JavaBeans
Property-Editoren und Customizer

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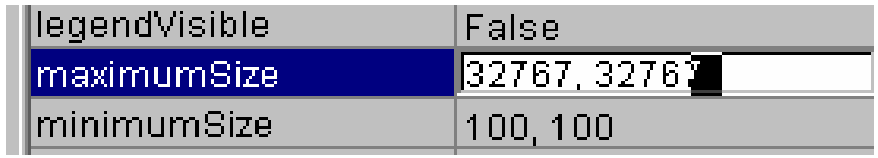
Property-Editoren

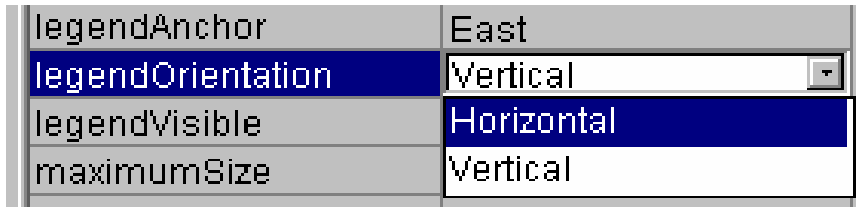
- Builder Tools beinhalten *Standard-Editoren* für
  - Zahlen (ganze Zahlen, Gleitkommazahlen),
  - Strings,
  - Auswahl von Fonts,
  - Auswahl von Farben.
- JavaBeans API erlaubt das Hinzufügen von *benutzerdefinierten Editoren.*
  - Editor erlaubt die Änderung der Property mittels eines grafischen Dialogs.
  - Property kann in Property-Panel grafisch dargestellt werden.

