
GMF (Graphical Modeling Framework)

Urs Frei

Inhalt

- GMF Beispiel Shape Editor
- Standardfunktionalitäten des GMF Editor
- Theorie GMF
 - Draw2d
 - GEF
- Über den Tellerrand blickend
 - GEF3d
 - Zest

Ziel:

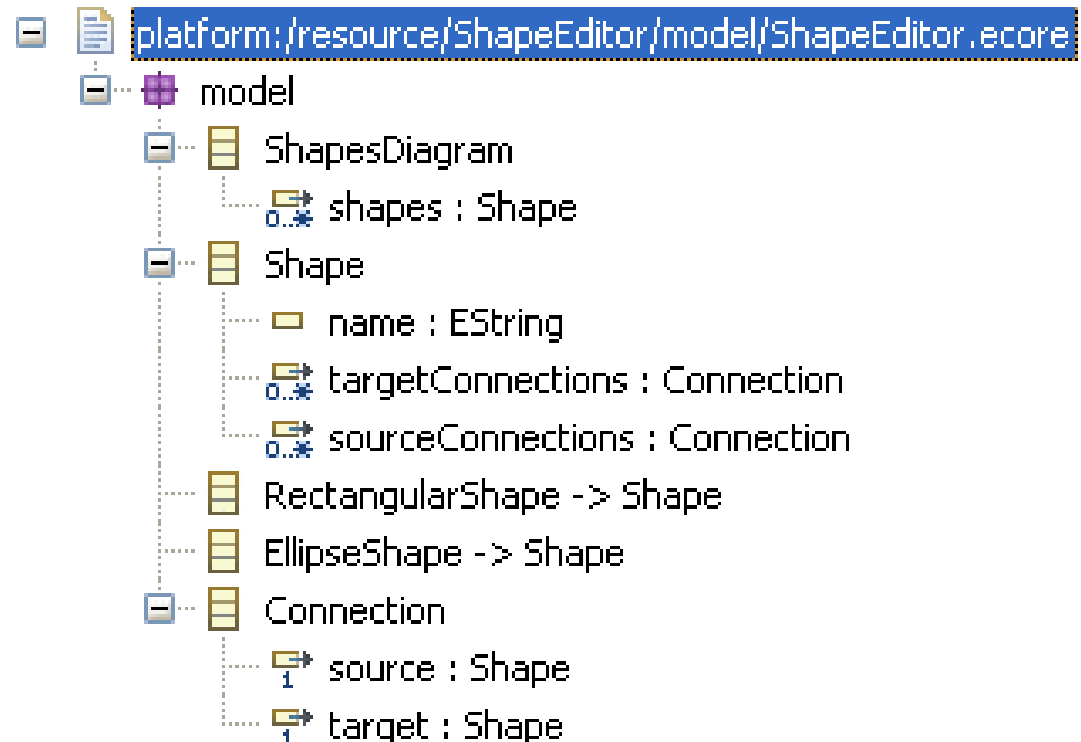
- So einfach ist das!!!
- Vortrag soll beim selbständigen Einstieg helfen
- Brauche eine graphische Visualisierung
 - Kein Problem
 - Es geht „alles“

GMF am Beispiel eines Shape-Editors

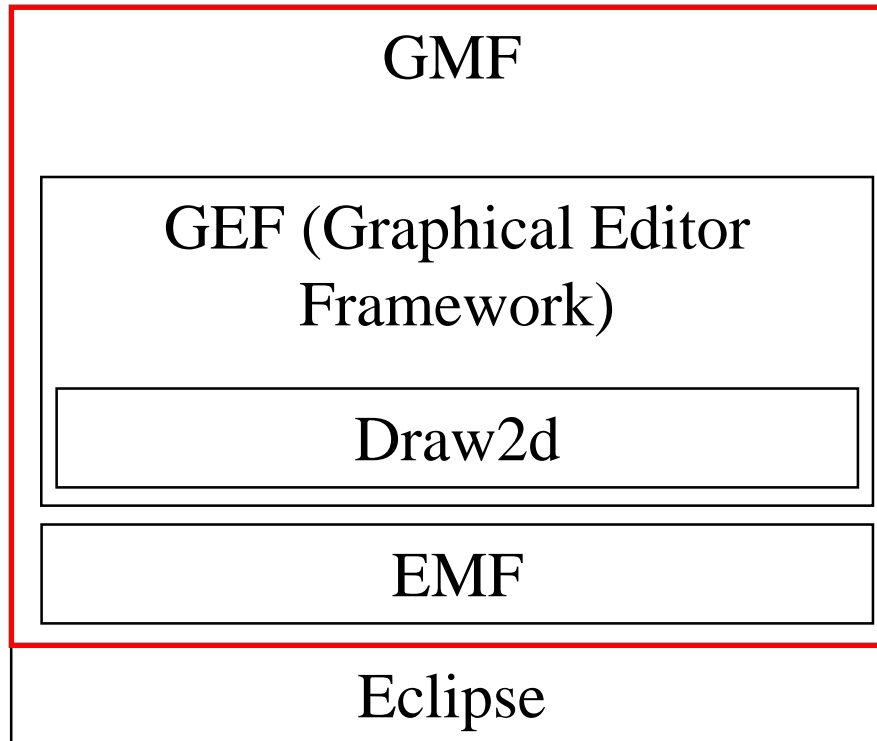
- Anforderungen:
 - Rechteck zeichnen
 - Ellipse zeichnen
 - Rechtecke und Ellipsen haben Namen
 - Elemente mit Linien verbinden

Ausgangslage EMF (Michael & Laurent)

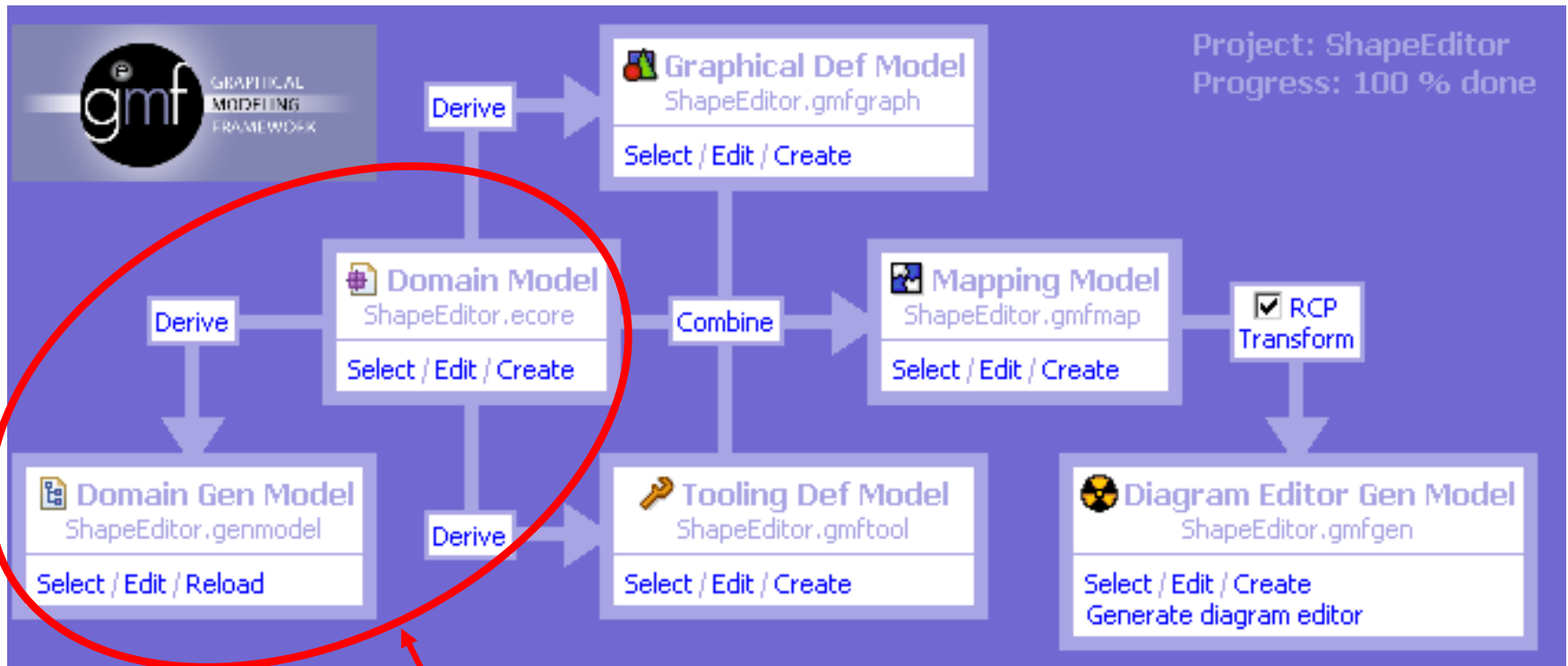
■ EMF Modell für Shape Editor



GMF Übersicht



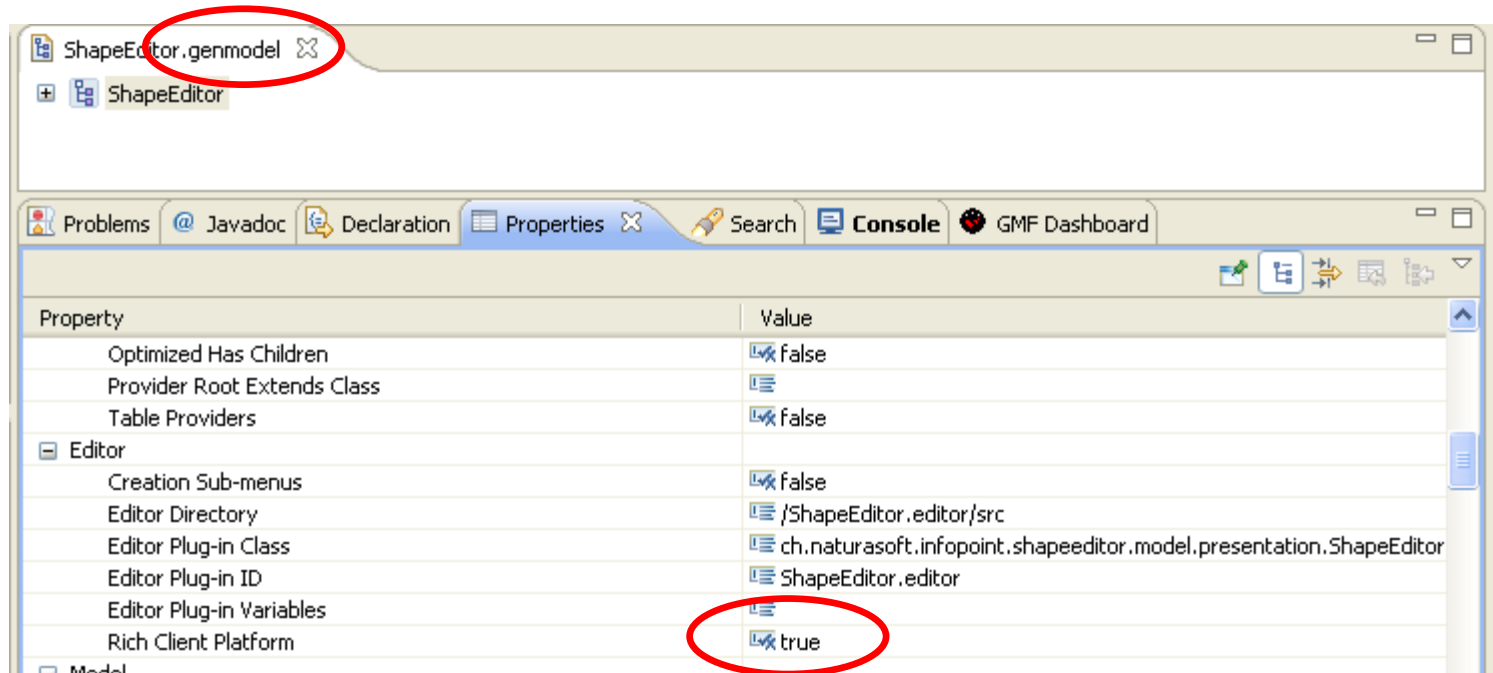
GMF Dashboard



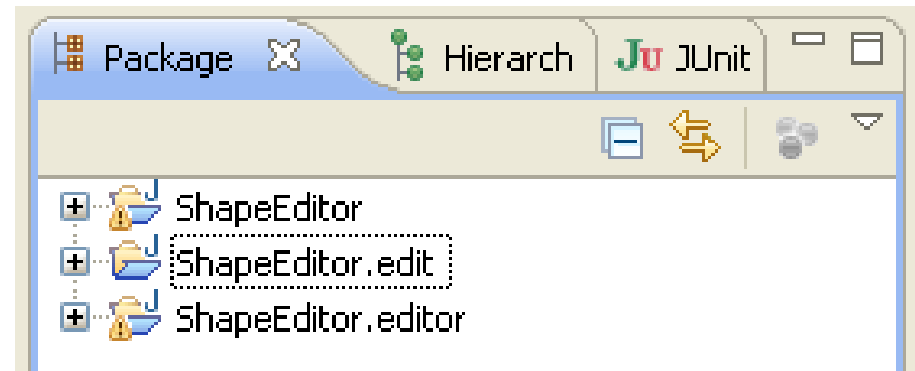
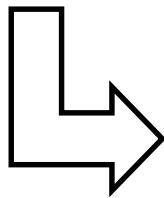
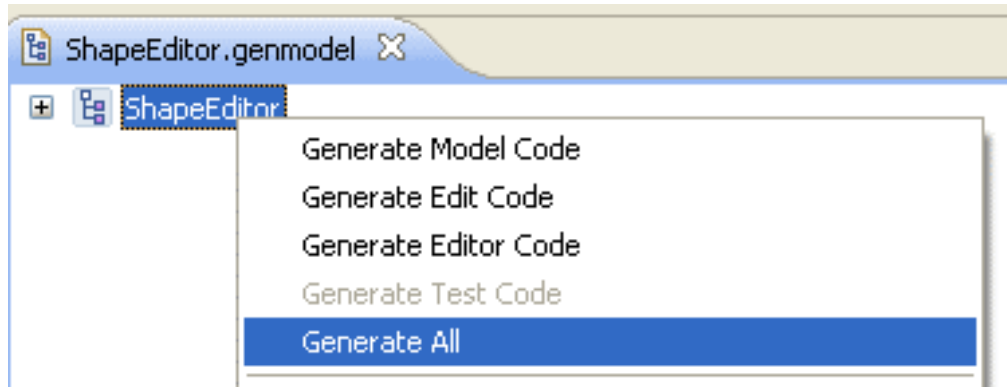
EMF-Teil (Michael Laurent)

