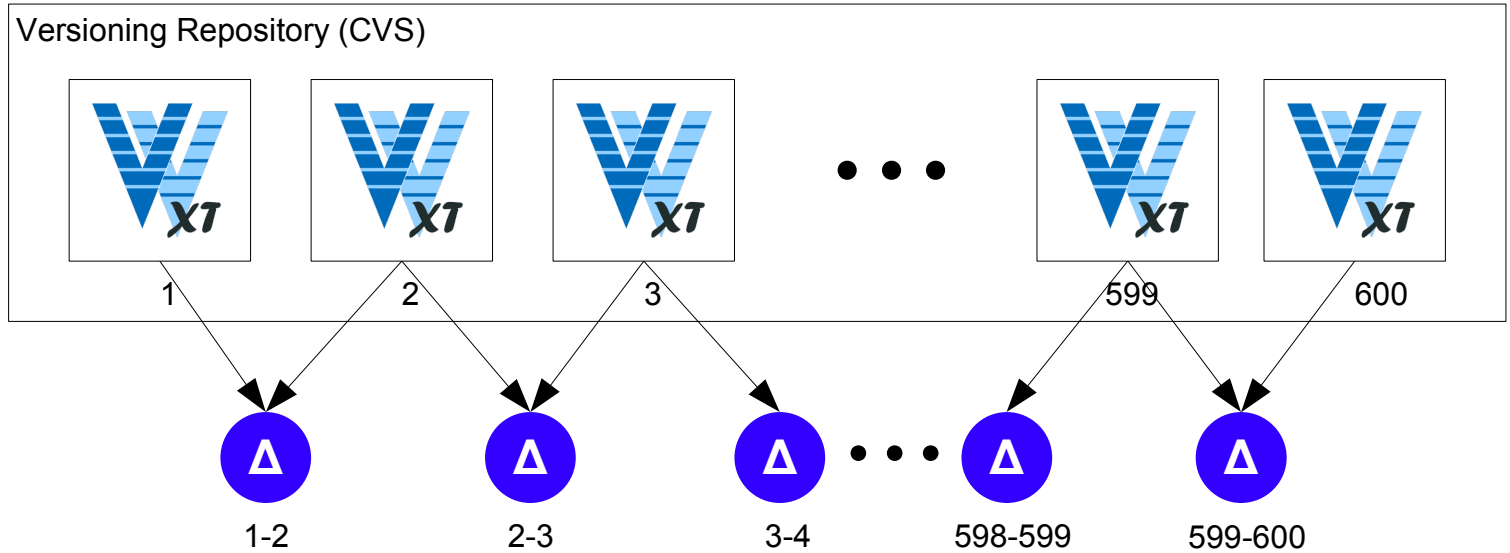
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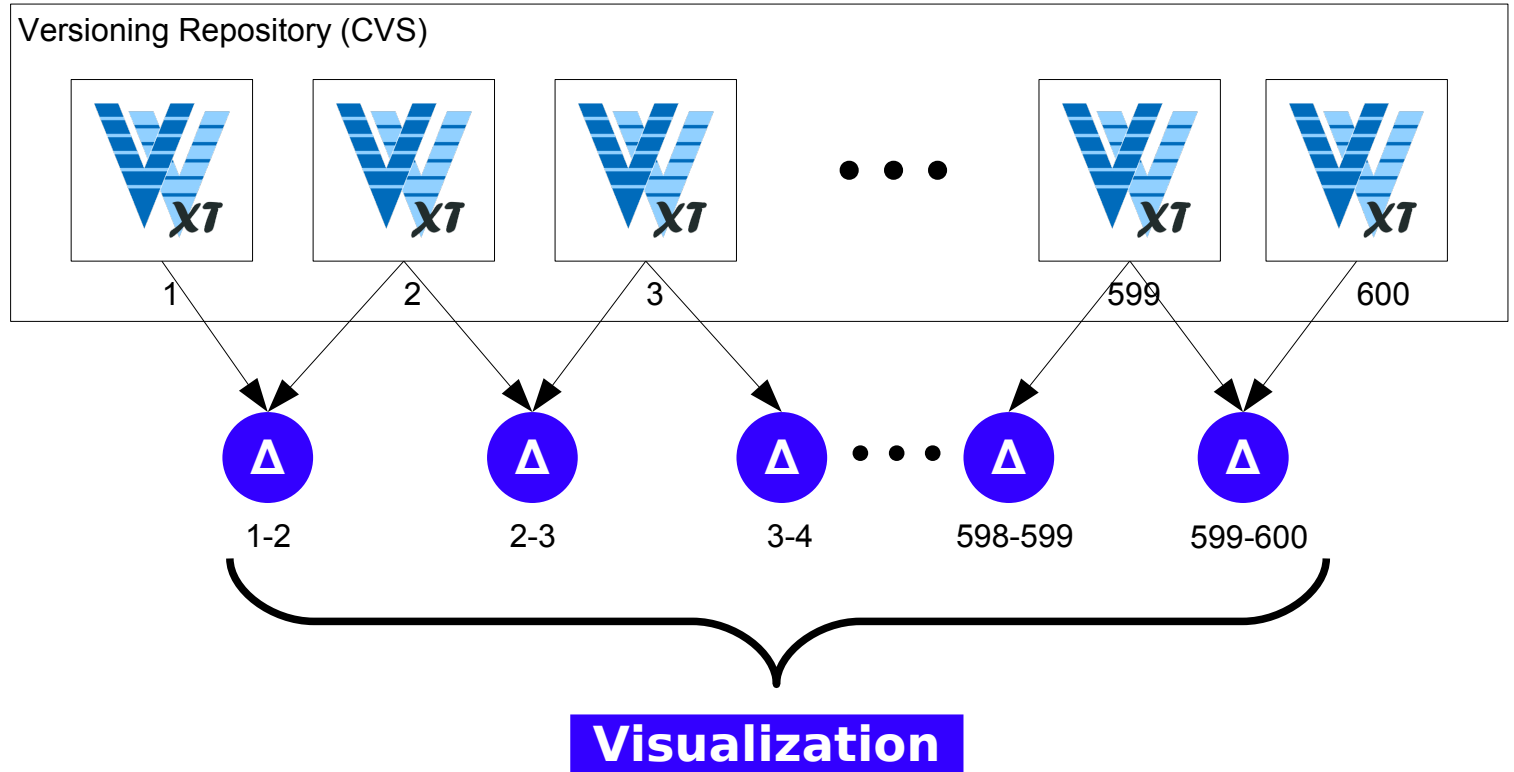
600

- Single XML files.
- Numbered in chronological order.
- Date, author and version log information available.

Study Approach



Study Approach



Motivation

V-Modell XT

Comparing

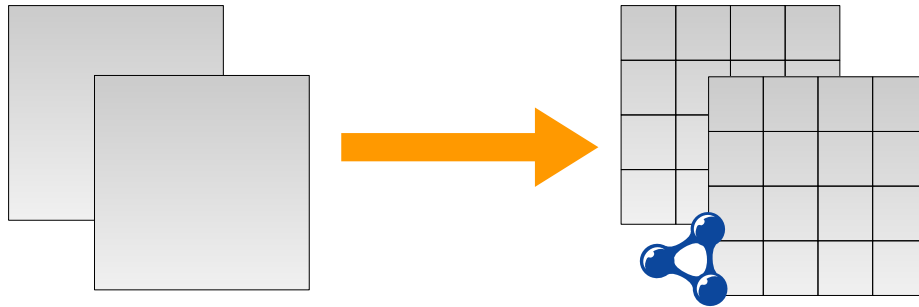
Results

Summary

Comparing Process Descriptions

Step 1: Normalize (Convert to RDF)

