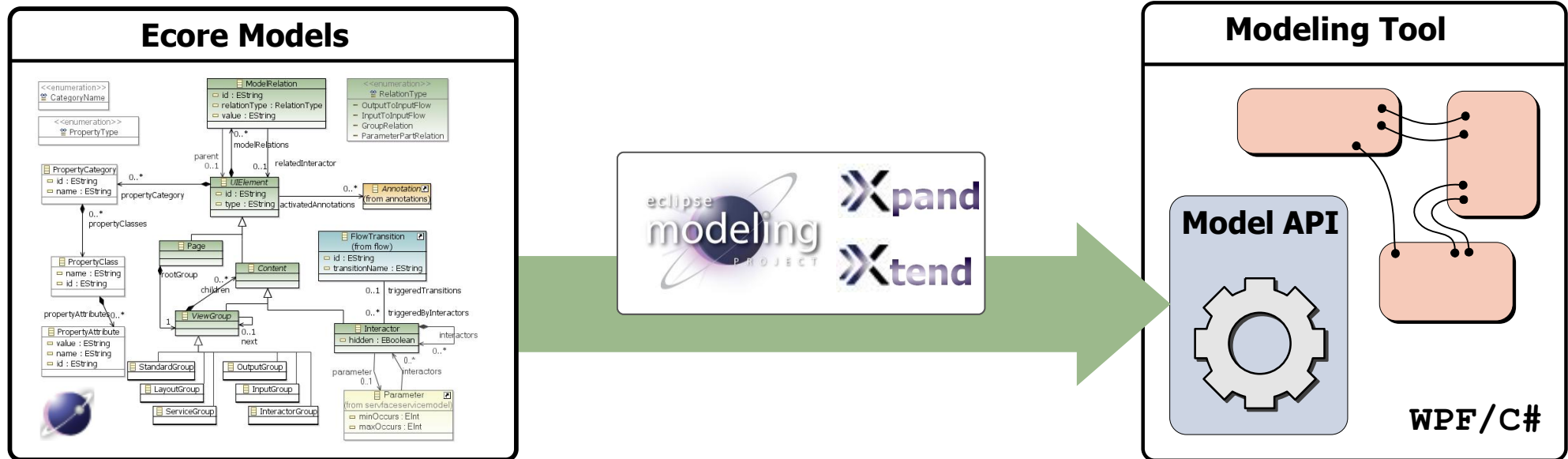


A Case Study on API Generation

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Agenda

1. ServFace

- Methodology & Models
- Need for Automation

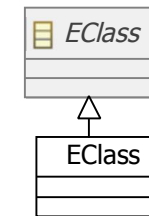


2. Code Generation

- C# Particularities