Der EMF Editor (RCP)

- Der Shape-Editor als EMF Editor
 - RCP Konfiguration



EMF Editor generieren



Launch EMF Editor

Name: ShapeEditor_EMF

Launch with: plug-ins selected below only Default Start level: 4 Default Auto-Start: false

type filter text

Plug-ins	Start Level	Auto-Start
<input checked="" type="checkbox"/> Workspace		
<input checked="" type="checkbox"/> ShapeEditor (1.0.0)	default	default
<input checked="" type="checkbox"/> ShapeEditor.edit (1.0.0)	default	default
<input checked="" type="checkbox"/> ShapeEditor.editor (1.0.0)	default	default
<input type="checkbox"/> Target Platform		
<input type="checkbox"/> at.ssw.coco.eclipse.branding (0.1.10)		
<input type="checkbox"/> at.ssw.coco.eclipse.builder (0.1.10)		
<input type="checkbox"/> at.ssw.coco.eclipse.core (0.1.10)		
<input type="checkbox"/> at.ssw.coco.eclipse.ide (0.1.10)		
<input type="checkbox"/> com.collabnet.subversion.merge (1.9.0.4)		
<input type="checkbox"/> com.google.collect (0.8.0.v200906161042)		
<input type="checkbox"/> com.google.guice (1.0.1.v200906161042)		
<input checked="" type="checkbox"/> com.ibm.icu (4.0.1.v20090415)	default	default
<input type="checkbox"/> com.jcraft.jsch (0.1.41.v200903070017)		
<input type="checkbox"/> com.sun.jna (3.0.9)		
<input type="checkbox"/> javax.activation (1.1.0.v200806101325)		

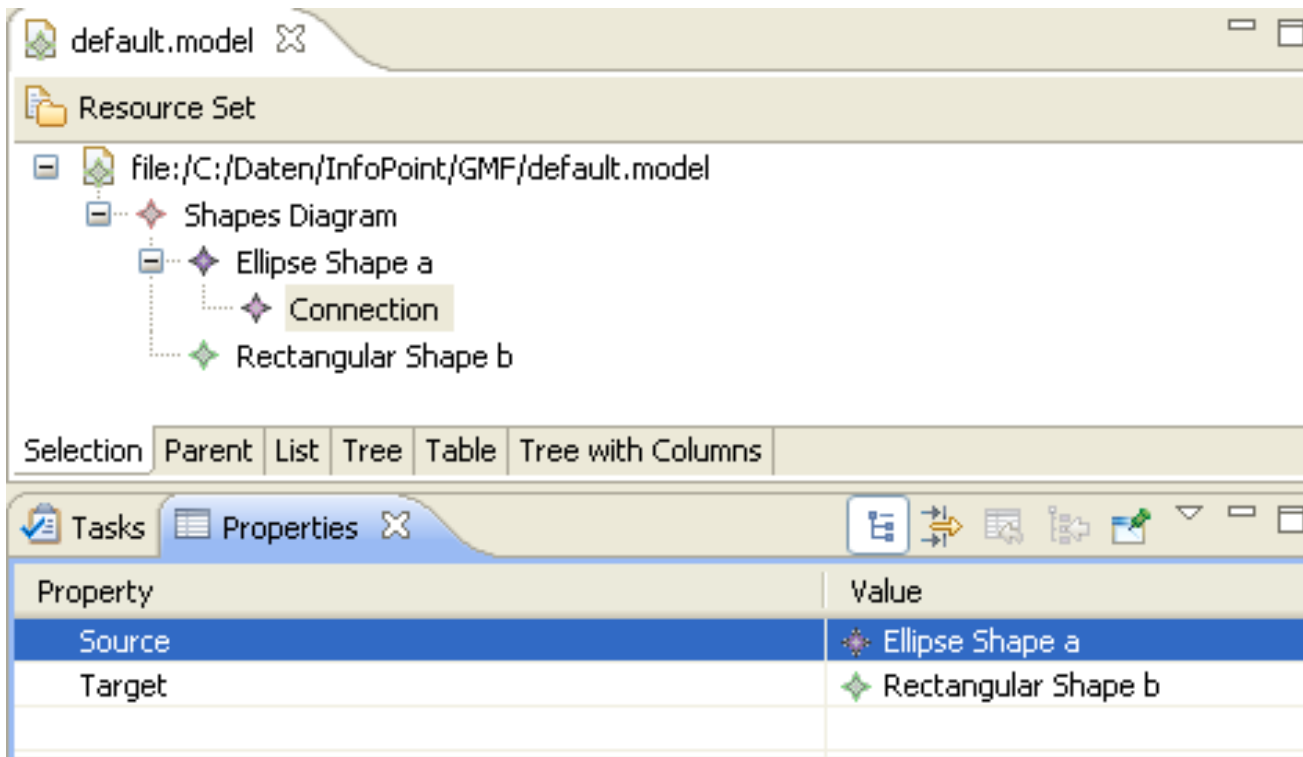
Select All
Deselect All
Add Working Set...
Add Required Plug-ins
Restore Defaults

Only show selected plug-ins
93 out of 1129 selected

Include optional dependencies when computing required plug-ins
 Add new workspace plug-ins to this launch configuration automatically
 Validate plug-ins automatically prior to launching

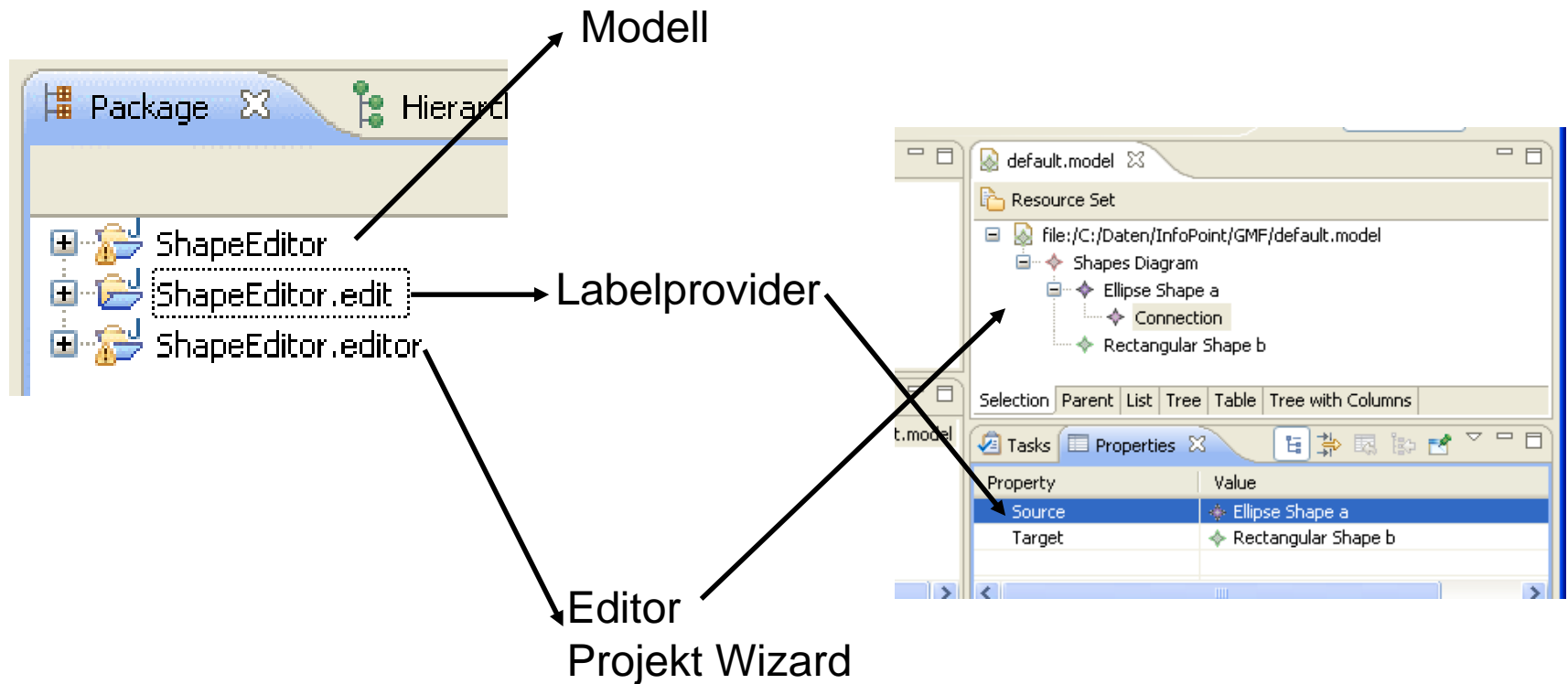
Validate Plug-ins

Shape Editor mit EMF erstellen

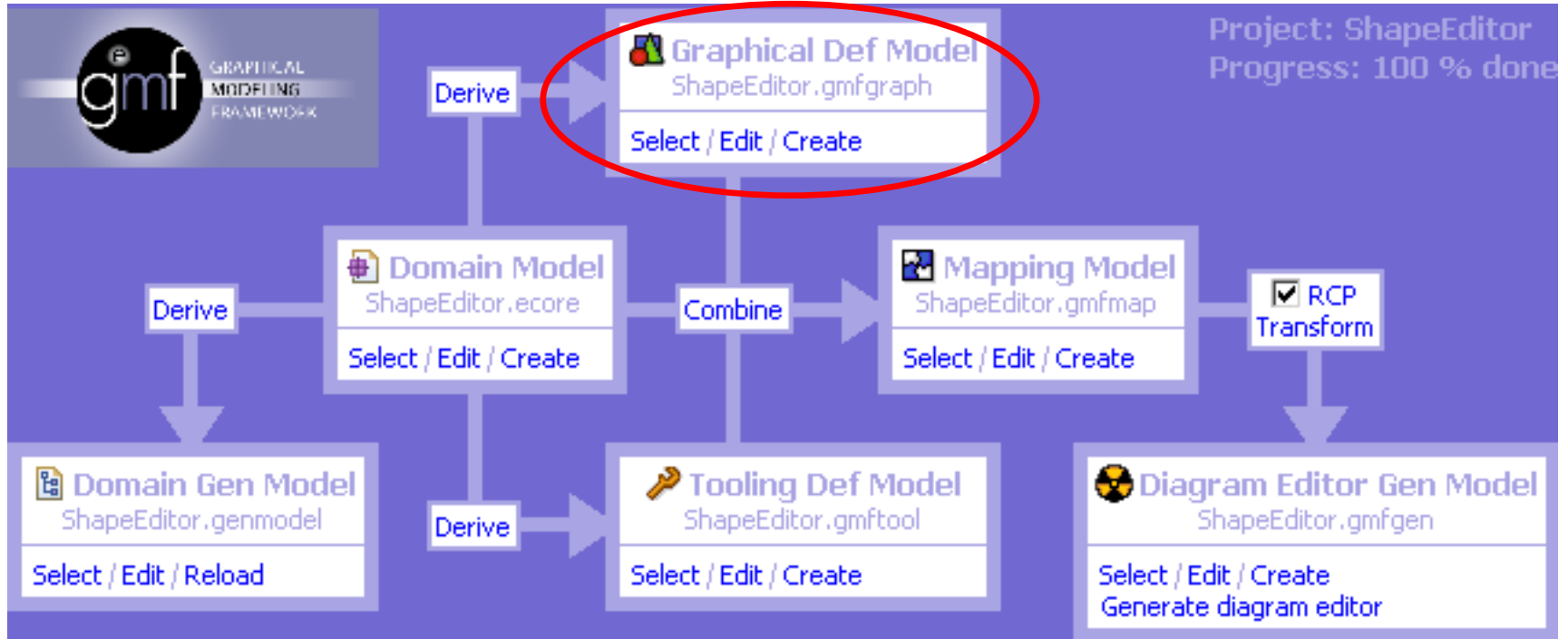


Für diese Anwendung nicht sehr komfortabel!!!