Arten von Property-Editoren

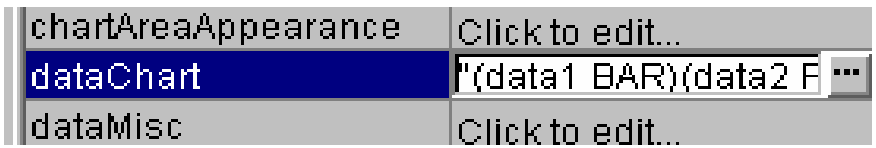
- Textbasiert

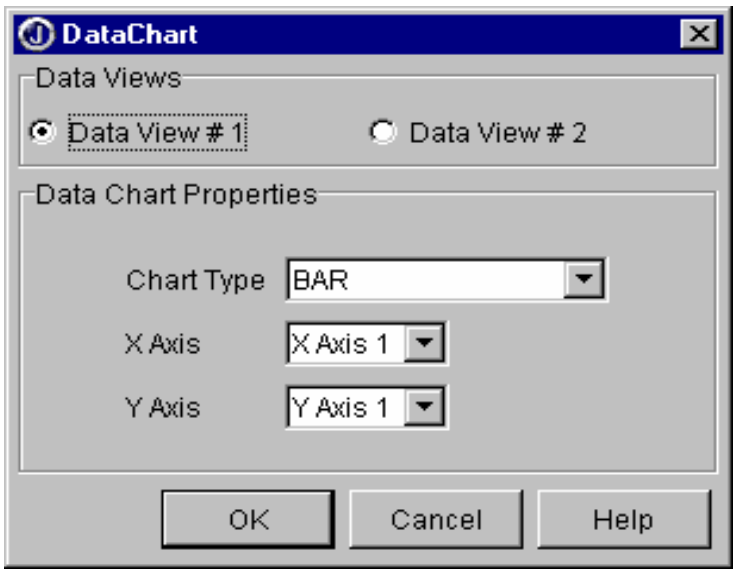


- Für Aufzählungen



- Mit benutzer-definiertem Dialog



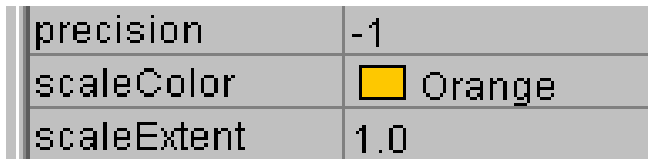


Interface PropertyEditor (1)

```
public interface PropertyEditor {

  public void   setValue(Object value);
  public Object getValue();

  public boolean isPaintable();
  public void    paintValue(Graphics g,
                            Rectangle box);

  public String getJavaInitializationString();

  public String getAsText();
  public void   setAsText(String s)
                    throws IllegalArgumentException;

  public String[] getTags();

  public boolean   supportsCustomEditor();
  public Component getCustomEditor();

  public void addPropertyChangeListener(
                    PropertyChangeListener listener);
  public void removePropertyChangeListener(
                    PropertyChangeListener listener);
}
```

Interface `PropertyEditor` (2)

- `setValue/getValue`
  - Verwaltung des Werts der Property.
  - Property kann nur einen Wert verwalten.
- `getAsText/setAsText`
  - Repräsentierung der Property als String.
- `isPaintable/paintValue`
  - Graphische Darstellung der Property im Property-Panel.



- `getJavaInitializationString`
  - Java Codefragment zur Initialisierung der Property.
  - Beispiel: `"new Color(255,0,0)"`
    → `bean.setColor(new Color(255,0,0));`

Interface `PropertyEditor` (3)

- `getTags`
  - Mögliche Werte bei Aufzählungen.
- `supportsCustomEditor/getCustomEditor`
  - Liefert eine GUI-Komponente zum Editieren der Property.
- `add/removePropertyChangeListener`
  - Client (Builder Tool) wird von Änderungen des Property-Werts mit `propertyChange()` informiert.

Implementierung eines Property-Editors

- PropertyEditor
  - Interface `PropertyEditor` implementieren oder
  - von Klasse `PropertyEditorSupport` ableiten.
- Registrierung in `BeanInfo`