Comparing

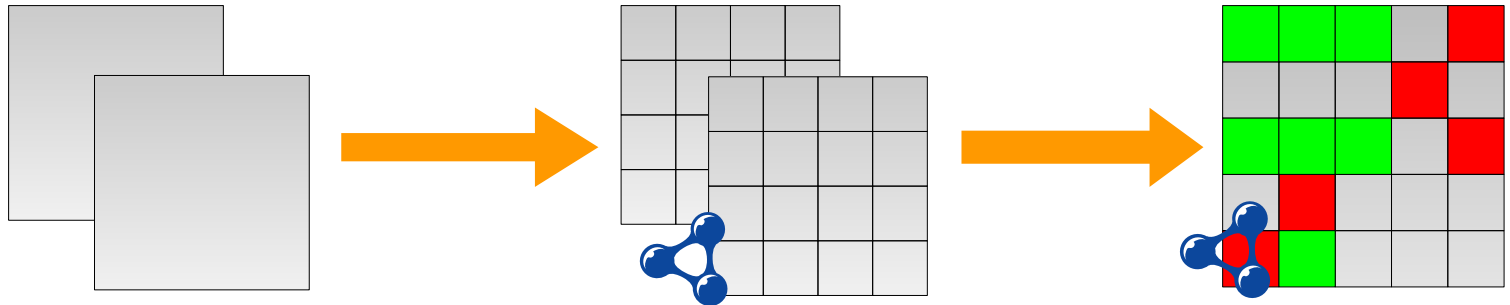


1

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Build Comparison Model

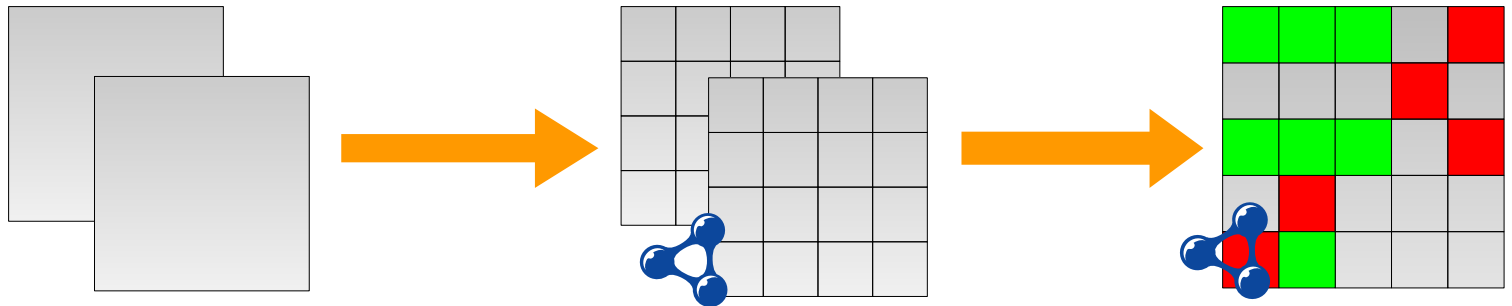
Comparing



2

Slide 16

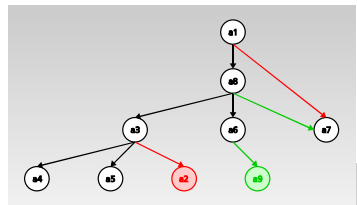
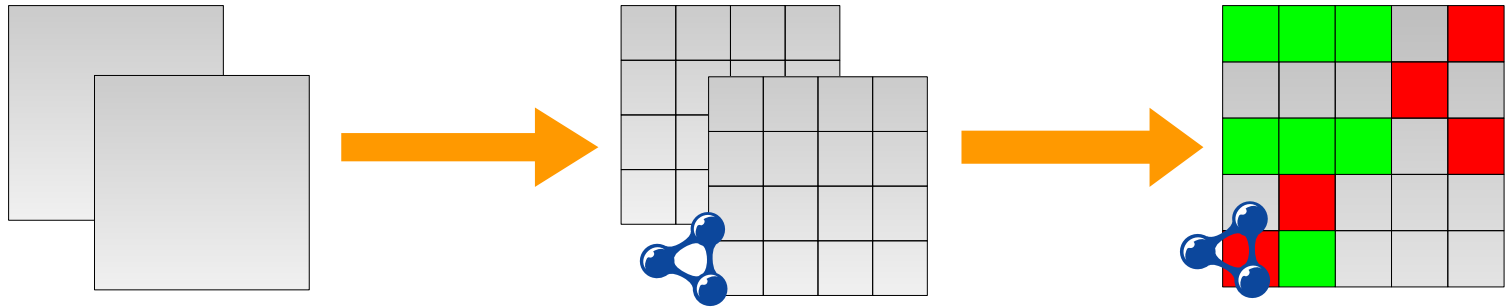
Query Comparison Model



Entity	Name
r3	Design
r7	Program
r4	Tester
r14	Compiler



Postprocess Query Results



noch erwarteten
Risikokosten sind damit das geplante
 Projektergebnis **und die Zielkosten** in
regelmäßigen Abständen zu überprüfen.
 Bei eventuellen **Abweichungen** ist die
 Projektleitung zu informieren. Diese leitet
eventuell entsprechende
 Korrekturmaßnahmen ein.

Entity	Name
r3	Design
r7	Program
r4	Entity
r14	r3
r7	Program
r4	Tester
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Motivation