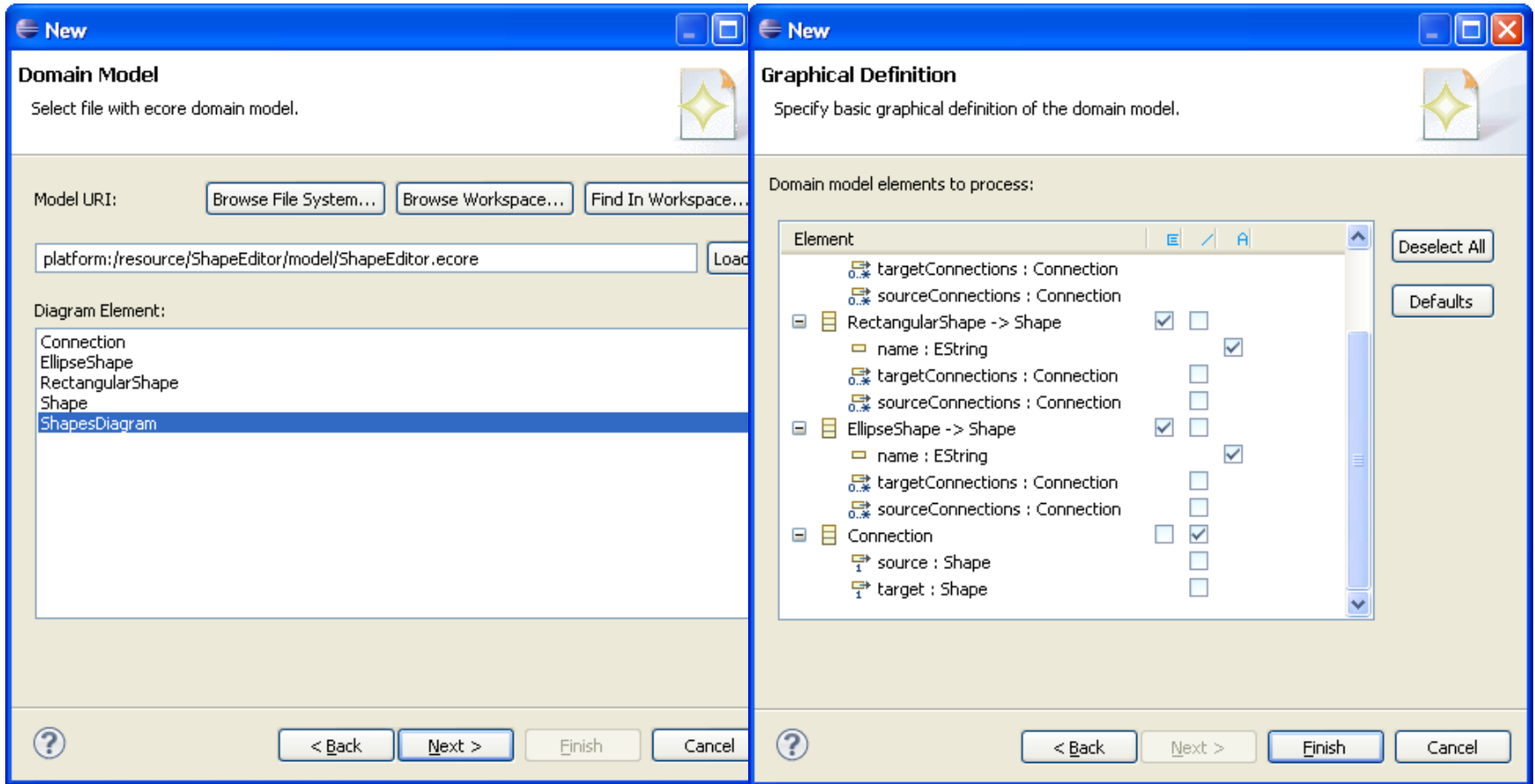
EMF was findet man wo?