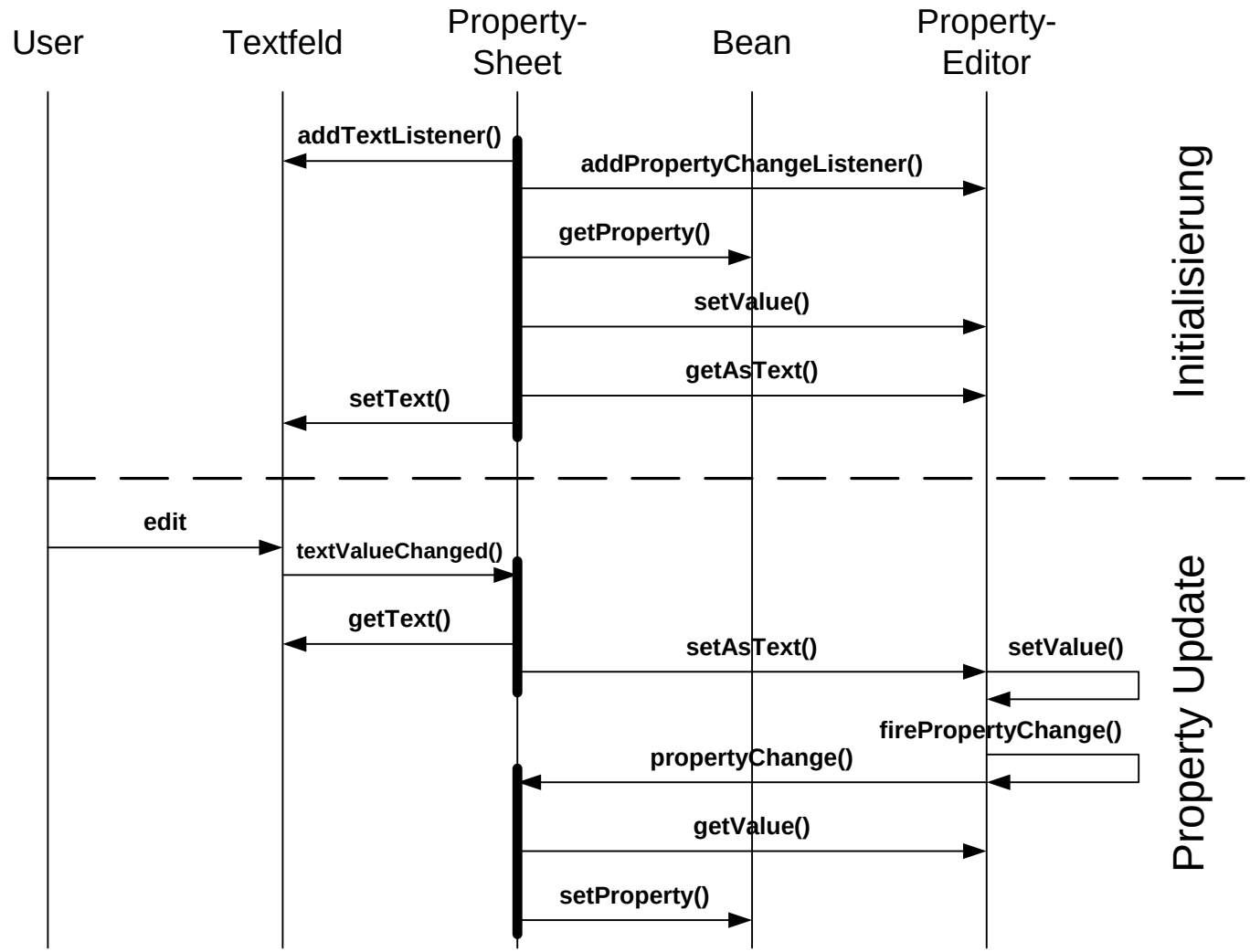
```
public class MyBeanBeanInfo extends SimpleBeanInfo {
  public PropertyDescriptor[] getPropertyDescriptors() {
    try {
      PropertyDescriptor prop1 =
                new PropertyDescriptor("myProp", MyBean.class);
      prop1.setPropertyEditorClass(MyPropEditor.class);
      return PropertyDescriptor[] { prop1 };
    }
    catch (IntrospectionException) { ... }
  }
}
```

Textbasierter Property-Editor

- Beispiel: Editieren eines Punkts: (x;y)

```
public class PointEditor extends PropertyEditorSupport {
   private final static MessageFormat pointFormat =
       new MessageFormat("({0,number};{1,number})");
   public void setAsText(String s) {
     Object[] p = pointFormat.parse(s);
     setValue(new Point(((Number)p[0]).intValue(),
                        (((Number)p[1]).intValue()));
   }
   public String getAsText() {
     Point p = (Point)getValue();
     return pointFormat.format(p.x(), p.y());
   }
   public String getJavaInitializationString() {
     Point p = (Point)getValue();
     return "Point(" + p.x() + "," + p.y() + ")";
   }
}
```