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Summary

Results

Question 1: Model Complexity

Results

**Has the model
complexity increased
over time?**

Slide 20

Question 2: Distribution of Changes

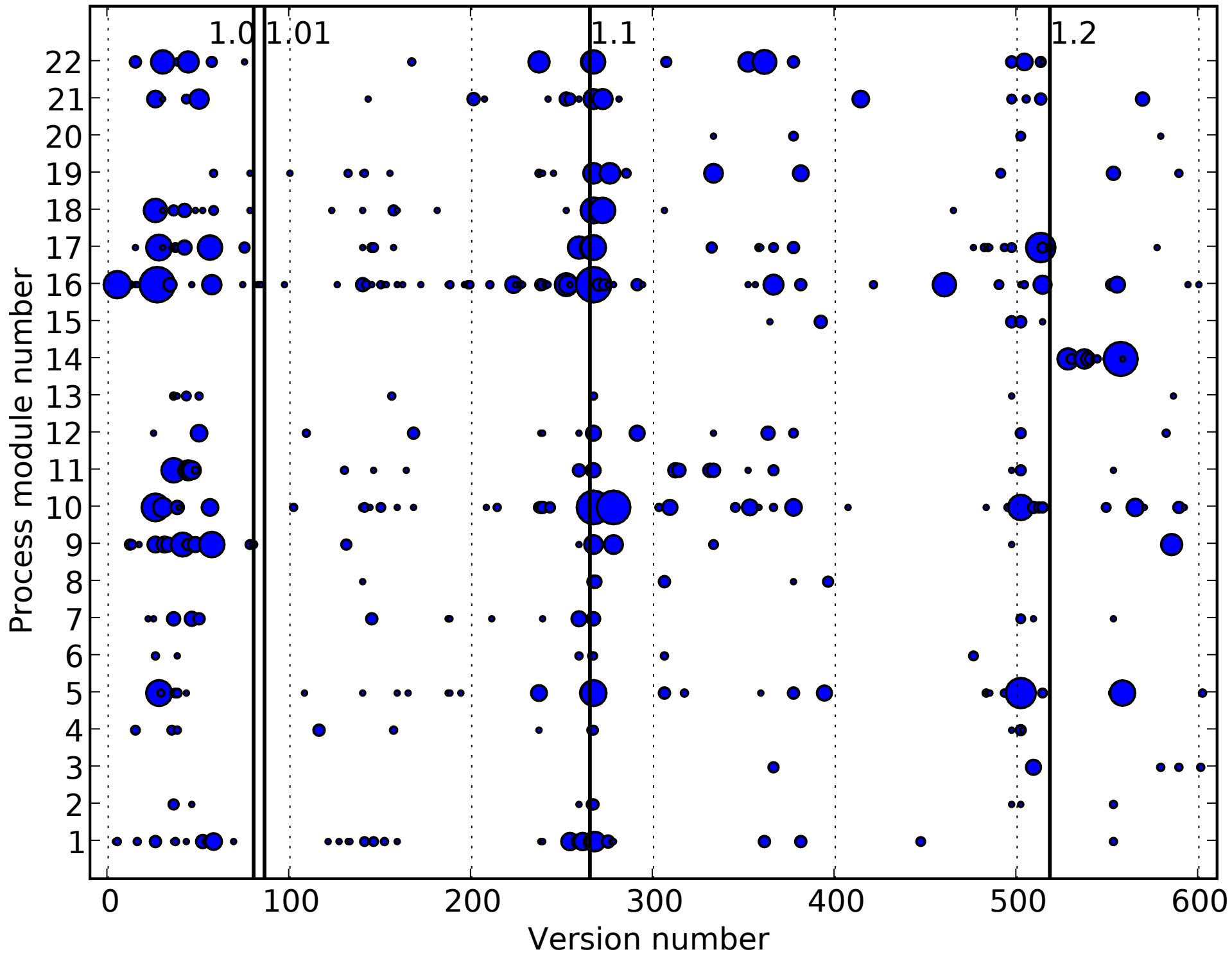
Results

**How are changes
distributed among
versions?**

**How do they relate to
releases?**

**How are they distributed
over the process modules?**

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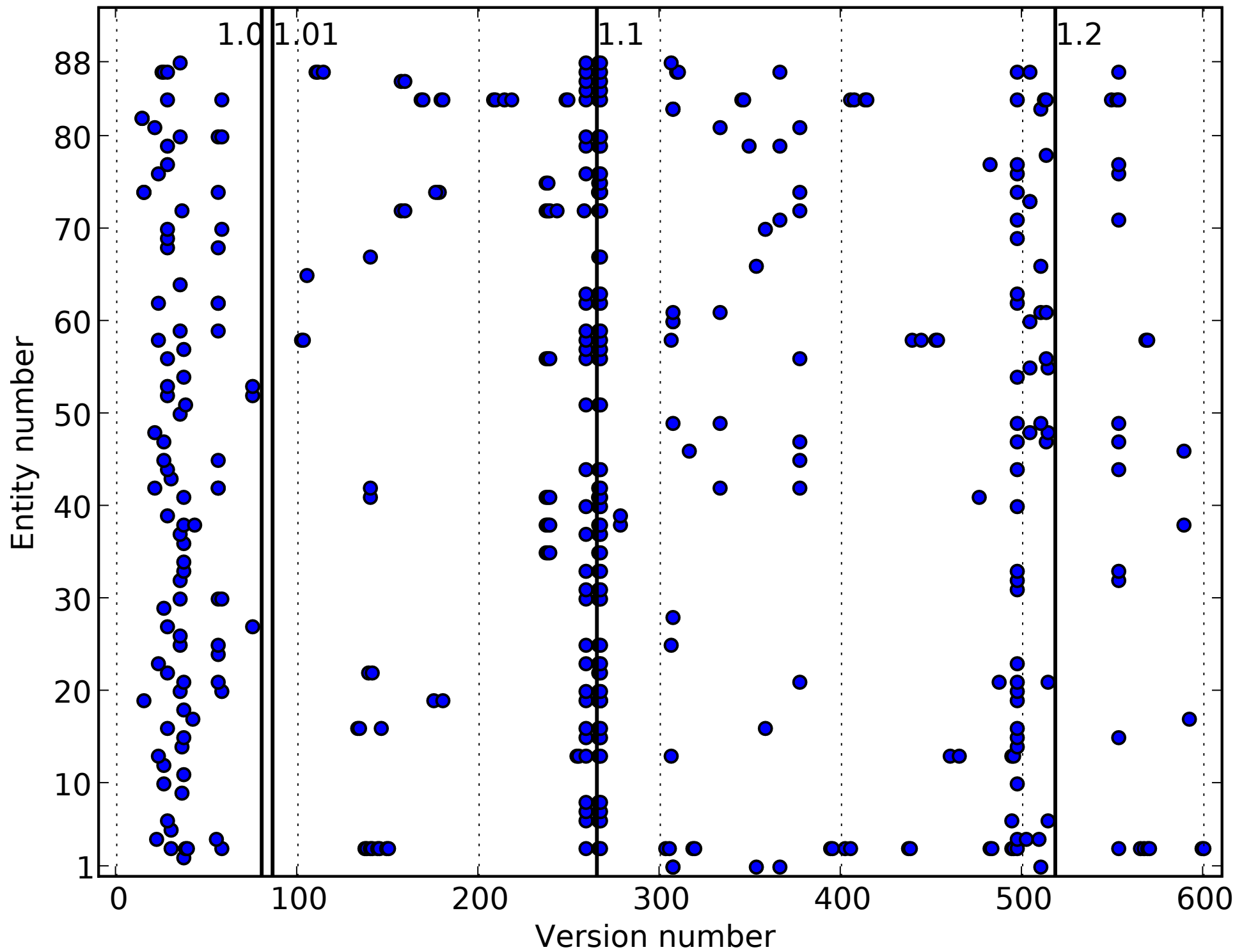


Question 3: Changes in Detail

Results

Does the evolution of individual modules look similar to the evolution of the whole model?

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Summary

Summary & Future Work

Summary

Summary

- We have used novel tools and techniques to gain insight into the evolution of a large process model.
- Similarities between the evolution of the V-Modell XT and the evolution of software systems can be observed.

Slide 24

Future Work

Summary

- Introduce other sources of information: version log to gain insight about rationale.
- Continue empirical study with the formulation of hypotheses.