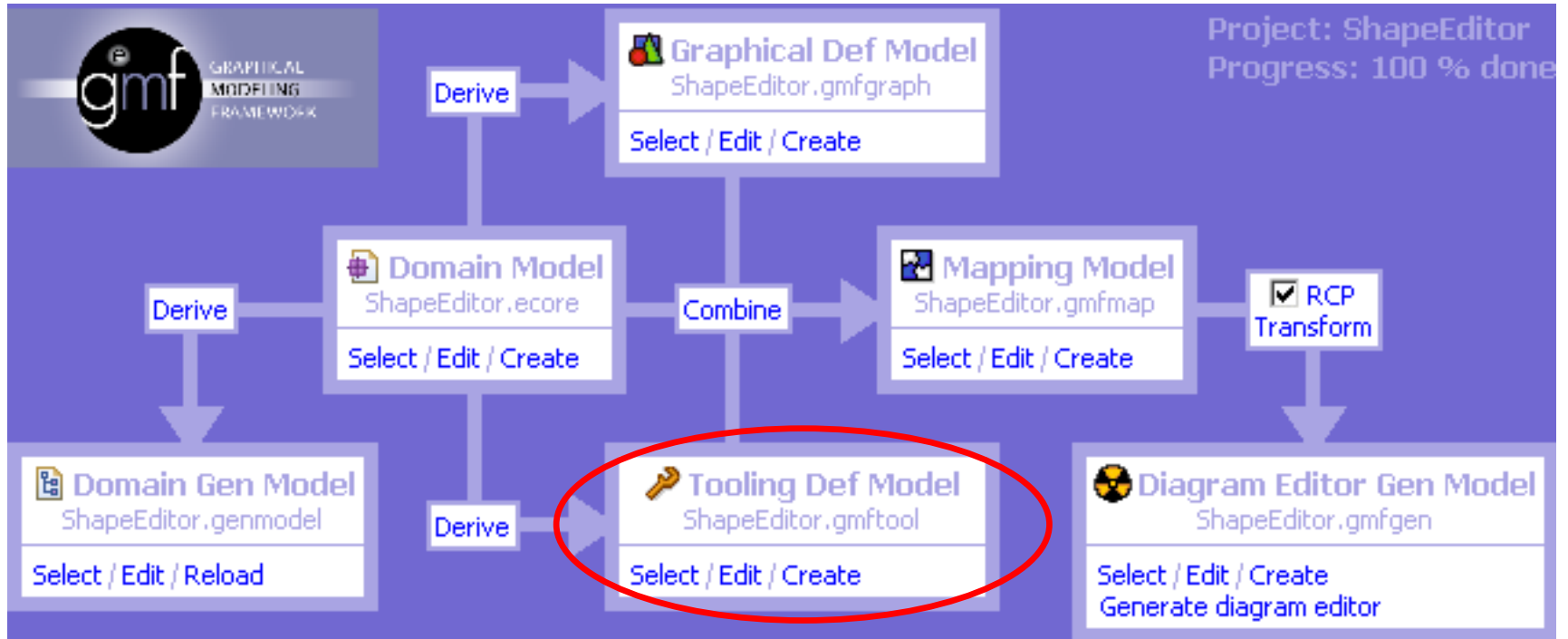
Wir wollen mehr → Graphischer Editor



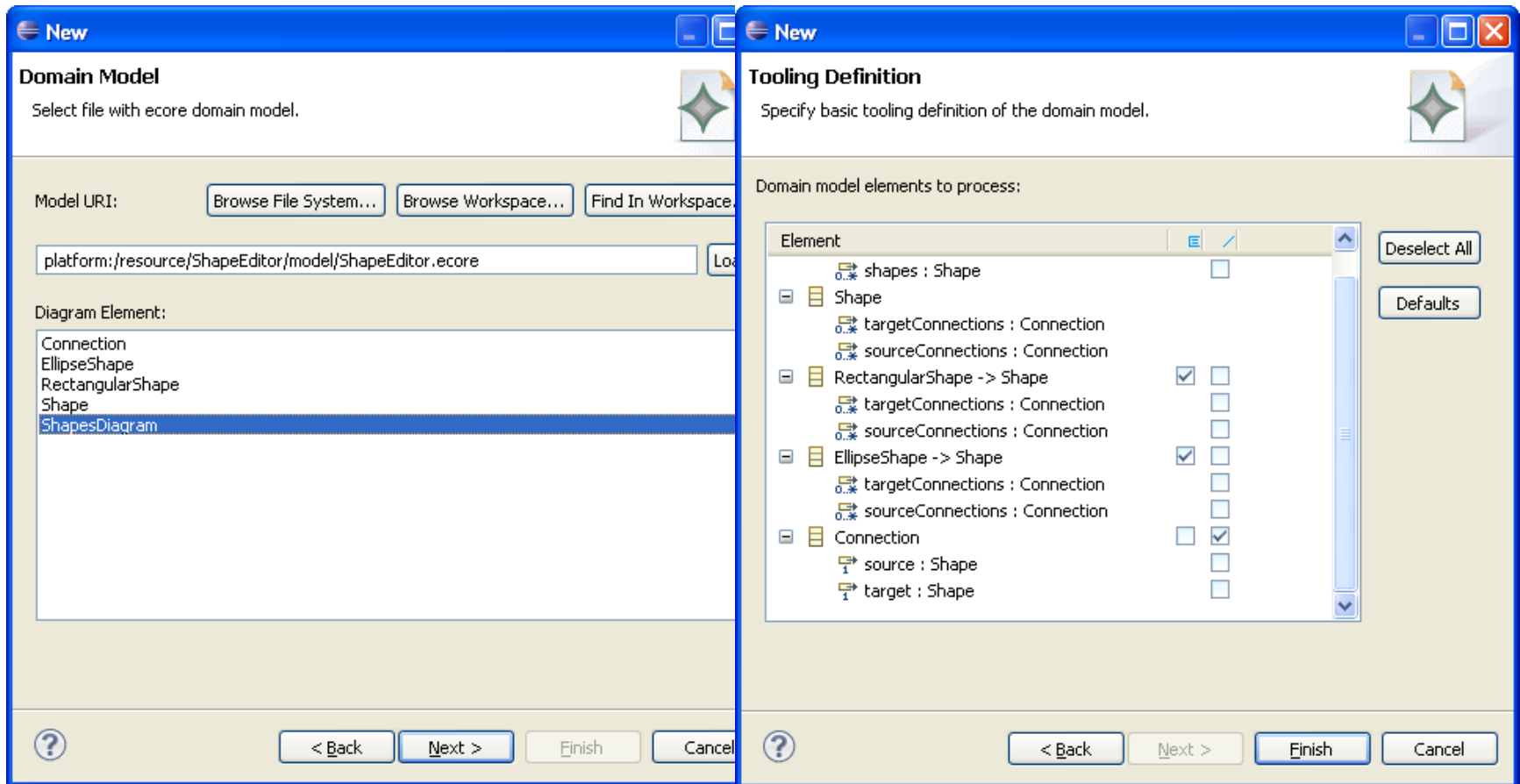
Graphische Elemente Definieren



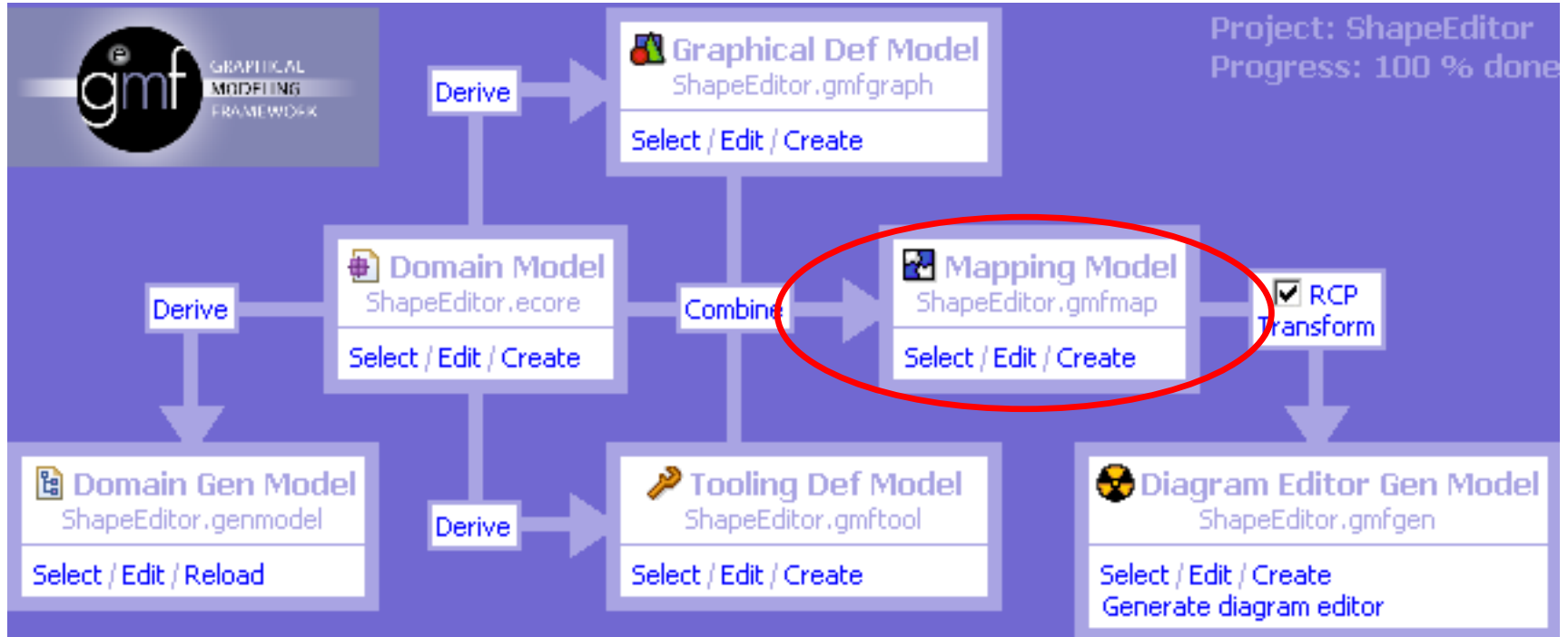
Editor Toolbar definieren 1/2



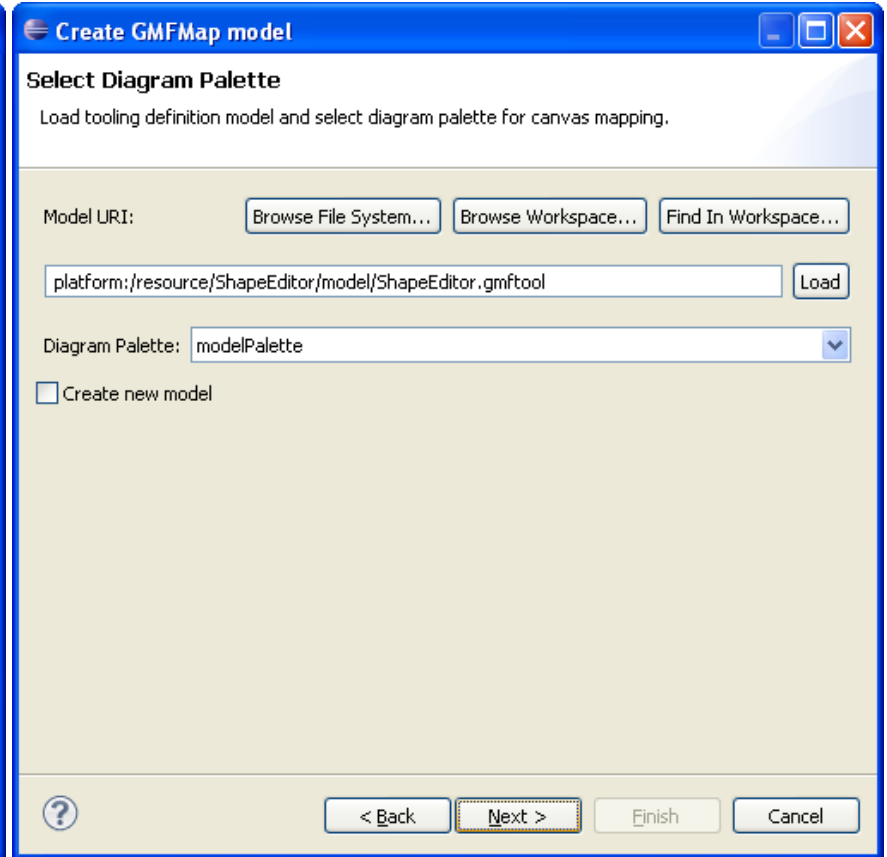
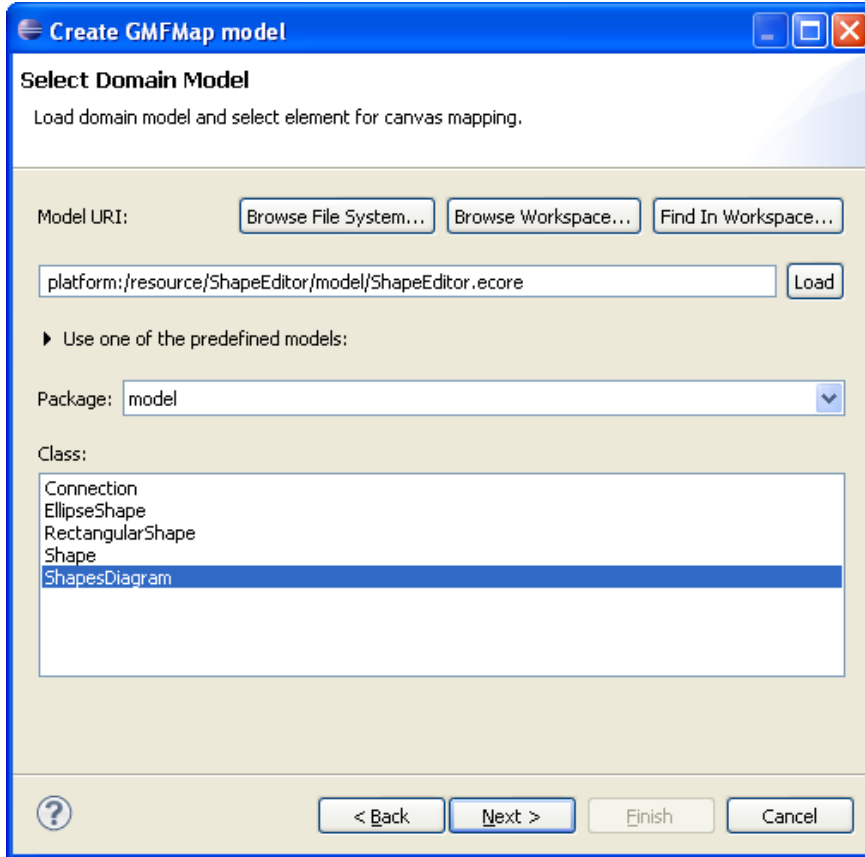
Editor Toolbar definieren 2/2



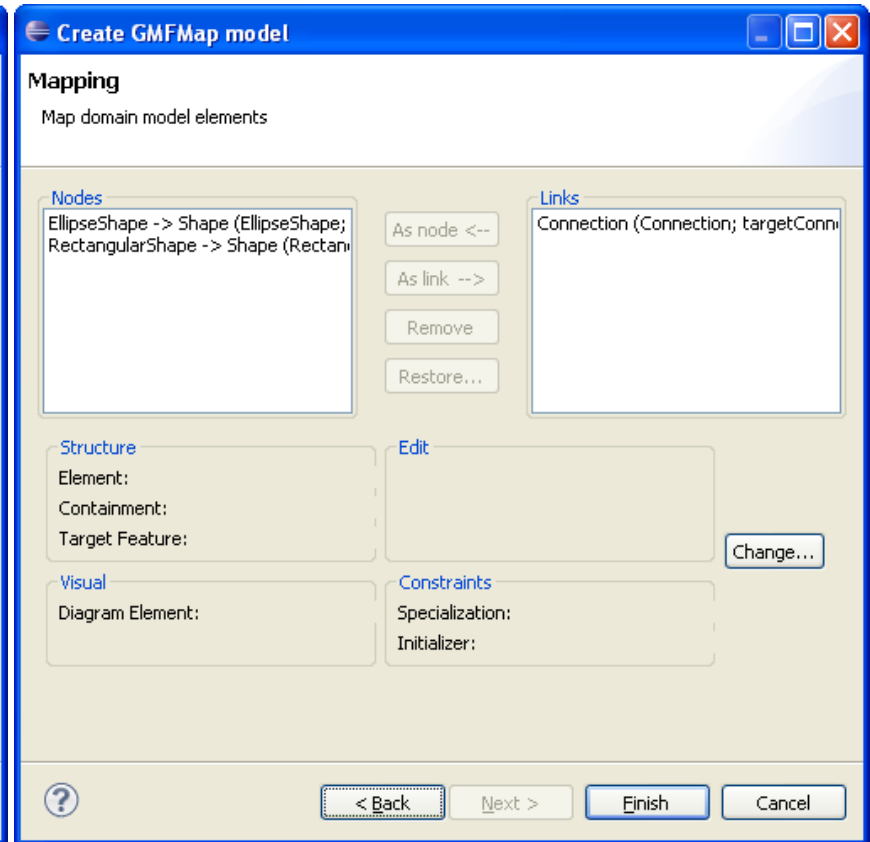
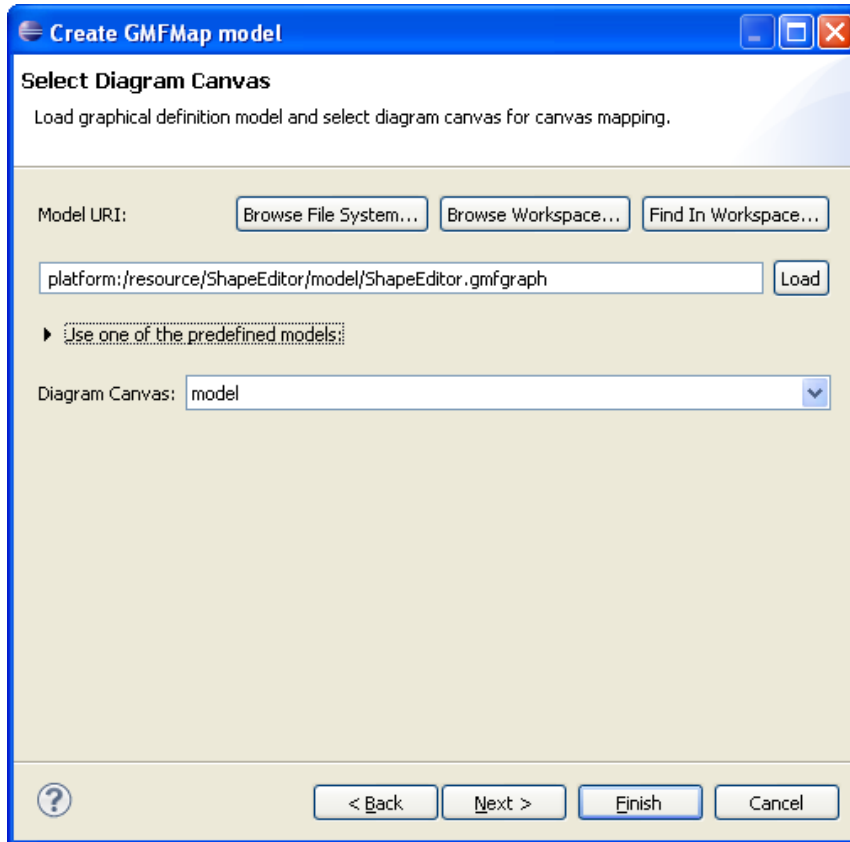
Mapping definieren 1/4