Textbasierter Editor: Interaktion



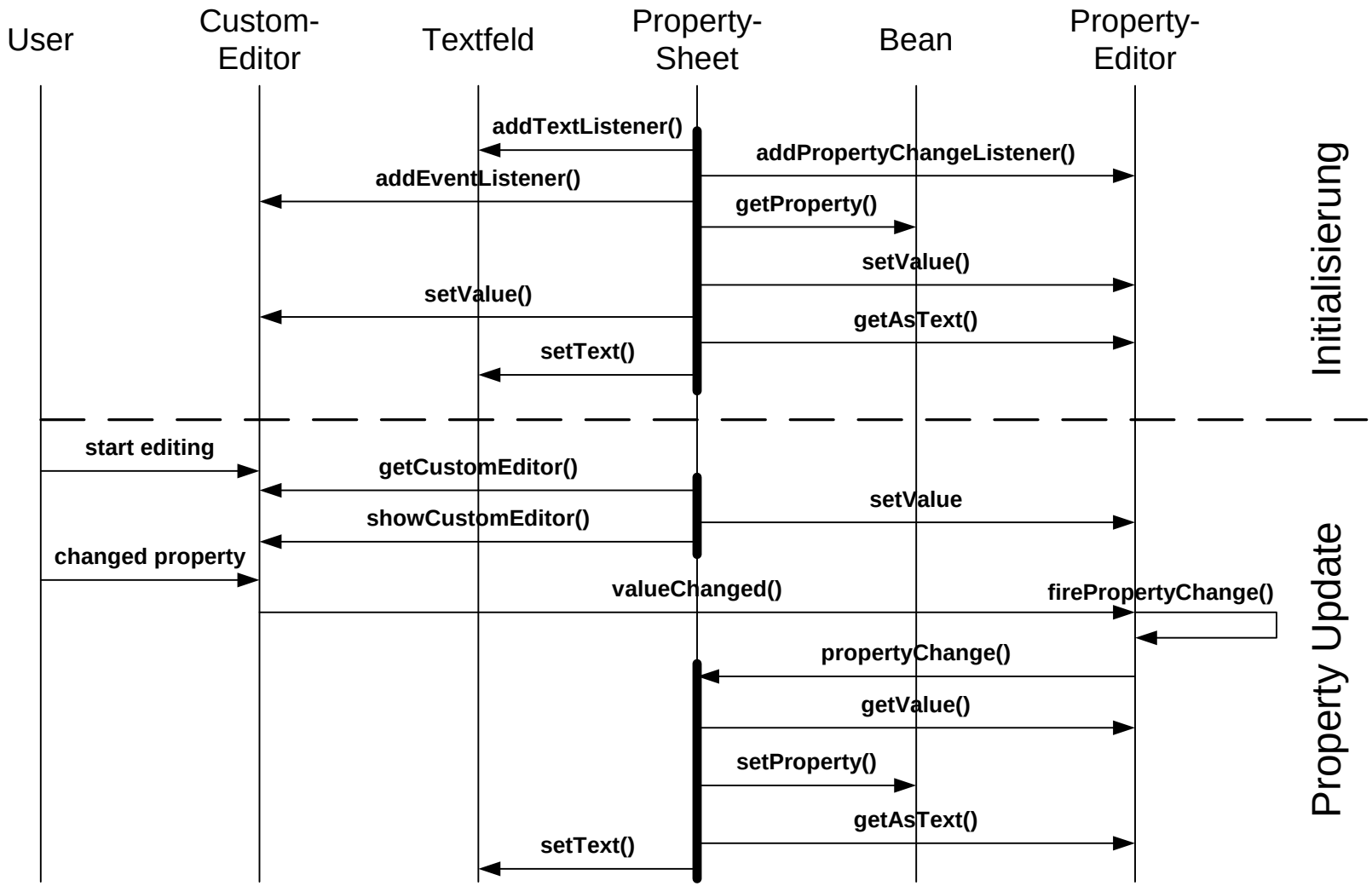
Property-Editor für Aufzählungen

```
public class AlignmentEditor extends PropertyEditorSupport {
   public String[] getTags() {
     return new String[] {"left","right","center"};
   }
   public void setAsText(String s) {
     if (s.equals("left"))
       setValue(new Integer(MyBean.LEFT);
     else ...
   }
   public String getAsText() {
     switch (((Integer)getValue()).intValue()) {
       case MyBean.LEFT: return "left";
       ...
     }
   }
   public String getJavaInitializationString() {
     switch (((Integer)getValue()).intValue()) {
       case MyBean.LEFT: return "MyBean.LEFT";
       ...
     }
   }
}
```