Slide 25

**Questions?
Comments?**

Backup Slides



**Backup
Slides**

Slide 27

Problem

State of the Art

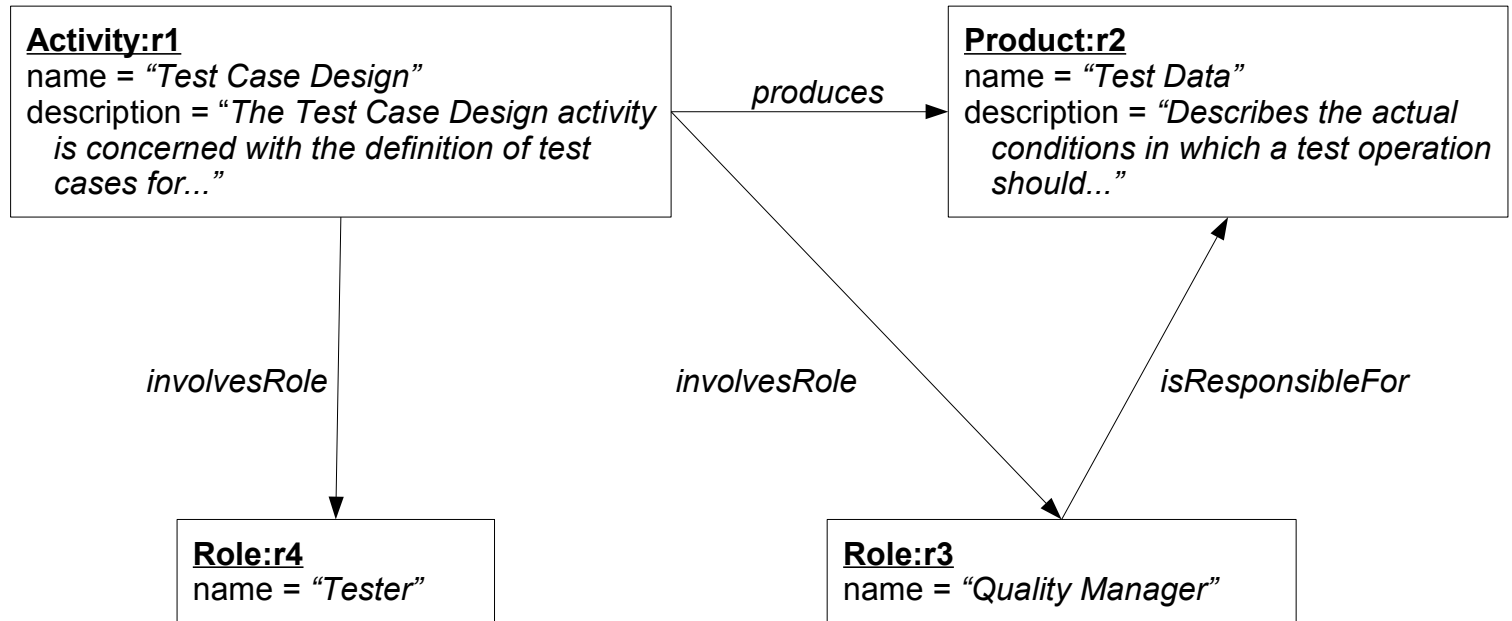
Approach

Evaluation

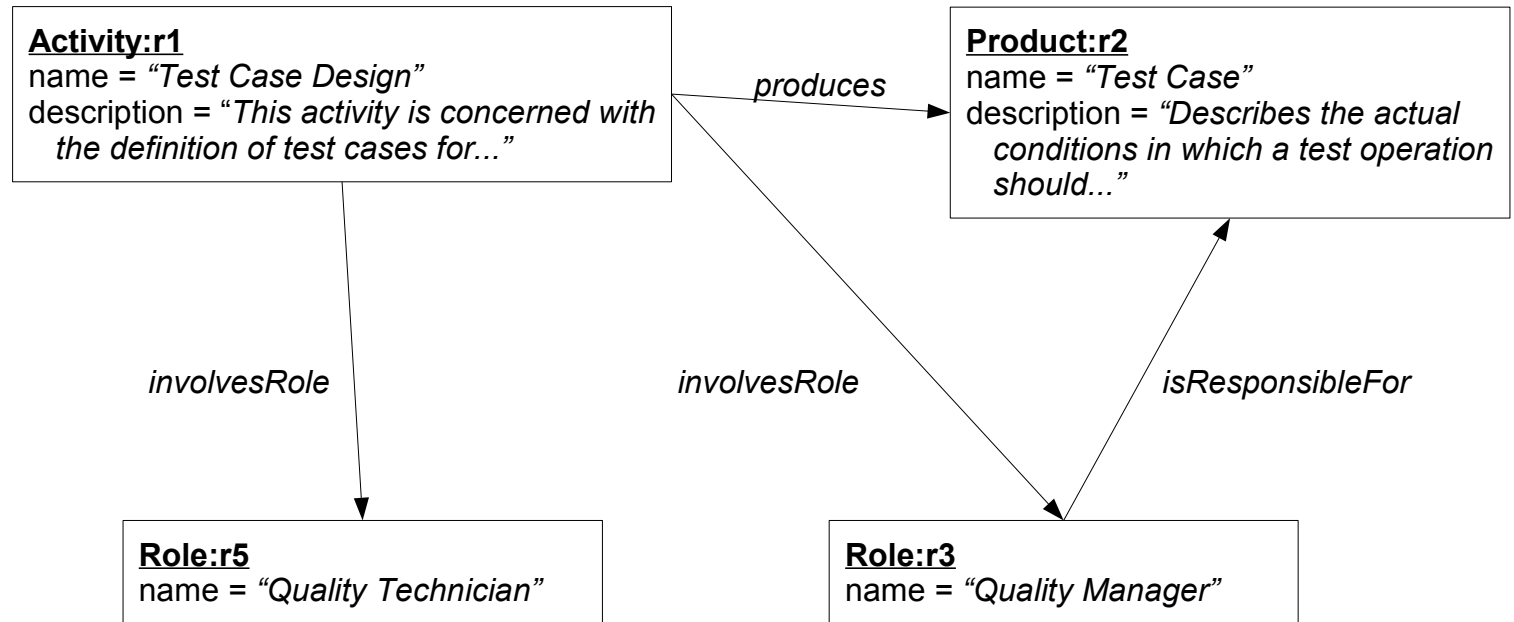
Summary

An Approach for Comparing Process Descriptions

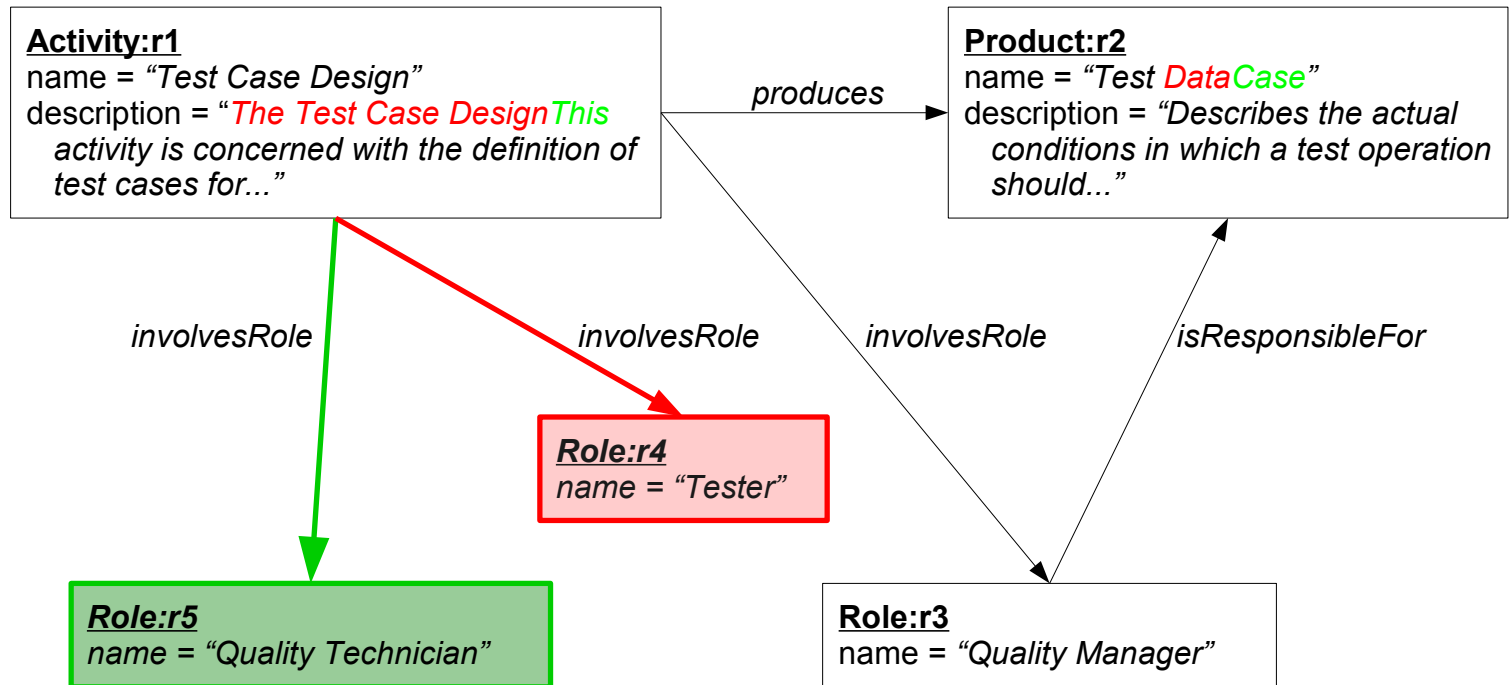
Example Process Description (Version 1)



Example Process Description (Version 2)

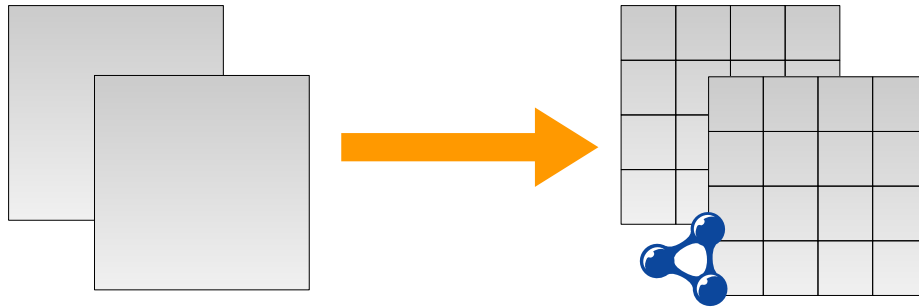


Example Process Description (Comparison)



Step 1: Normalize (Convert to RDF)

Approach



1

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Step 1: Normalize (Convert to RDF)

Approach

Activity:r1

name = *“Test Case Design”*