Mapping definieren 2/4



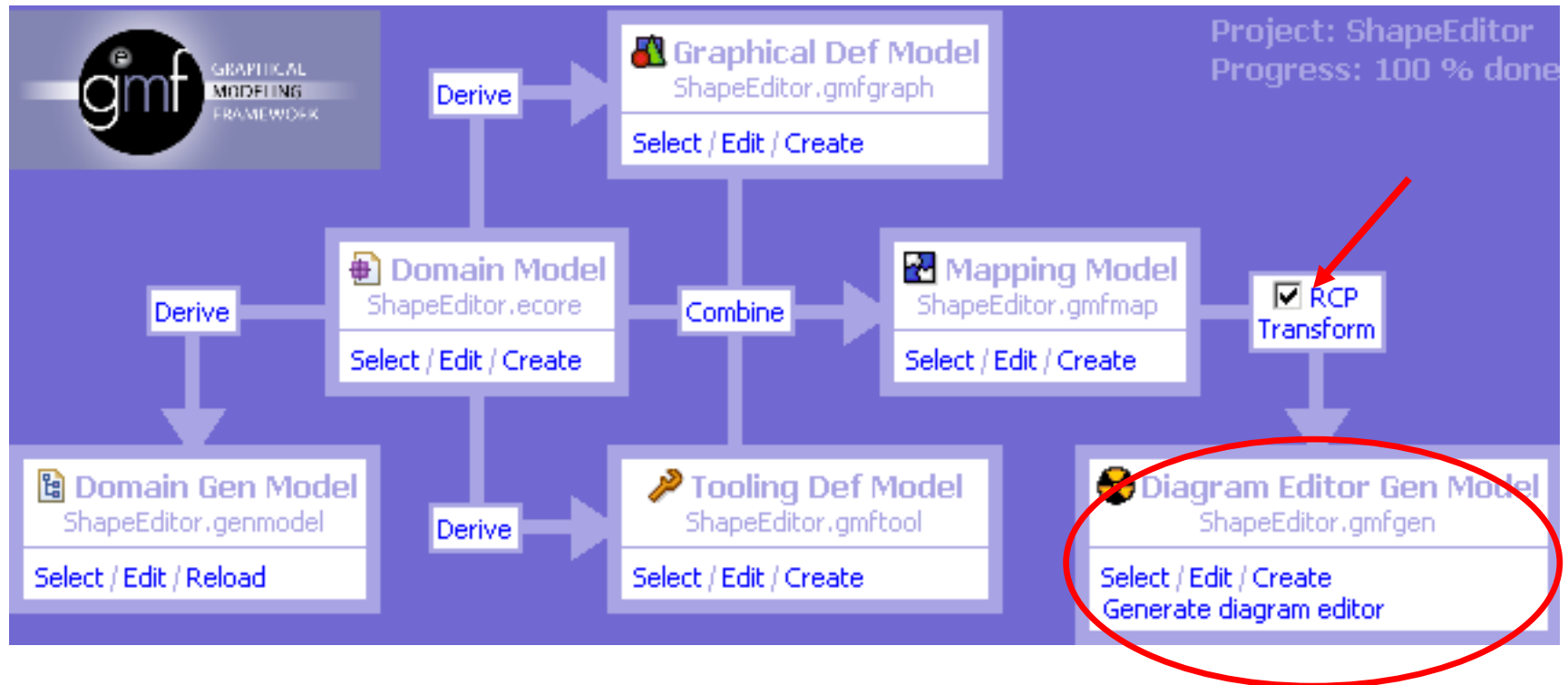
Mapping definieren 3/4



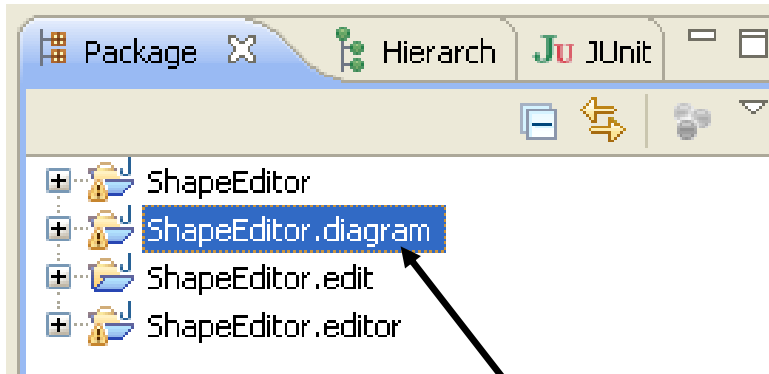
Mapping definieren 4/4

Property	Value
Domain meta information	
Containment Feature	0..* Shape.targetConnections:Connection
Element	Connection
Source Feature	1 Connection.source:Shape ←
Target Feature	1 Connection.target:Shape ←
Misc	
Related Diagrams	
Visual representation	
Appearance Style	
Context Menu	
Diagram Link	◆ Connection Connection
Tool	◆ Creation Tool Connection

GMF gmfgen



Neues Plugin mit GMF Code



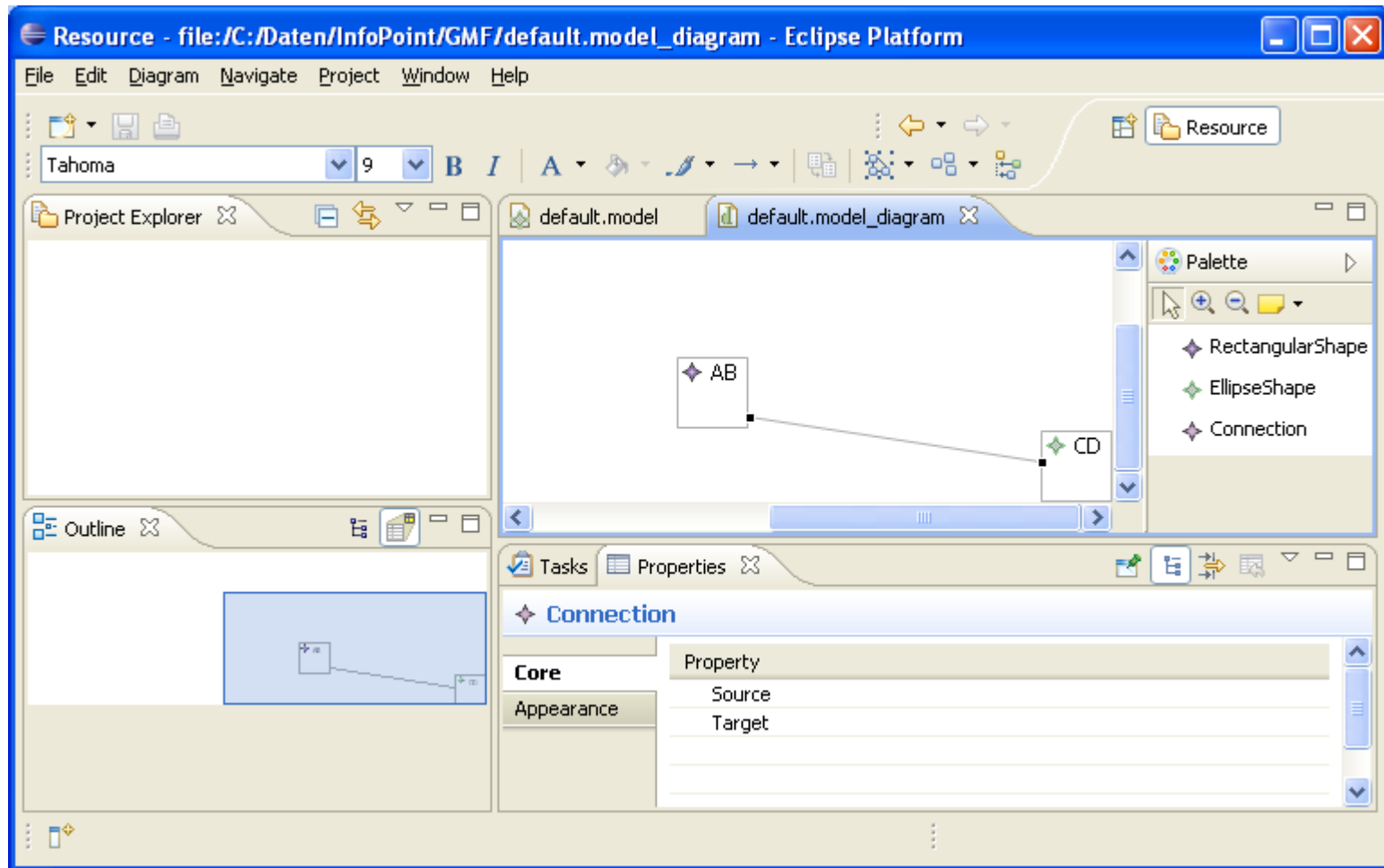
Enthält alle GMF Informationen (GEF, draw2d)

GMF Launch konfigurieren

The screenshot shows the 'Plug-ins' tab of the GMF Launch configuration dialog. The 'Launch with:' dropdown is set to 'plug-ins selected below only' (1). The 'Default Start level' is 4 and 'Default Auto-Start' is false. The 'Plug-ins' list shows the 'Workspace' folder expanded, with four items checked: ShapeEditor (1.0.0), ShapeEditor.diagram (1.0.0.qualifier), ShapeEditor.edit (1.0.0), and ShapeEditor.editor (1.0.0) (3). The 'Target Platform' folder is collapsed. The 'Add Required Plug-ins' button is highlighted (4). The 'Deselect All' button is also highlighted (2). The 'Only show selected plug-ins' checkbox is unchecked, and the status shows '151 out of 1130 selected'. At the bottom, there are checkboxes for 'Include optional dependencies when computing required plug-ins', 'Add new workspace plug-ins to this launch configuration automatically', and 'Validate plug-ins automatically prior to launching', along with a 'Validate Plug-ins' button.

Plug-ins	Start Level	Auto-Start
Workspace		
ShapeEditor (1.0.0)	default	default
ShapeEditor.diagram (1.0.0.qualifier)	default	default
ShapeEditor.edit (1.0.0)	default	default
ShapeEditor.editor (1.0.0)	default	default
Target Platform		
at.ssw.coco.eclipse.branding (0.1.10)		
at.ssw.coco.eclipse.builder (0.1.10)		
at.ssw.coco.eclipse.core (0.1.10)		
at.ssw.coco.eclipse.ide (0.1.10)		
com.collabnet.subversion.merge (1.9.0.4)		
com.google.collect (0.8.0.v200906161042)		
com.google.guice (1.0.1.v200906161042)		
com.ibm.icu (4.0.1.v20090415)	default	default
com.jcraft.jsch (0.1.41.v200903070017)		

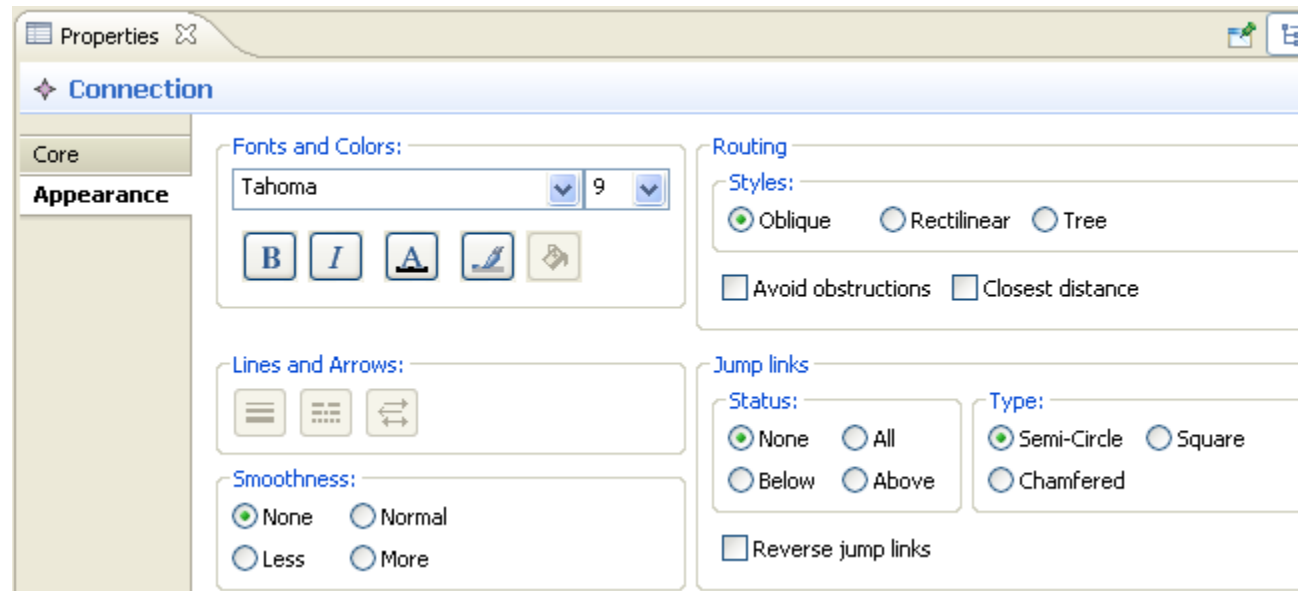
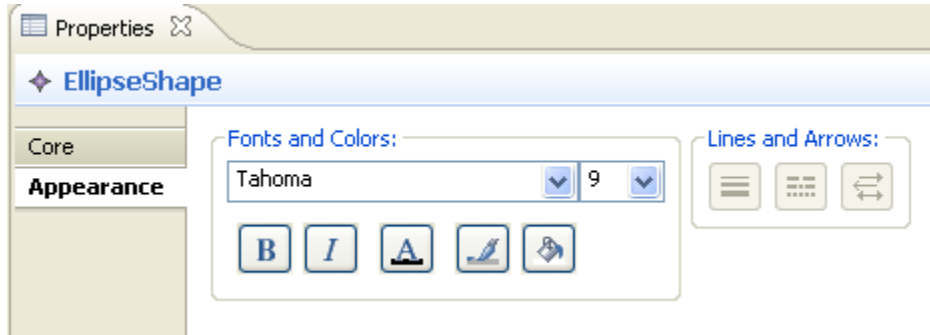
Shape Editor mit GMF erstellen