Editor mit benutzerdefiniertem Dialog

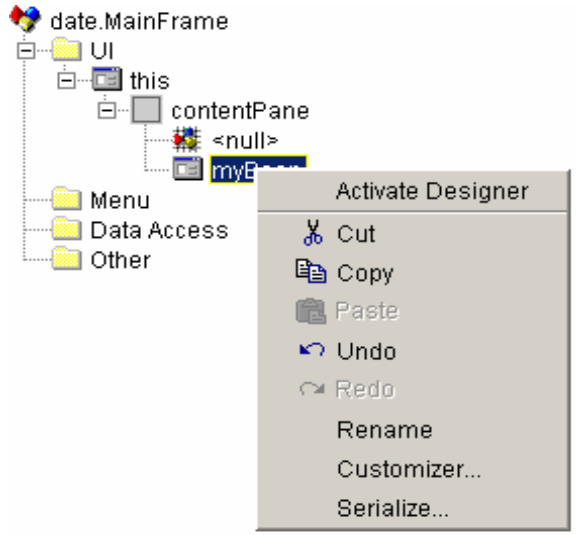
```
public class MyPropEditor extends PropertyEditorSupport {
  public String getAsText()                { ...          }
  public boolean supportsCustomEditor() { return true;  }
  public Component getCustomEditor() {
    MyPropDialog dlg = new MyPropDialog(getValue());
    dlg.addMyListener(new MyListener() {
      public valueChanged(MyEvent e) {
        firePropertyChange();
      }
    });
    return dlg;
  }
  public boolean isPaintable() { return true; }
  public void paintValue(Graphics g, Rectangle clipRect) {}
  public String getJavaInitializationString() { ... }
}
```

Benutzerdefinierter Editor - Interaktion



Bean-Customizer

- Customizer hat Funktion eines *Wizards*.
- Möglichkeit Bean als Gesamtes zu konfigurieren.



- Registrierung in `BeanInfo`

```
public class MyBeanBeanInfo extends SimpleBeanInfo {
  public BeanDescriptor getBeanDescriptor() {
    return new BeanDescriptor(MyBean.class,
                              MyBeanCustomizer.class);
  }
}
```