description = *“The Test Case Design activity is concerned with the definition of test cases for...”*

Slide 33

Step 1: Normalize (Convert to RDF)

Activity:r1

name = "Test Case Design"

description = "The Test Case Design activity
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cases for..."

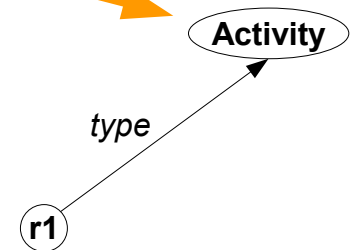


r1

Step 1: Normalize (Convert to RDF)

Activity: r1

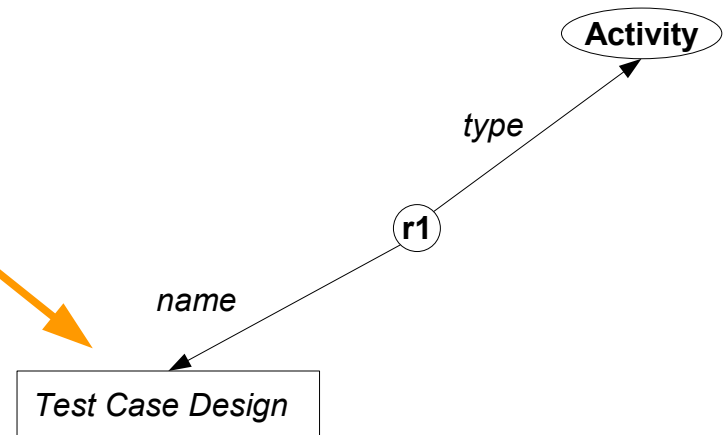
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Step 1: Normalize (Convert to RDF)

Activity:r1

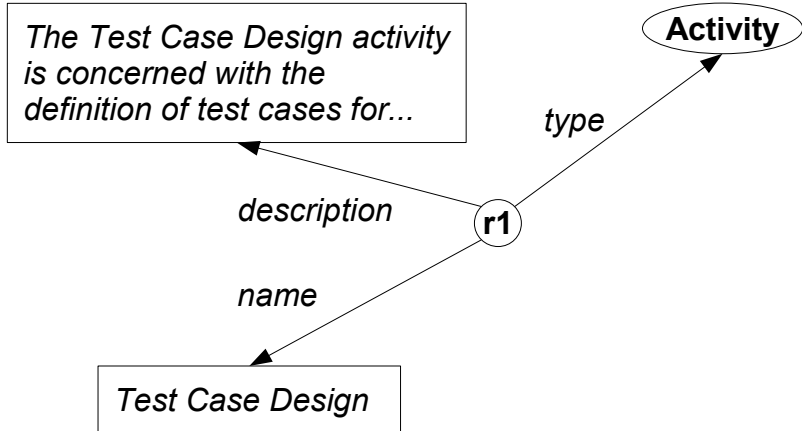
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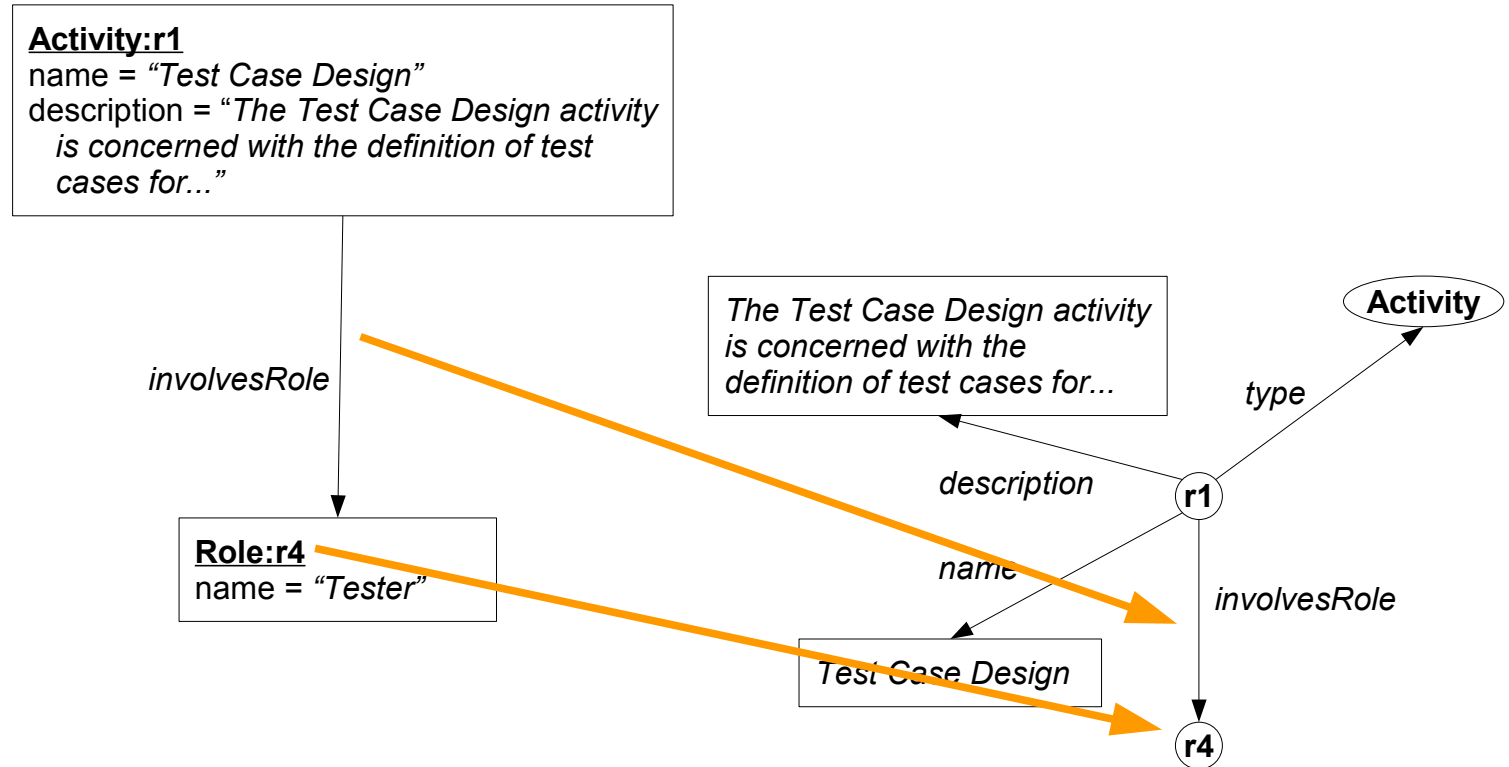
Step 1: Normalize (Convert to RDF)