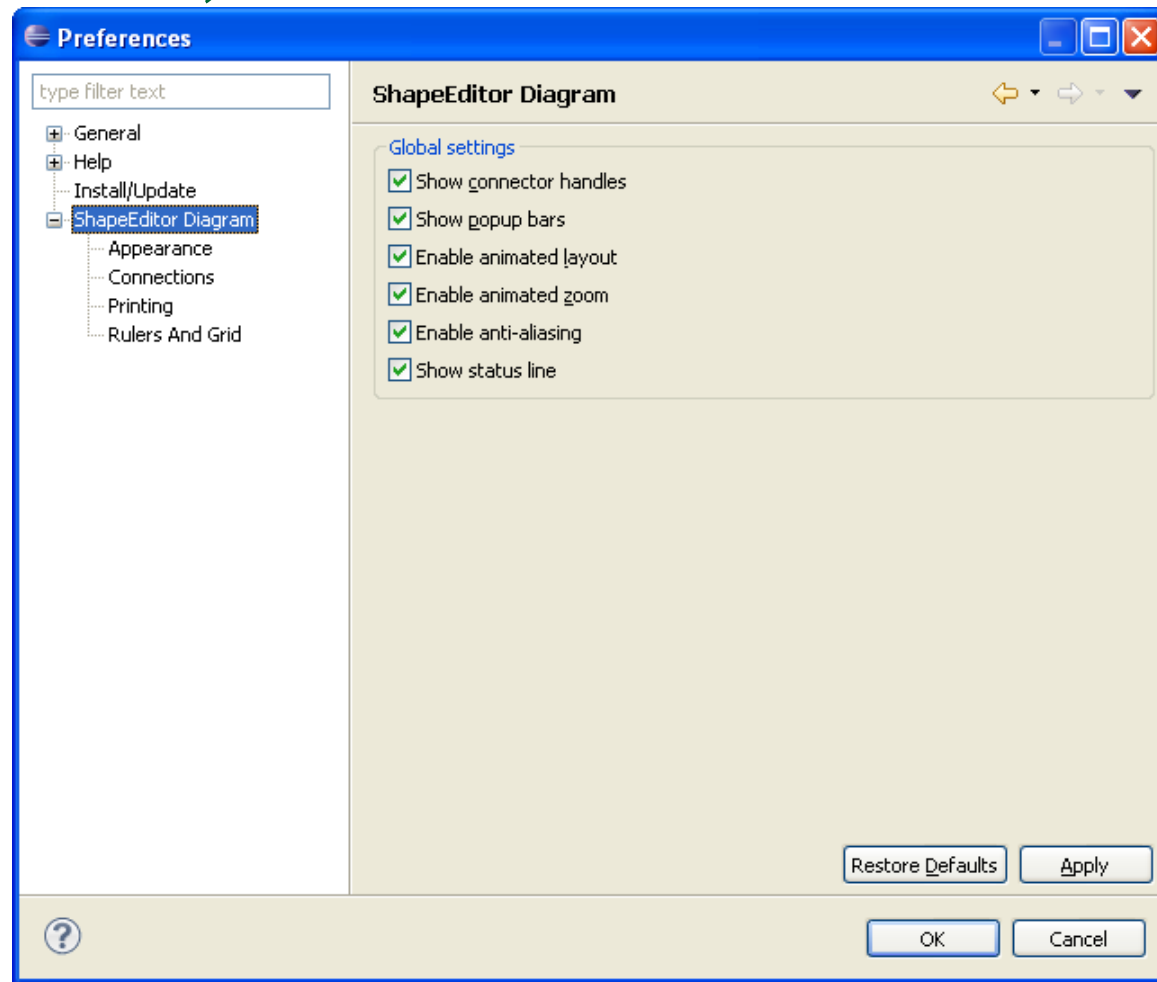
Was kann der Editor standardmässig?

- Outline
- Property-View (wie bei EMF)
- Kopieren/Einfügen über Zwischenablage (auch in andere Programme)
- Drucken von Diagrammen
- Algorithmen zum Anordnen von Elementen

Was kann der Editor standardmässig? (Properties)



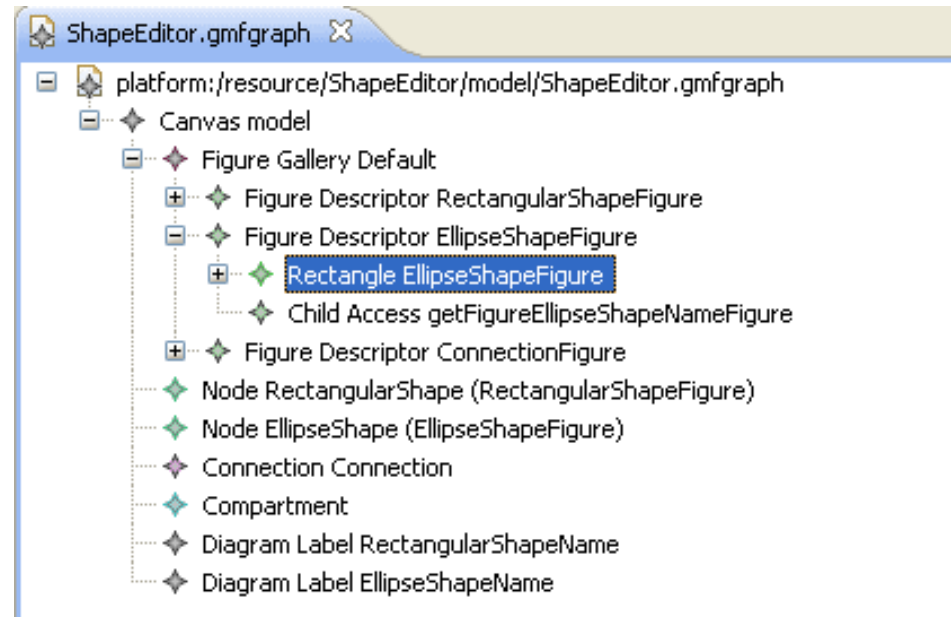
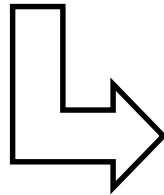
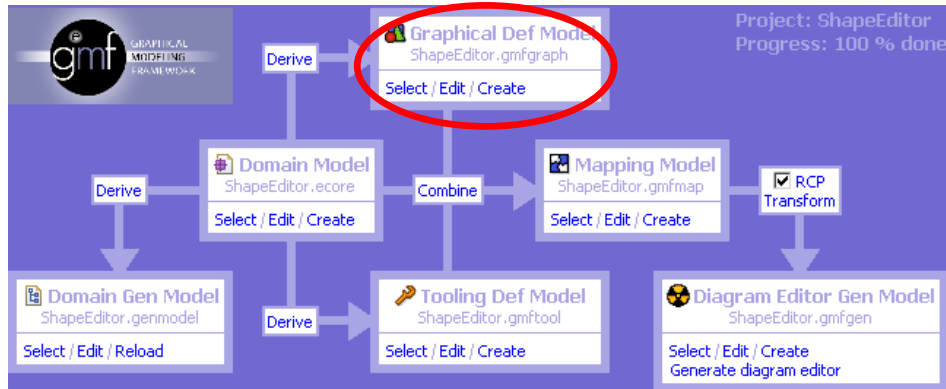
Was kann der Editor standardmässig? (Preference)



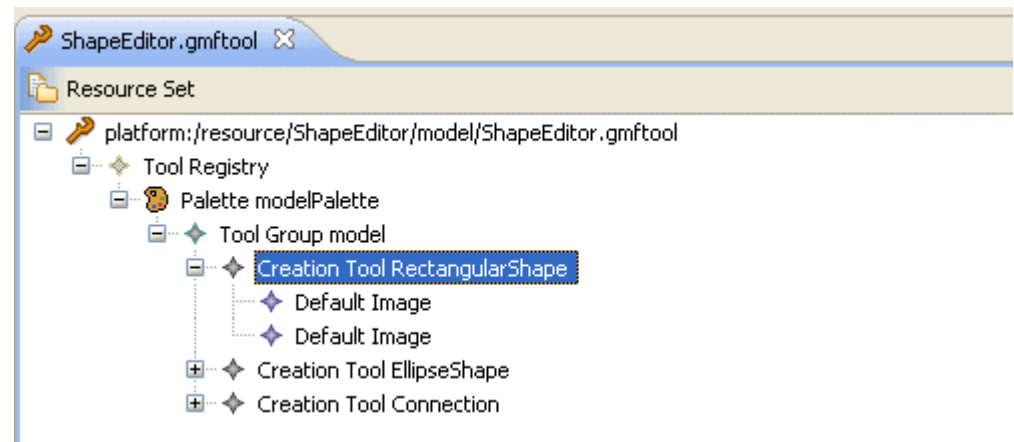
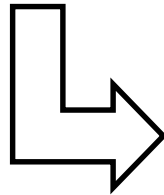
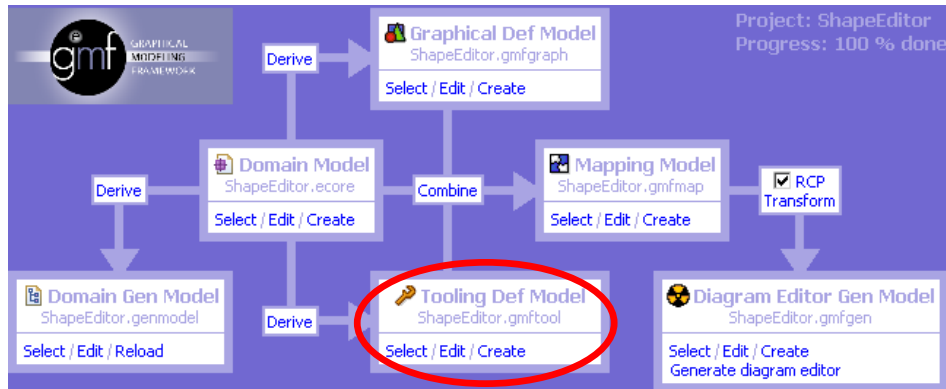
Wo nimmt man folgende Anpassungen vor?

- Eine Ellipse soll eine Ellipse sein
- Symbolleiste: ein Bild anpassen
- Bsp.: falscher Shape wird gezeichnet. Wo ändern?

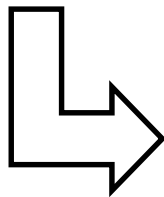
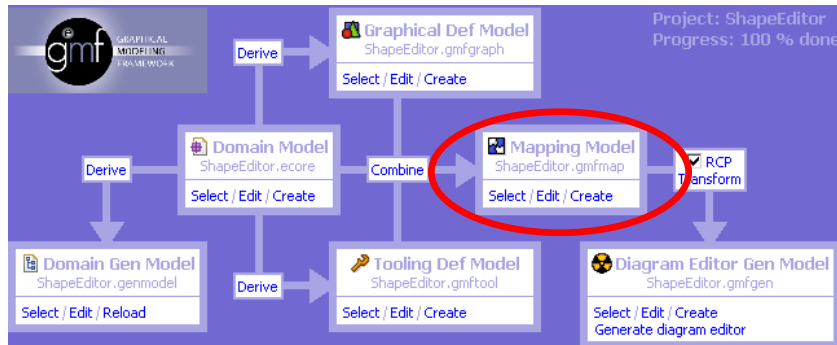
Ellipse anpassen



Symbolleiste anpassen



Falscher Shape wird gezeichnet: Wo ändern?