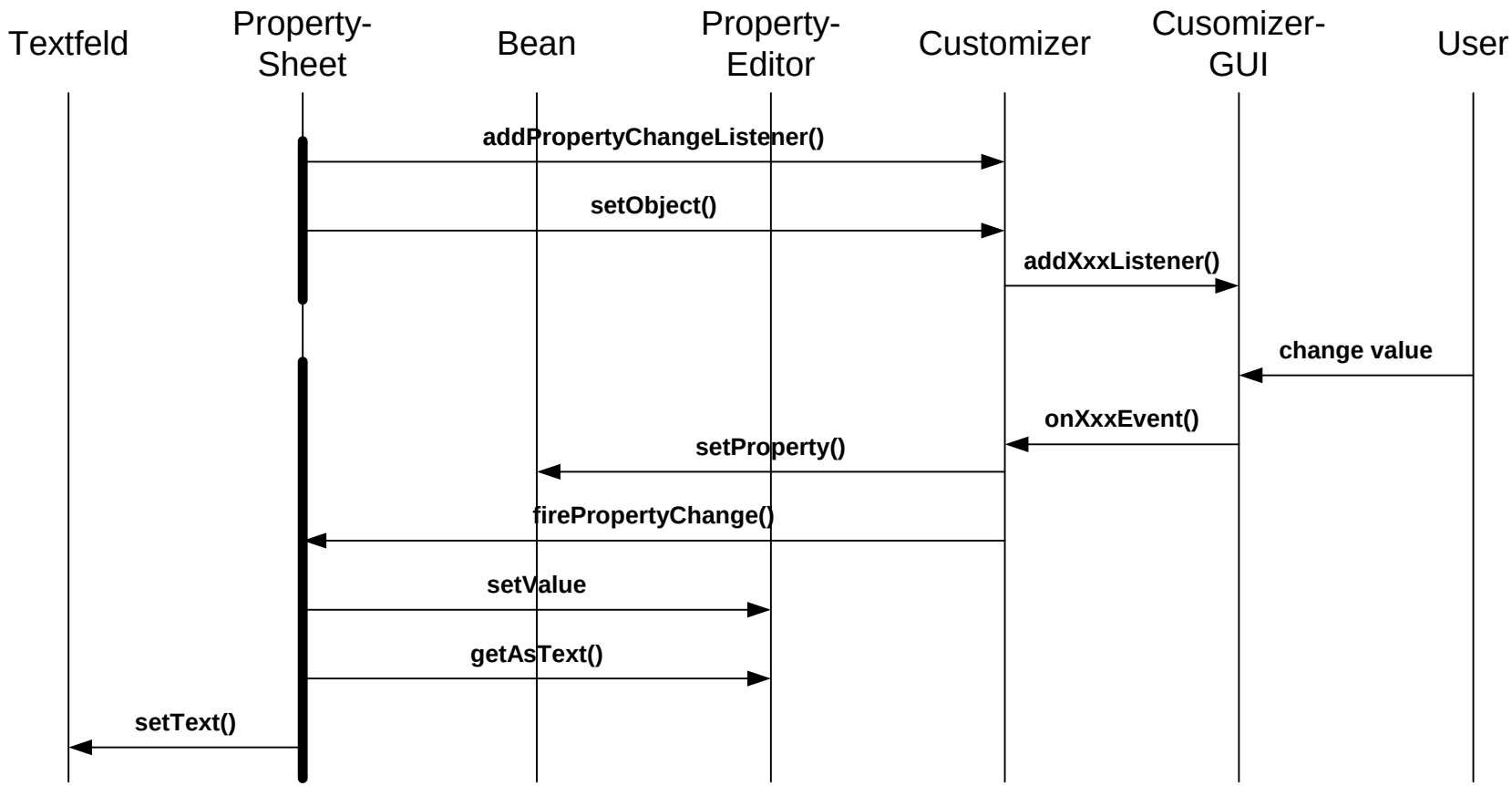
Customizer - Implementierung

- Customizer muss `Customizer`-Interface implementieren:

```
public interface Customizer {
  public void setObject(Object bean);
  public void addPropertyChangeListener(...);
  public void removePropertyChangeListener(...);
}
```

- `setObject`
  - Wird von Builder-Tool aufgerufen, wenn der Customizer-Dialog geöffnet werden soll.
- `add/removePropertyChangeListener`
  - Builder-Tool registriert sich beim Customizer.
  - Customizer muss mit `firePropertyChange()` Builder-Tool von Änderungen in Properties informieren.

Customizer – Interaktion



Customizer – Beispiel

```
public class MyBeanCustomizer extends Panel
                implements Customizer, ItemListener {
  protected MyBean   myBean;
  protected MyProp[] propValues;
  protected PropertyChangeSupport changer =
              new PropertyChangeSupport(this);
  public void setObject(Object bean) {
    cBox = new Choice();
    cBox.addItemListener(this); add(cBox);
    myBean = (MyBean)bean;
  }
  public addPropertyChangeListener(PropertyChangeListener l) {
    changer.addPropertyChangeListener(l);
  }
  public void itemStateChanged(ItemEvent e) {
    MyProp newVal = propValues[cBox.getSelectedIndex()];
    myBean.setProperty(newVal);
    changer.firePropertyChange("myProp", null, newVal);
  }
}
```

Zusammenfassung

- Komponenten und JavaBeans
- Java Delegations-Eventmodell
  - Event-Objekt
  - Event-Quelle
  - Event-Listener
- Bean Properties
  - Simple Properties
  - Bound Properties
  - Constrained Properties
- Bean Customizing
  - Property-Editoren
  - Bean-Customizer