Activity:r1

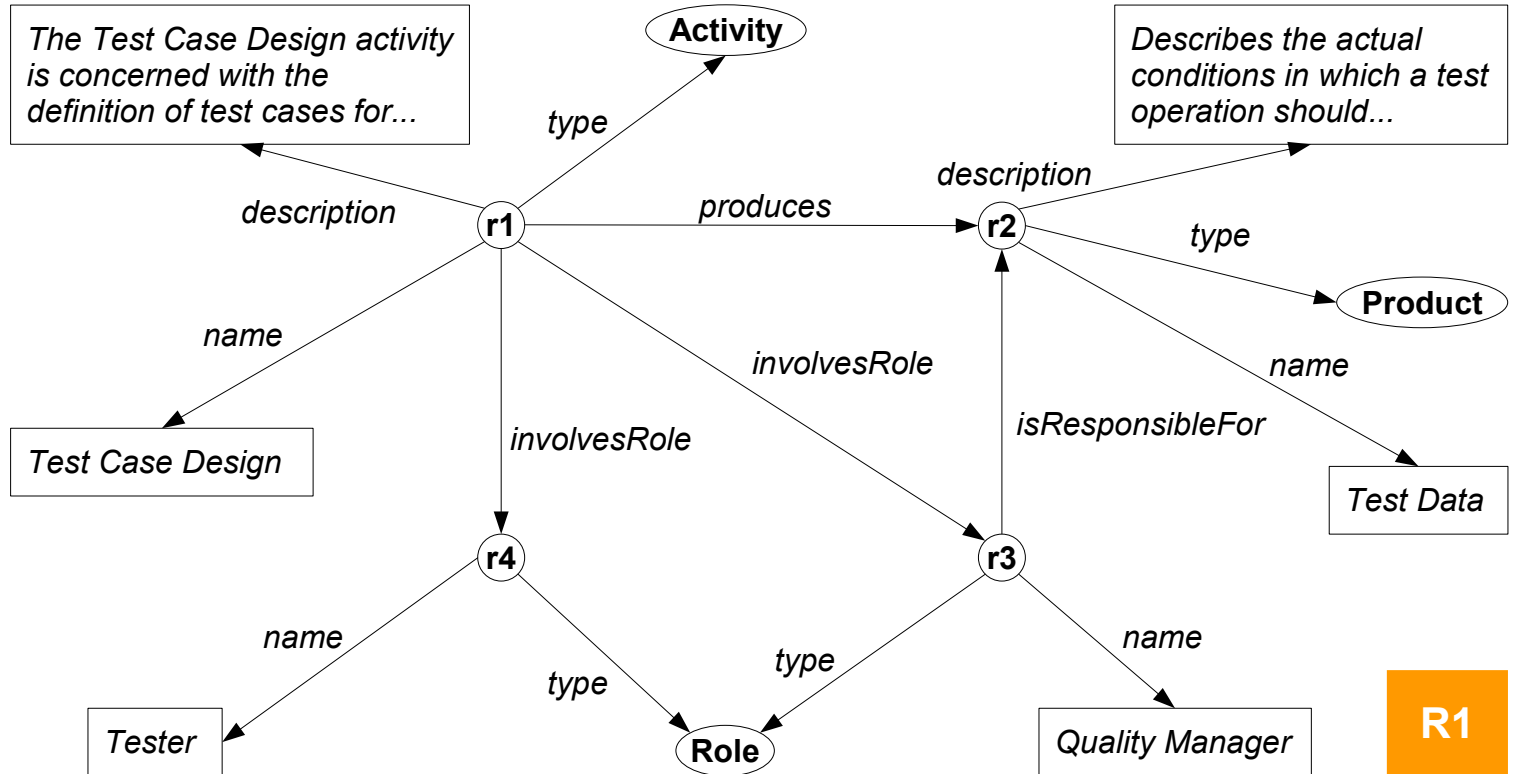
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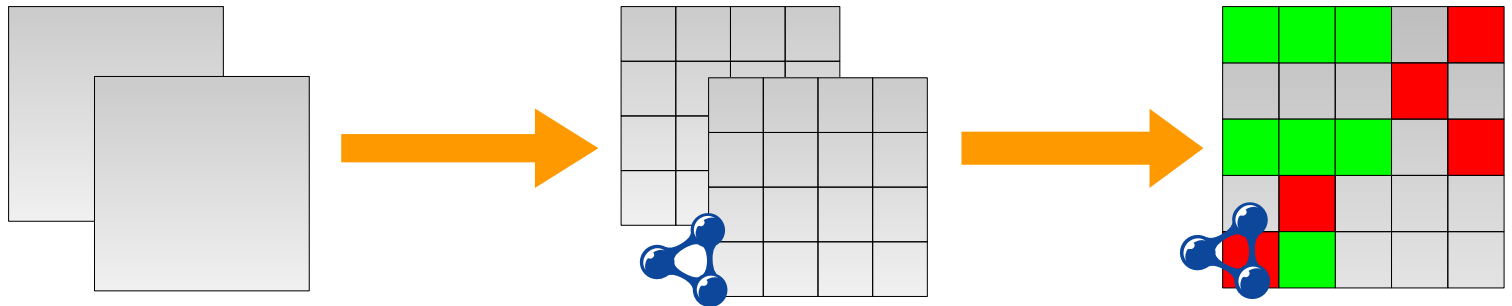


Example: Normalized Version 1



Build Comparison Model

Approach

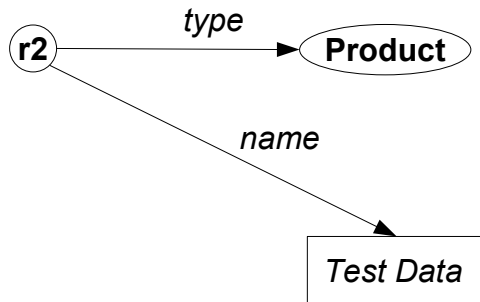


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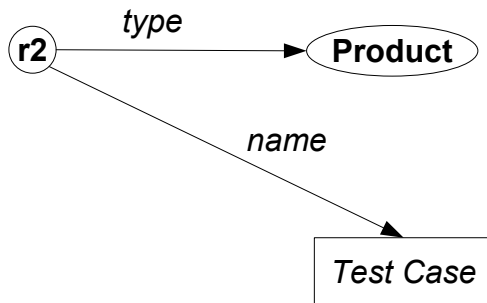
Slide 40