The screenshot shows the Eclipse IDE interface for the ShapeEditor.gmfmap resource set. The Resource Set tree displays the following structure:

- platform:/resource/ShapeEditor/model/ShapeEditor.gmfmap
 - Mapping
 - Top Node Reference <shapes:EllipseShape/EllipseShape>
 - Node Mapping <EllipseShape/EllipseShape>
 - Feature Label Mapping false
 - Top Node Reference <shapes:RectangularShape/RectangularShape>
 - Link Mapping <Connection{Connection.source:Shape}/Connection>
 - Canvas Mapping
- platform:/resource/ShapeEditor/model/ShapeEditor.ecore
- platform:/resource/ShapeEditor/model/ShapeEditor.gmfgraph
- platform:/resource/ShapeEditor/model/ShapeEditor.gmftool

The Properties view shows the following information:

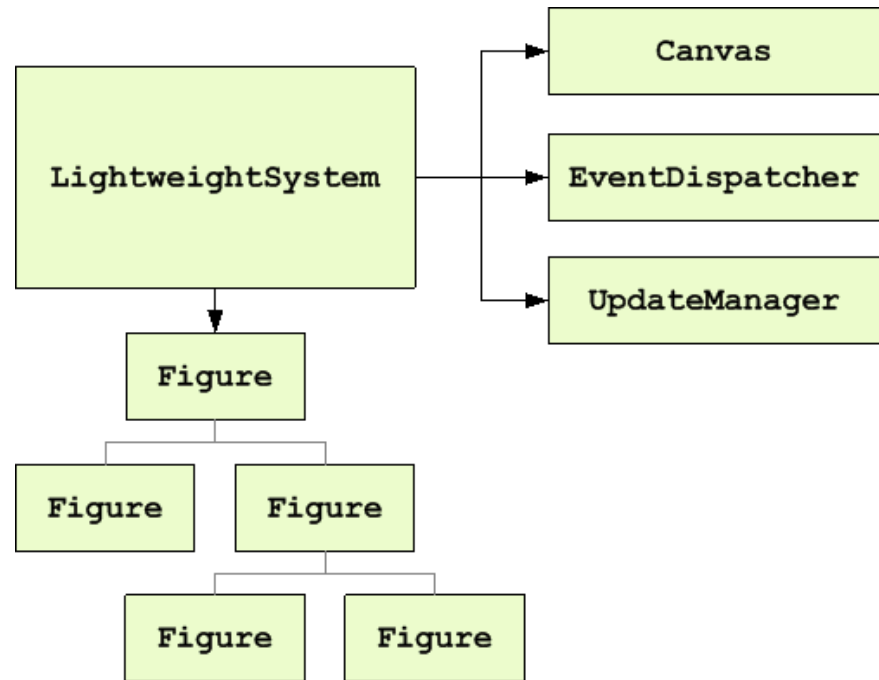
Property	Value
Domain meta information	
Element	EllipseShape -> Shape
Misc	
Related Diagrams	
Visual representation	
Appearance Style	
Context Menu	
Diagram Node	◆ Node EllipseShape (EllipseShapeFigure)
Tool	◆ Creation Tool RectangularShape

GMF: etwas genauer

- Besteht aus:
 - GEF
 - Draw2D
 - EMF → kennen wir

Draw2d: Übersicht

- Lightweight Toolkit
- Empfängt SWT Event und transformiert sie
- Paint und Layout Events über UpdateManager
- „Alles“ ist Figure
Bsp. Label usw.

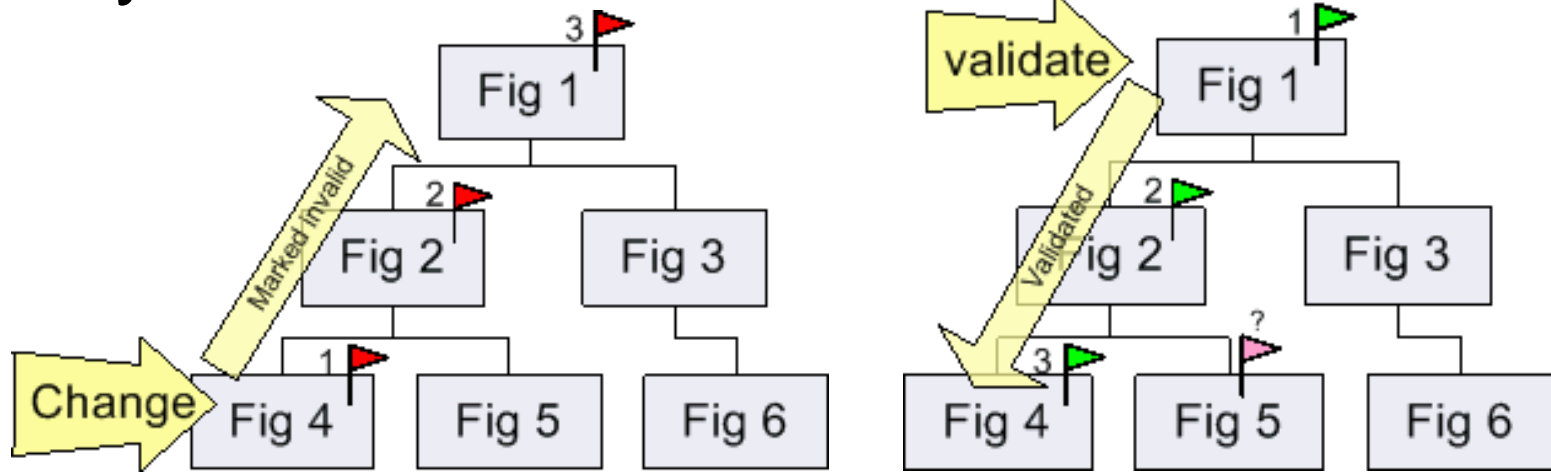


Draw2d: Aufgaben

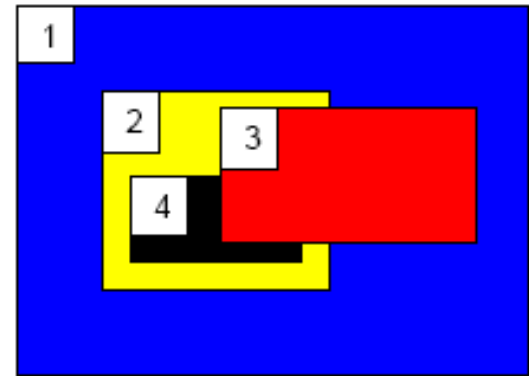
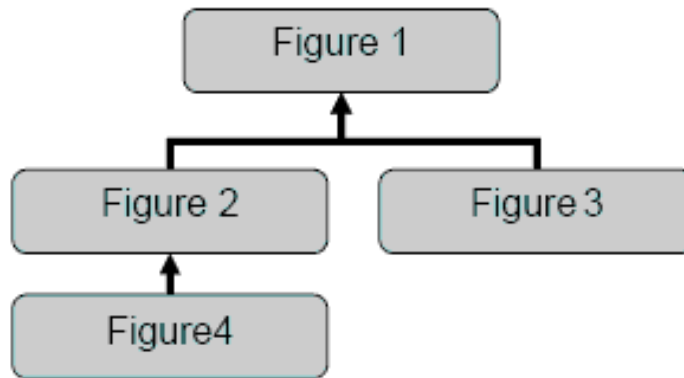
- Painting →
- Layout →
- Hit Testing
- Connection Routing →
- Koordinaten-Systems

Draw2d: Painting, Layout

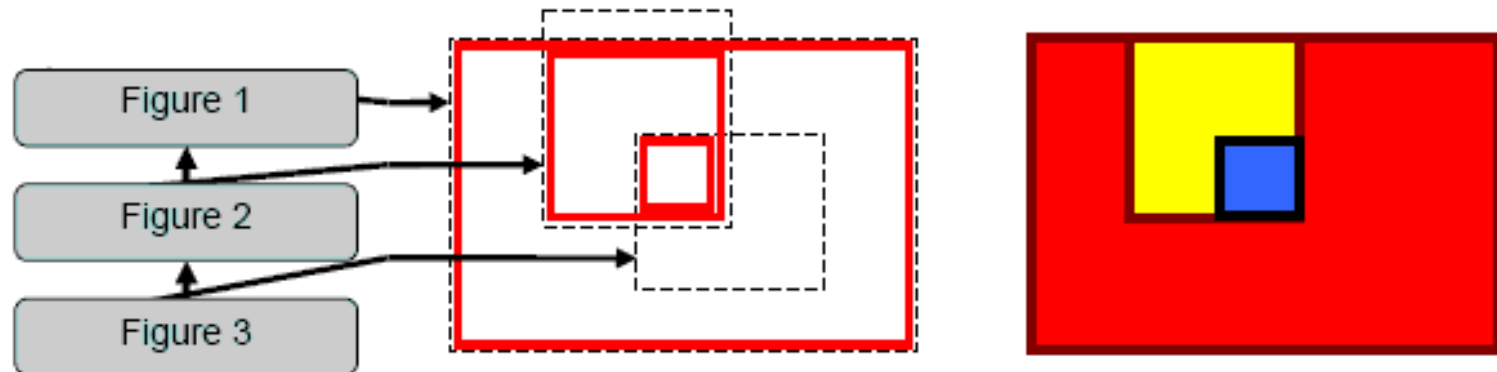
- `Figure#paint()` → Start des Zeichnens mit div. Optimierungen (`Figure#paintFigure()`
`Figure#paintChildrenArea()` `Figure#paintChildren()`
`Figure#paintBorder()`)
- Layout



Draw2d: Z-Order, Clipping



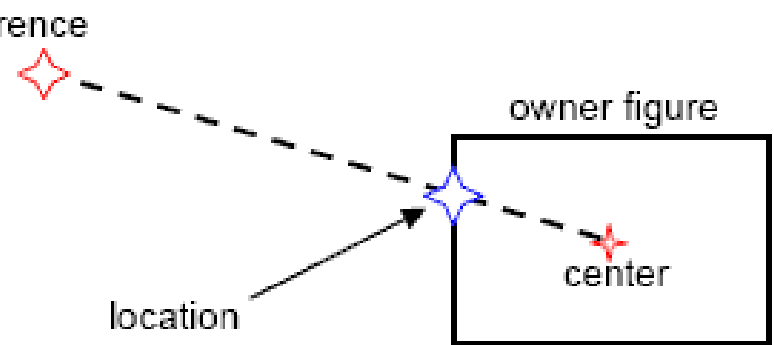
This picture shows a tree of figures and its graphical representation if each figure is painted as a full rectangle.



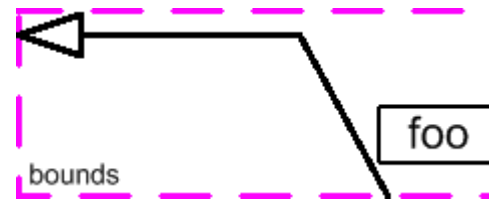
The Bounds of the figures are represented as dash lines, each figure is painted as a full rectangle with a black border, the clipping area associated with each figure is represented as a red line.