Build Comparison Model

Version 1

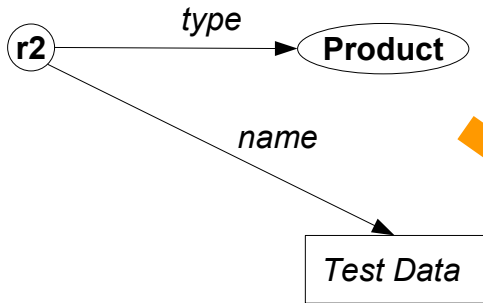


Version 2

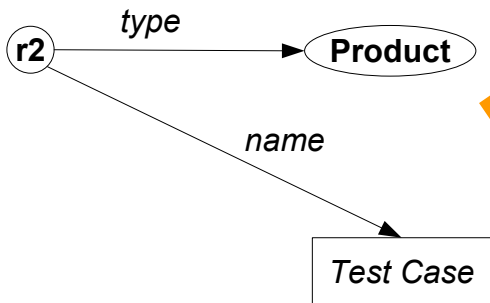


Build Comparison Model

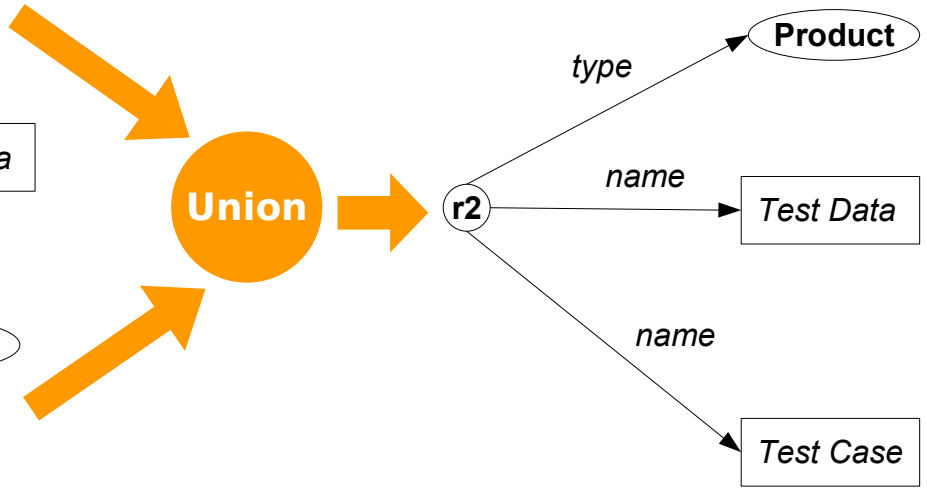
Version 1



Version 2

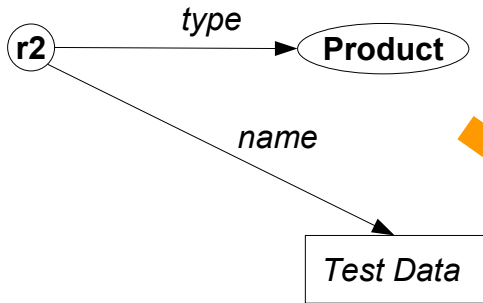


Comparison Model

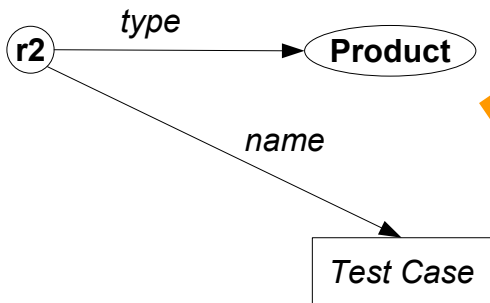


Build Comparison Model

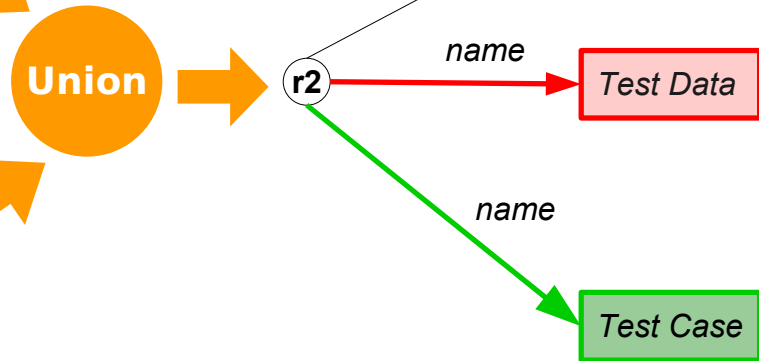
Version 1



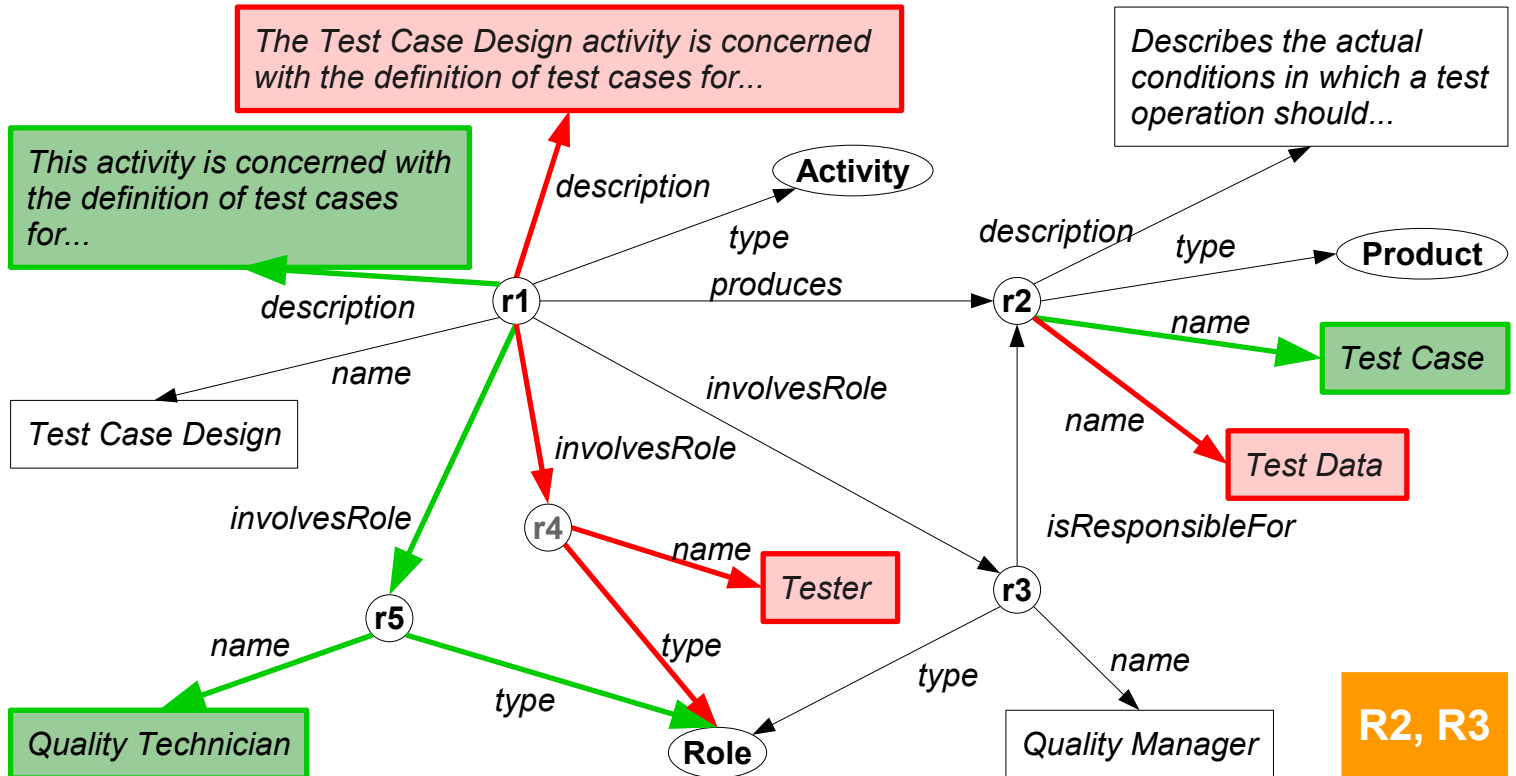
Version 2



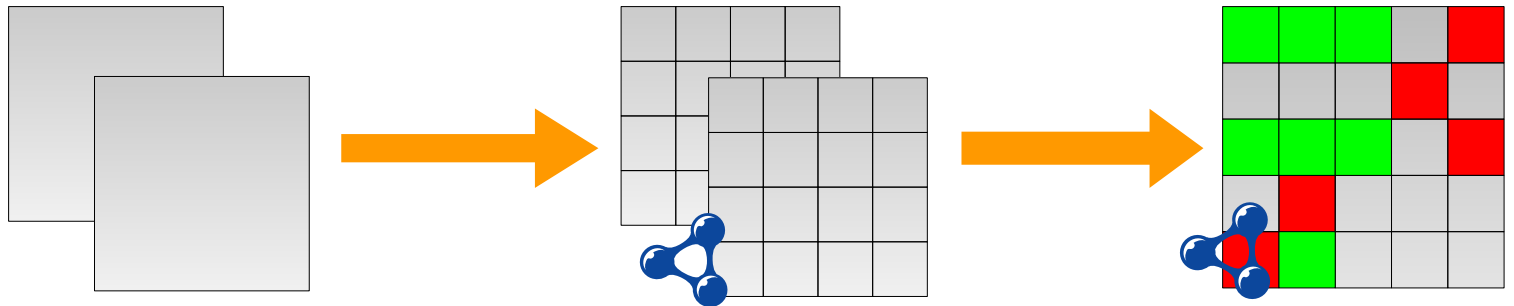
Comparison Model



Example Comparison Model



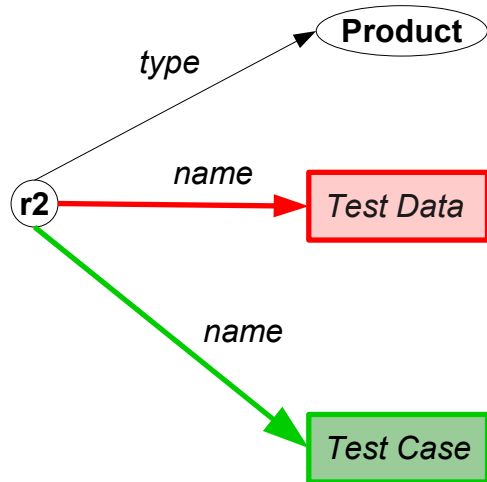
Query Comparison Model



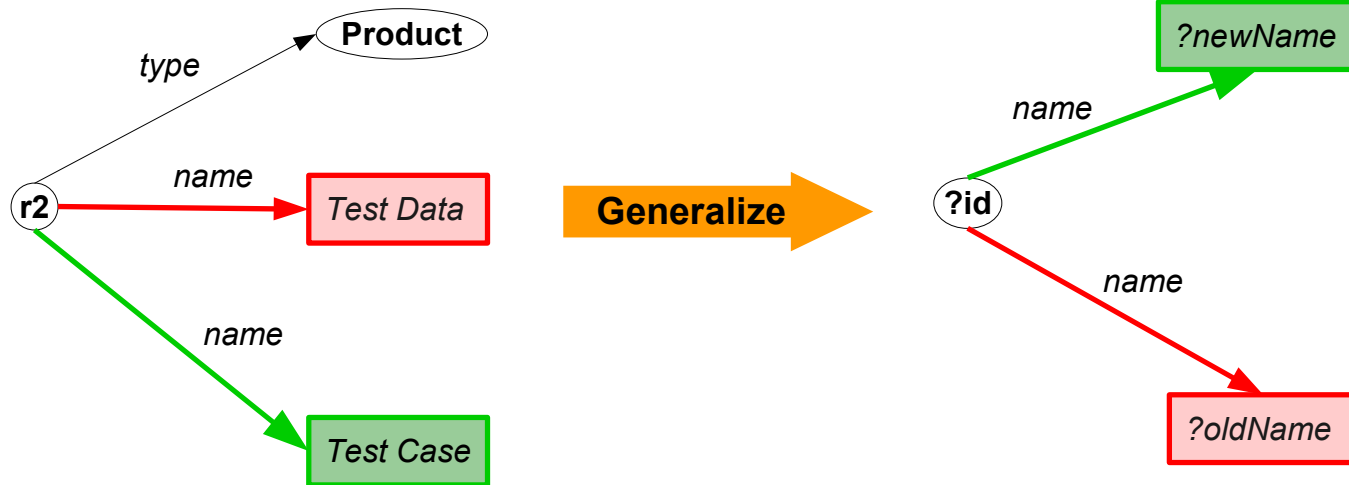
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Change Patterns

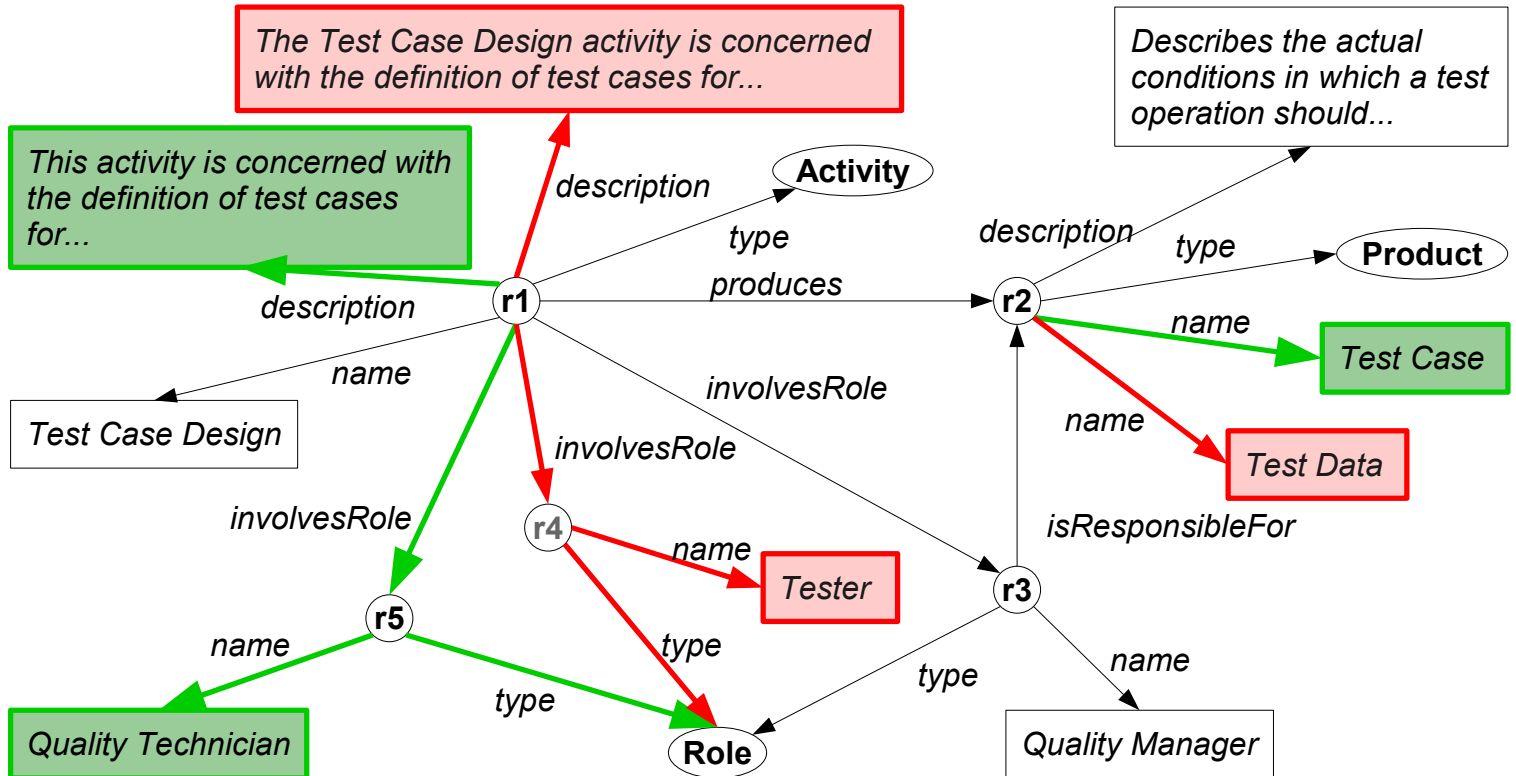


Change Patterns

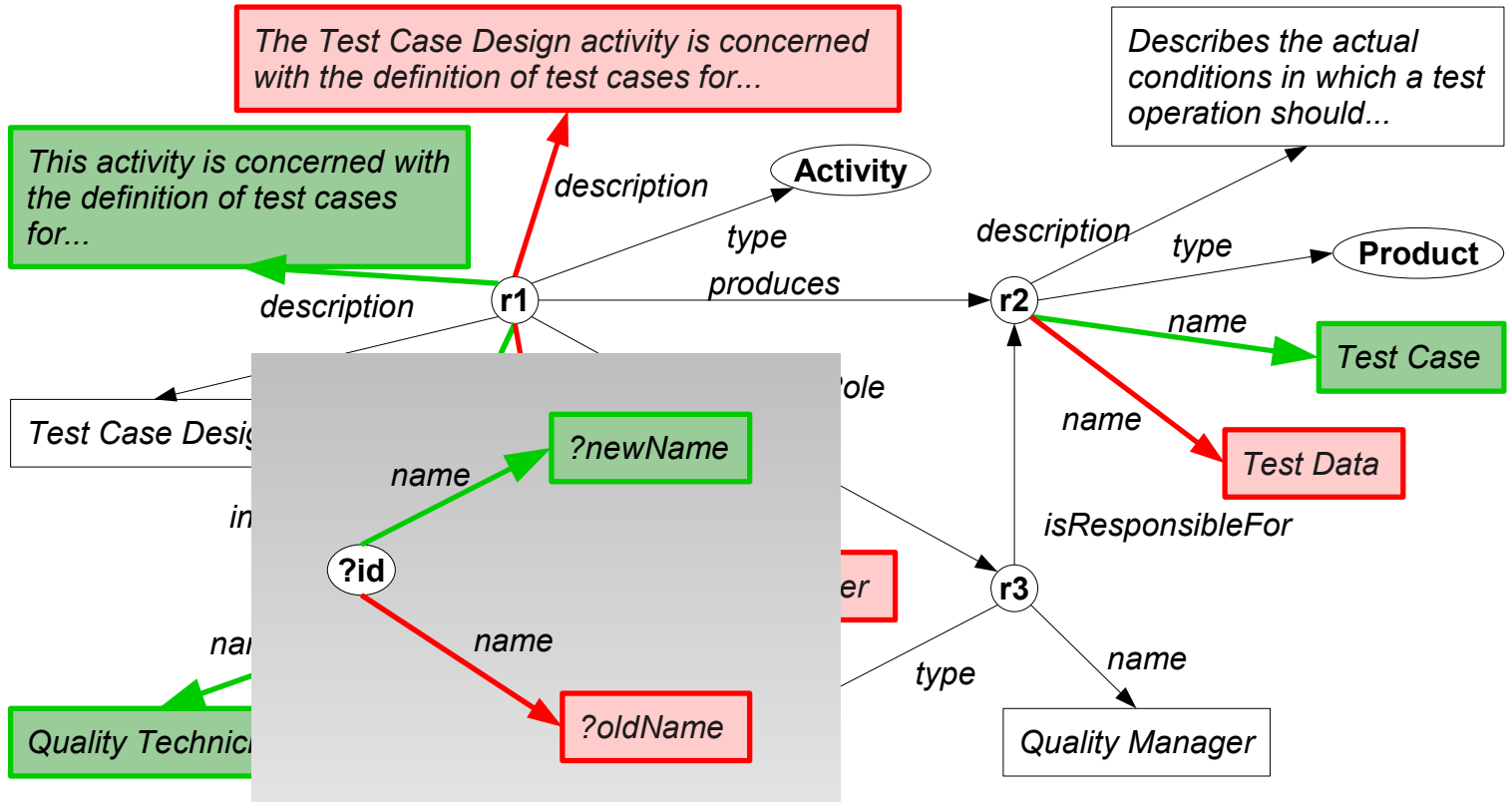


R2

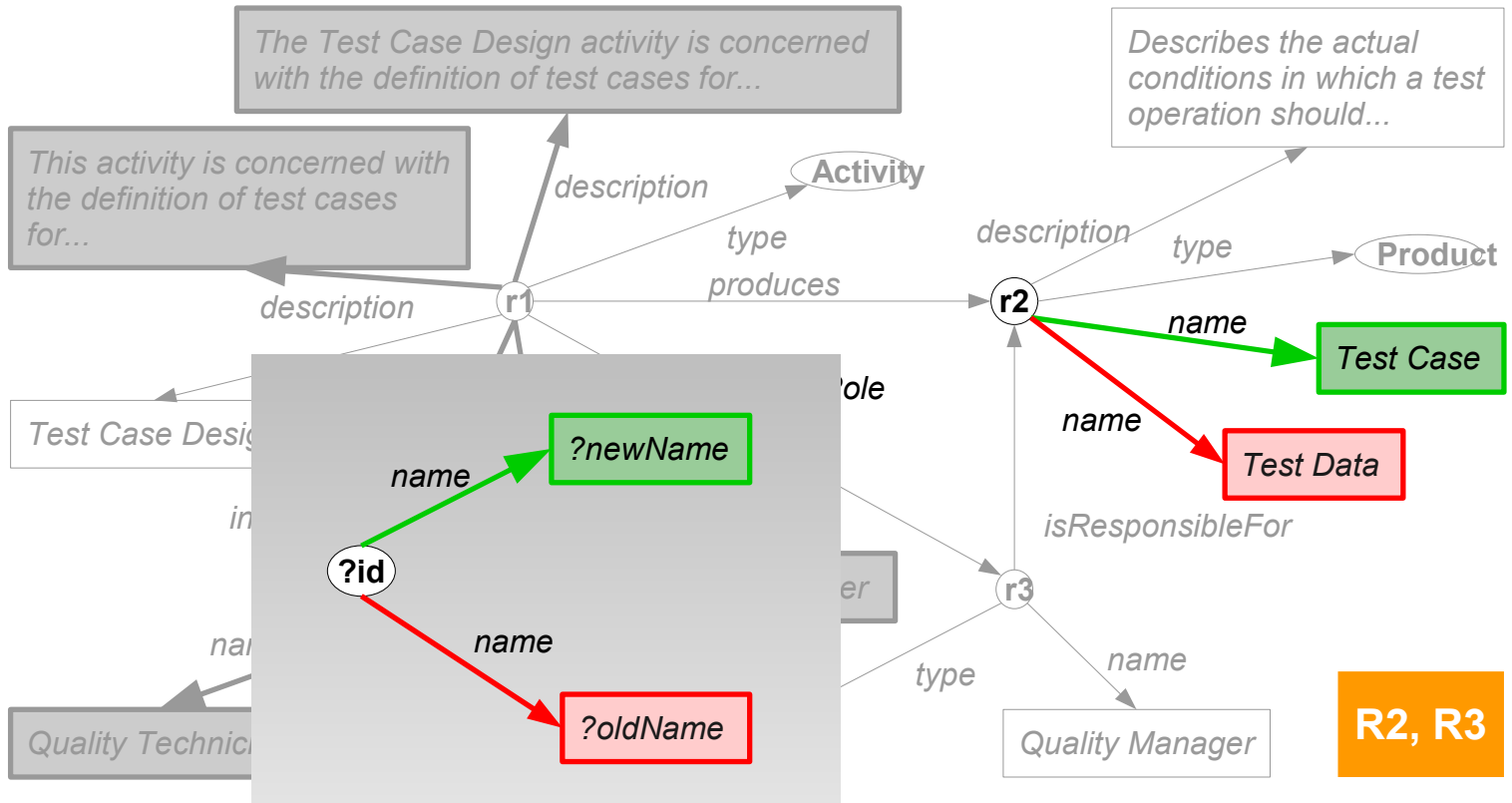
Example Description (Normalized Comparison)



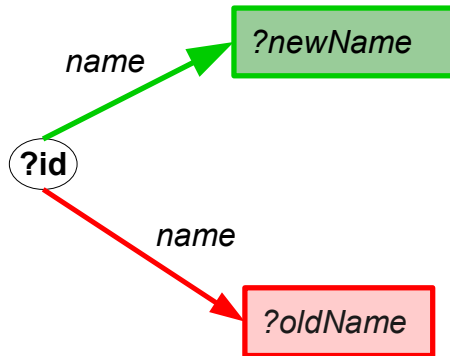
Example Description (Normalized Comparison)



Example Description (Normalized Comparison)



Queries



```
select ?id ?oldName ?newName
where {
  graph relrdf:A {
    ?id ex:name ?oldName
  }
  graph relrdf:B {
    ?id ex:name ?newName
  }
}
```

Example Queries

**Which entities
were deleted
from the
model?**

```
select ?type ?name
where {
  graph relrdf:A {
    ?entity a ?type .
    ?entity ex:name ?name
  }
}
```

Example Queries

Which process activities were added to the model?

```
select ?name
where {
  graph relrdf:B {
    ?entity a ex:Activity .
    ?entity ex:name ?name
  }
}
```

Example Queries

**Which products
where
renamed and
how?**

```
select ?entity ?oldName ?newName
where {
  graph relrdf:AB {
    ?entity a ex:Product .
  }
  graph relrdf:A {
    ?entity ex:name ?oldName
  }
  graph relrdf:B {
    ?entity ex:name ?newName
  }
}
```

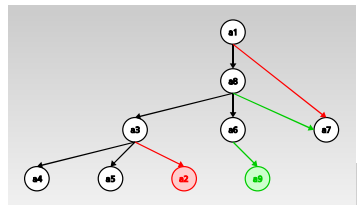
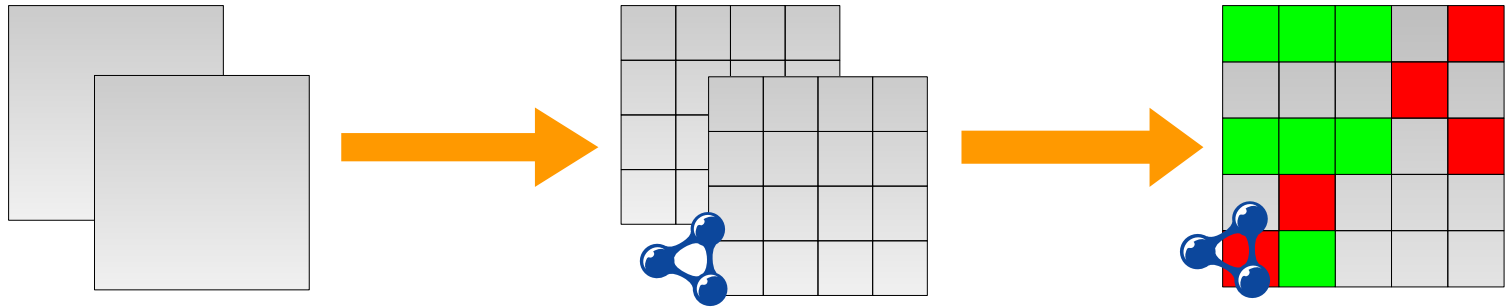
Example Queries

Approach

Which tools are required (used) by the new activities?

```
select ?activity ?tool
where {
  graph relrdf:B {
    ?actId a ex:Activity .
    ?actId ex:name ?activity
  }
  graph relrdf:modelB {
    ?entity ex:usesTool ?toolId .
    ?toolId ex:name ?tool
  }
}
```

Postprocess Query Results



noch erwarteten
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r7	Program
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r14	r3
	Design
r7	Program
r4	Tester
r14	Compiler



Tool System Architecture