Draw2d: Connections

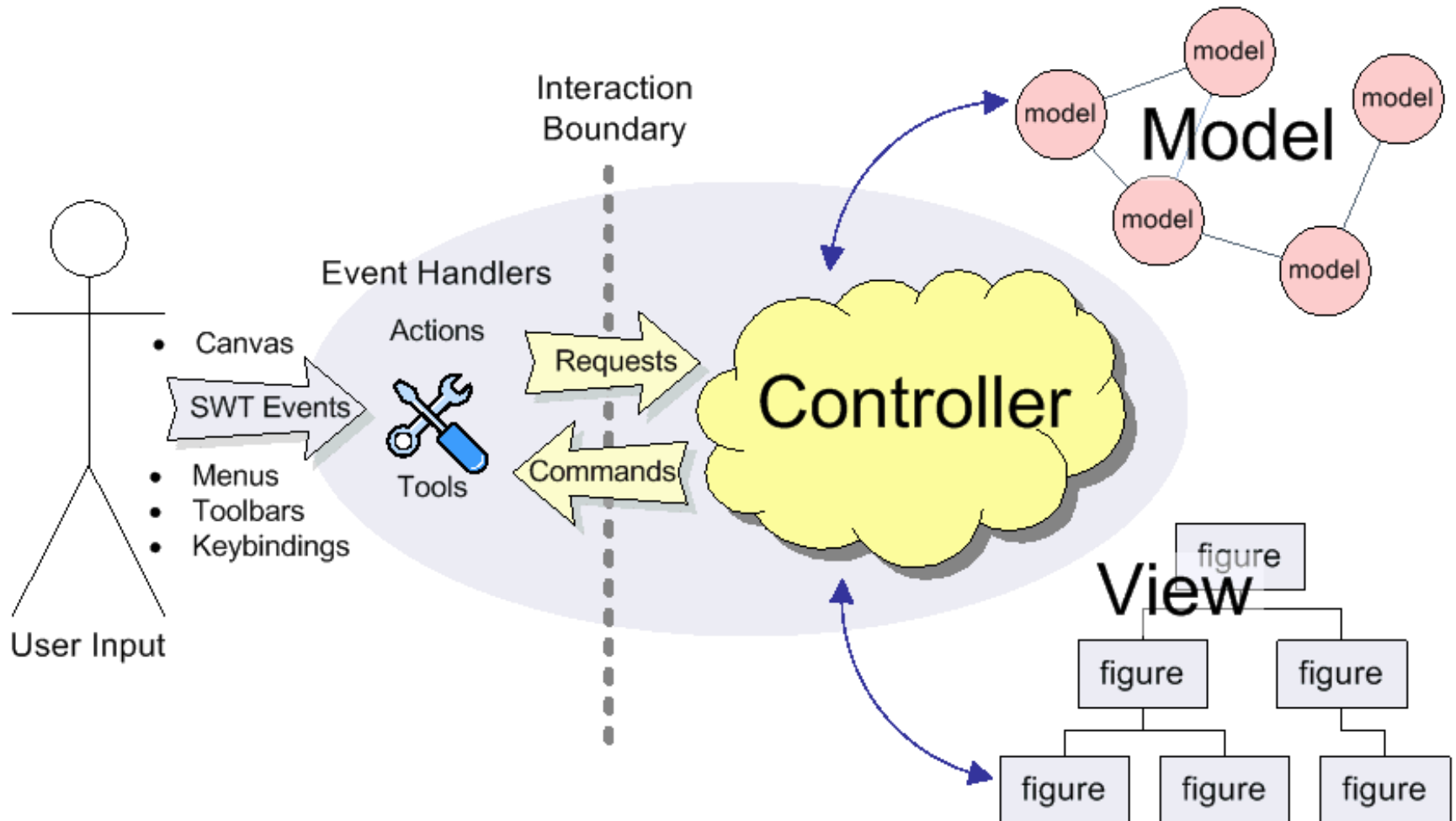
- Bsp: ChopboxAnchor



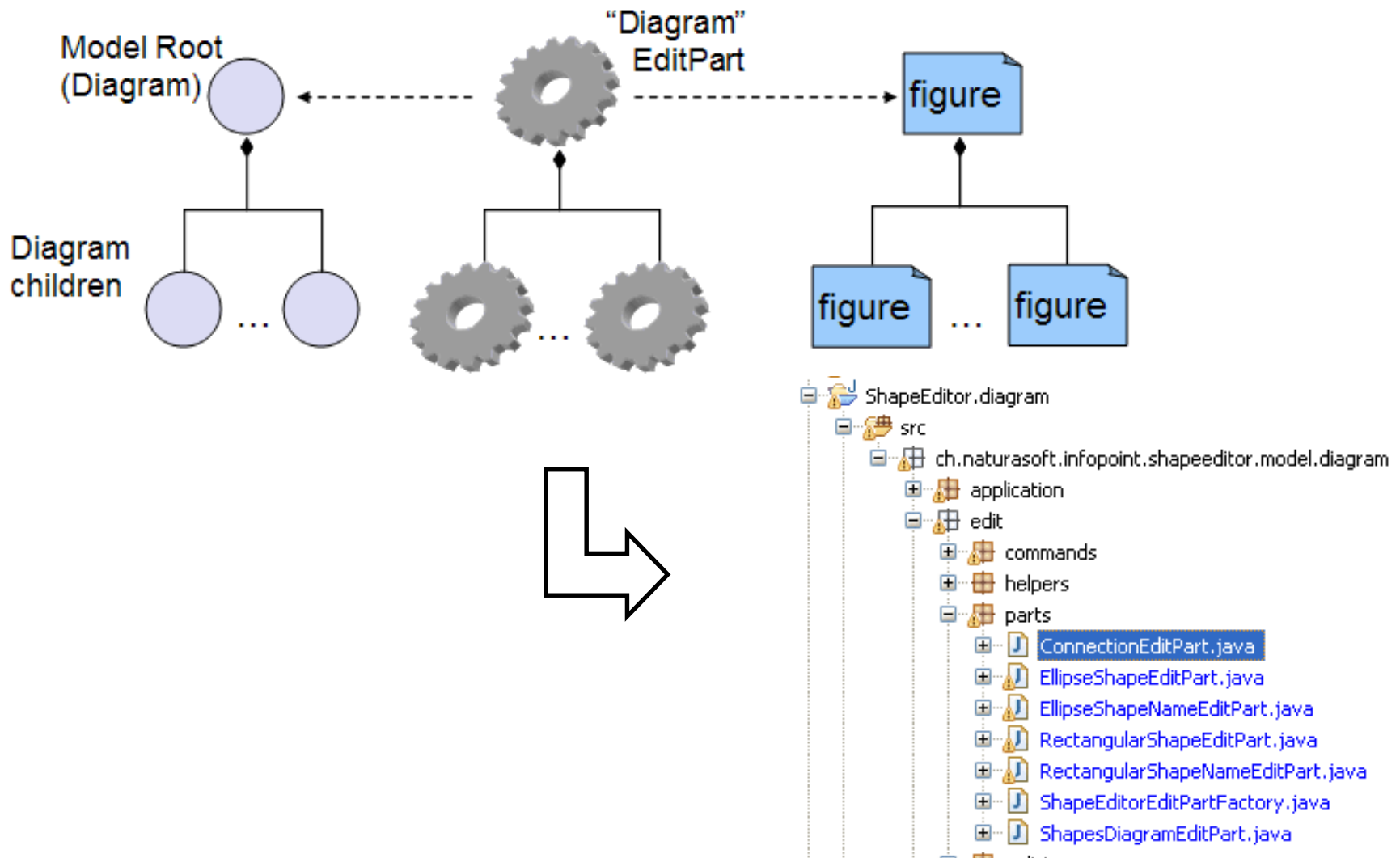
- Decorations



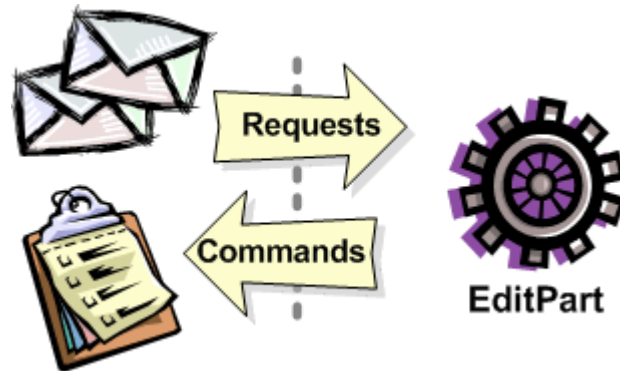
GEF: Übersicht



GEF: EditPart (Controller)



GEF: Editing



1. Mausevent
2. Welcher EditPart ist betroffen (source EditPart)
3. Welcher Ziel (target EditPart) ist betroffen
Bsp.: Element verschieben. Source → RectangleEditPart; Target → DiagramEditPart
4. Gibt es ein Command zu dieser Operation? Ist es ausführbar?
5. Modell ändern.

GEF: EditPolicies

- Änderungen erfolgen nicht direkt über EditParts, sondern über EditPolicies
- Ein EditPolicy hat eine Verantwortlichkeit
- Anmeldung der EditPolicies über Rollen
- Command führt dann Änderung durch → undo redo

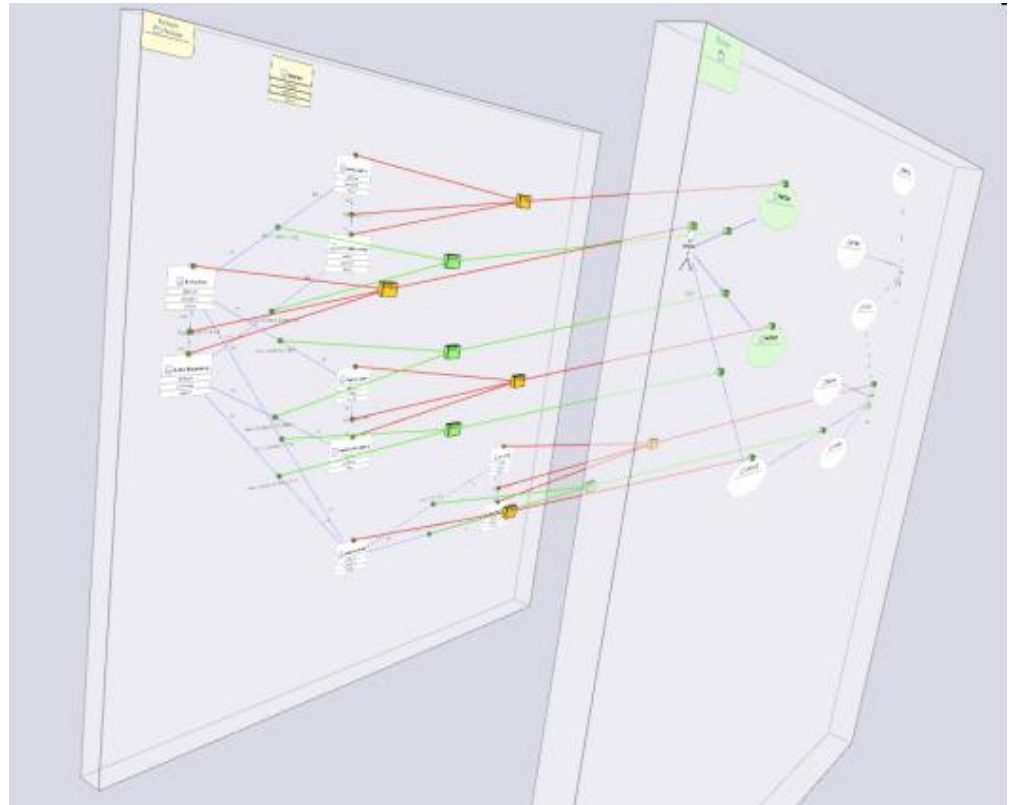


GMF: Und wozu braucht man noch das GMF?

- Vereint EMF und GEF
- Zwei Hauptkomponenten
 - Runtime
 - Tooling Komponente für MDA Ansatz
- MDA Ansatz vereinfacht Erstellung graphischer Editoren (Problem von GEF)

Über den Tellerrand blickend

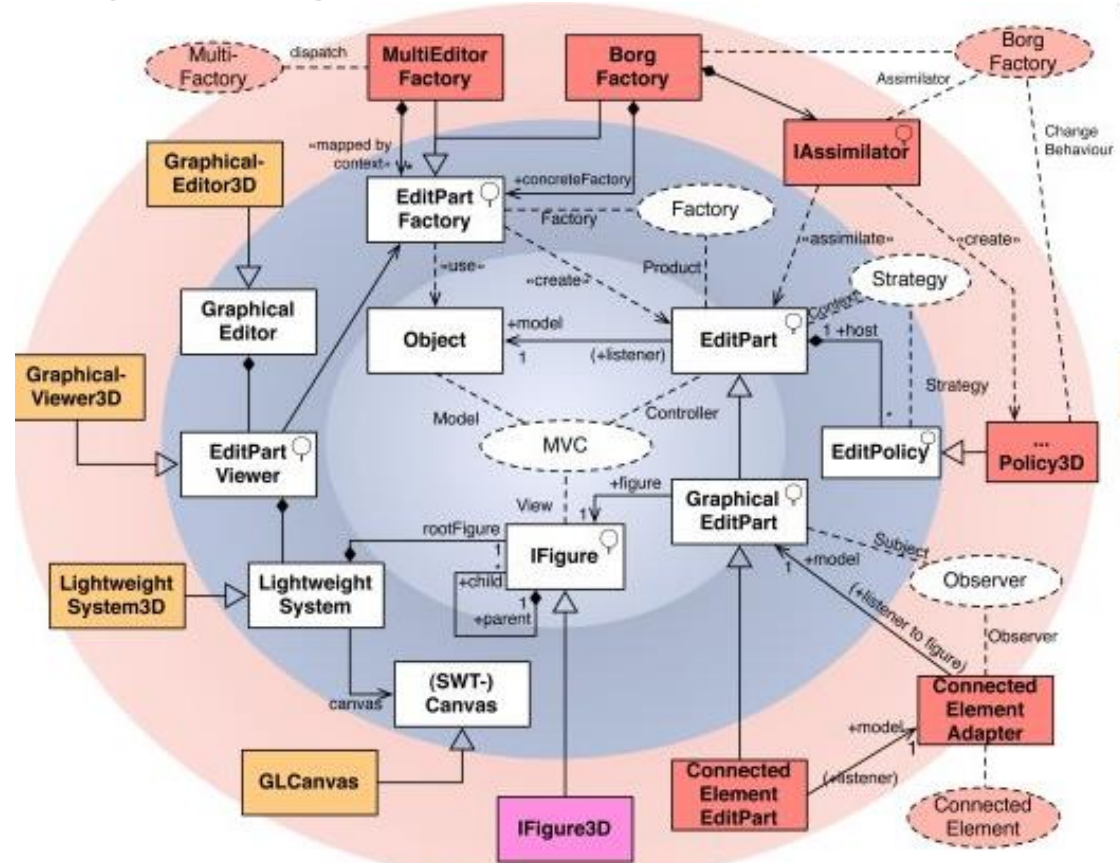
- GEF 3d
 - Noch kein Release
 - Mehrere Dimensionen
→ Inter-Diagramm-Verbindungen



Über den Tellerrand blickend

■ GEF3d

- Erweitert GEF → Jeder GEF Editor sollte erweiterbar sein



Über den Tellerrand blickend

- Zest:
 - Eclipse Visualisierungs- Toolkit
 - Unterprojekt von GEF
 - Verfolgt JFace-Ansatz (Contentprovider, Labelprovider)
 - Vorgefertigte Komponenten für
 - Graph
 - GraphNode
 - GraphConnection
 - GraphContainer

Referenzen

- Eclipse Modeling Framework EMF (Michael und Laurent)
http://www.infopoint-fhs.ch/_documents/03022010/Praesentation.pdf
- GMF-Tutorial:
www.tm.tfh-wildau.de/vandenhouten/media/GMF-Step-By-Step.pdf
- Eclipse Magazine www.eclipsemagazin.de
 - Vol. 8
 - Vol. 6.09
 - Vol. 1.10
 - Vol. 2.10
- www.eclipse.org/gef
- www.eclipse.org/gef/zest
- www.eclipse.org/emf
- www.eclipse.org/gmf
- www.eclipse.org/gef3d