- Ecore as Meta-Model



3. Extension Mechanism



4. Conclusion and Outlook





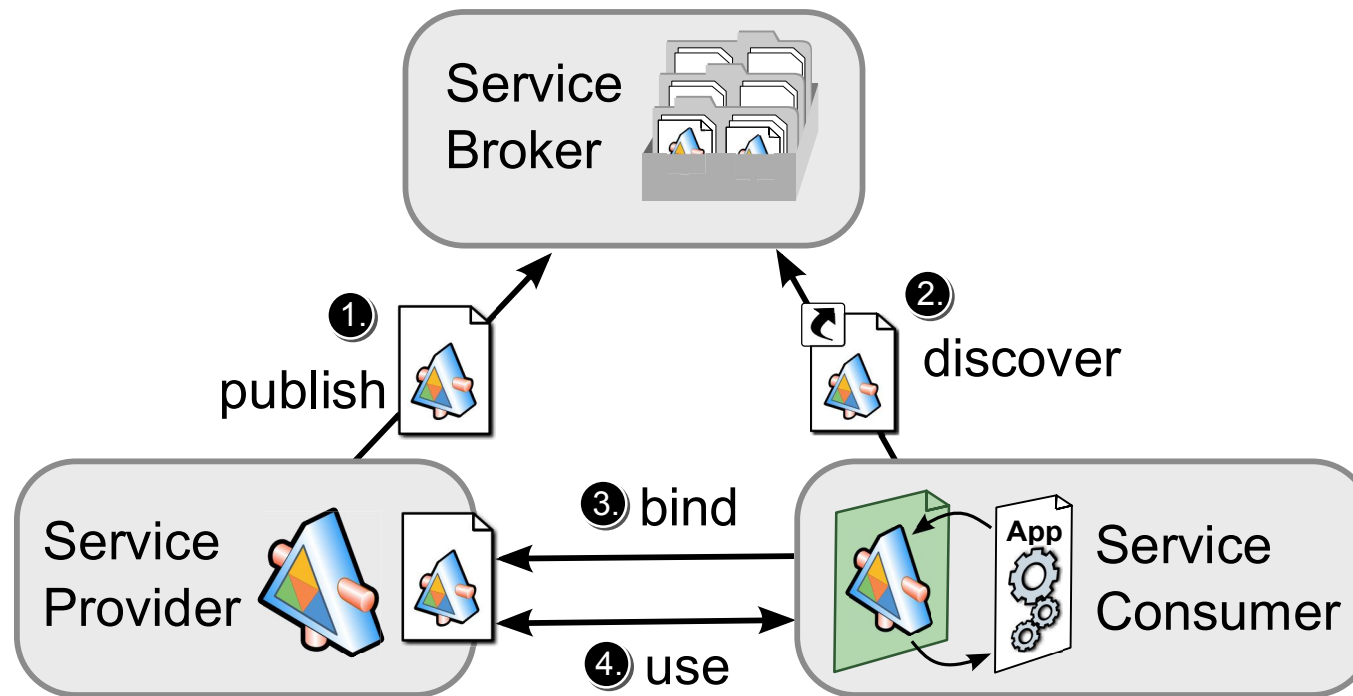
What is ServFace?

ServFace adds UI-related Annotations to Webservice Descriptions (WSDL)

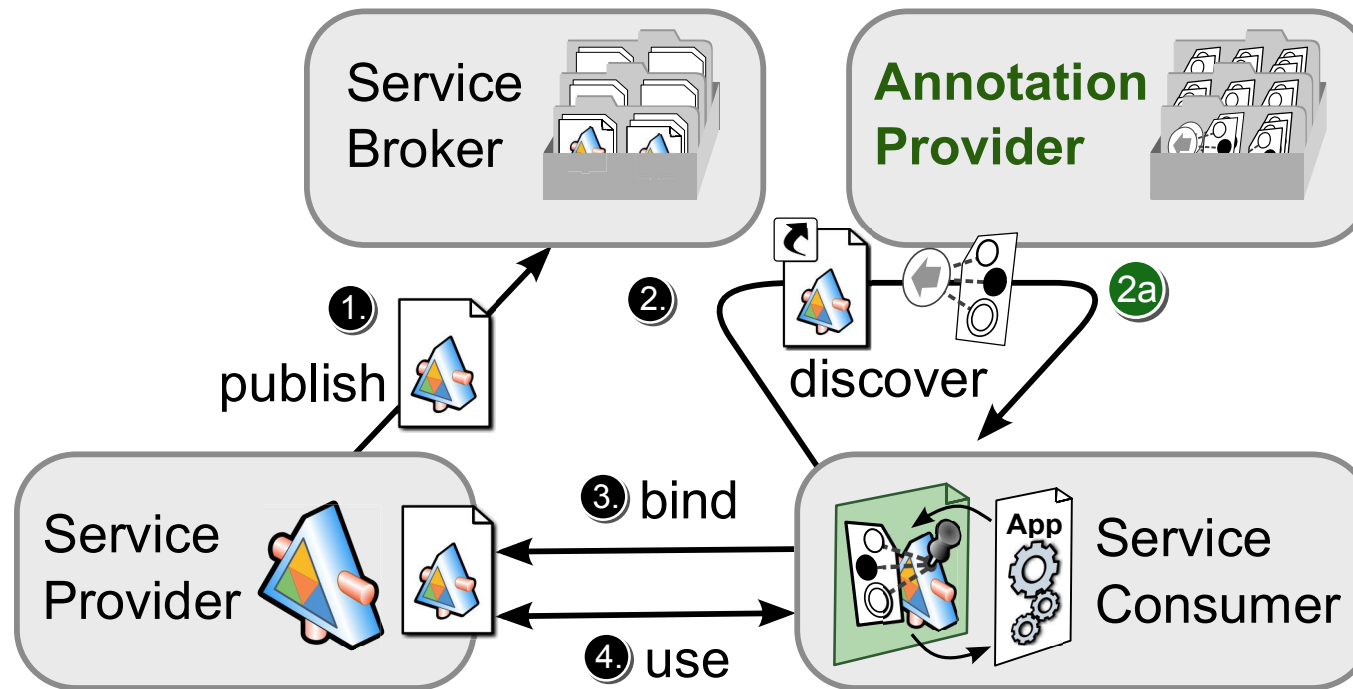
Annotations:

- automate UI development
- allow for better UIs
- hints for UI developers

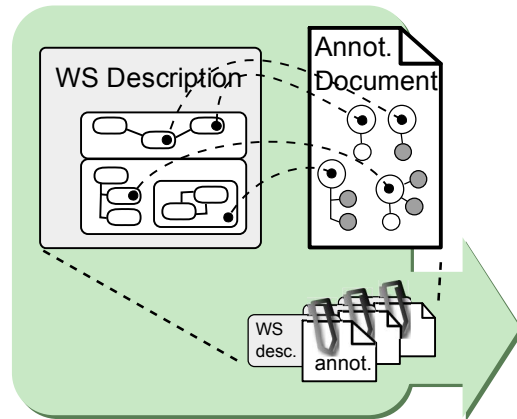
SOA Triangle



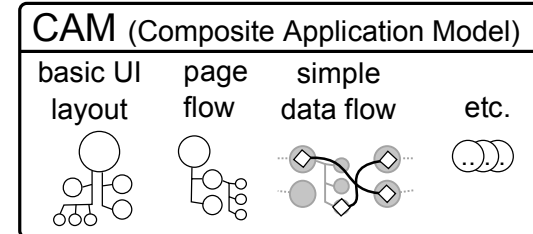
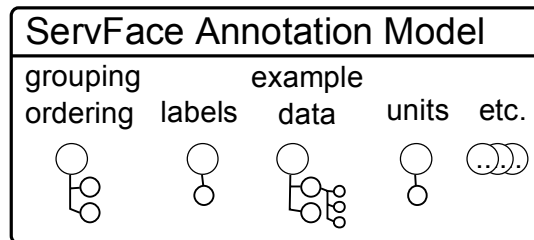
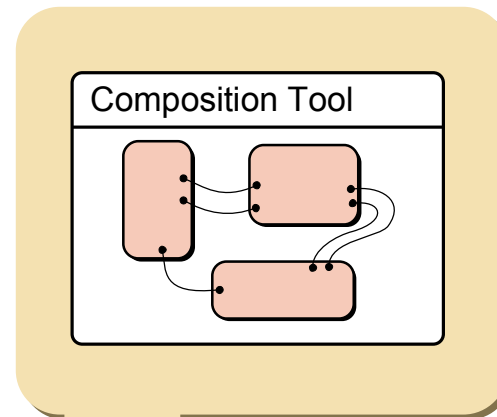
SOA Triangle ++



Service Annotation

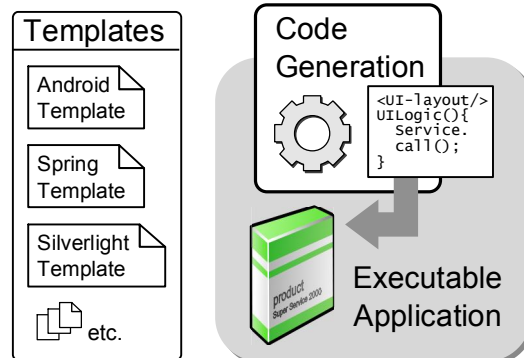


Service/UI Composition

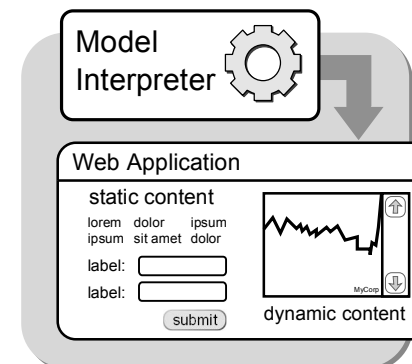


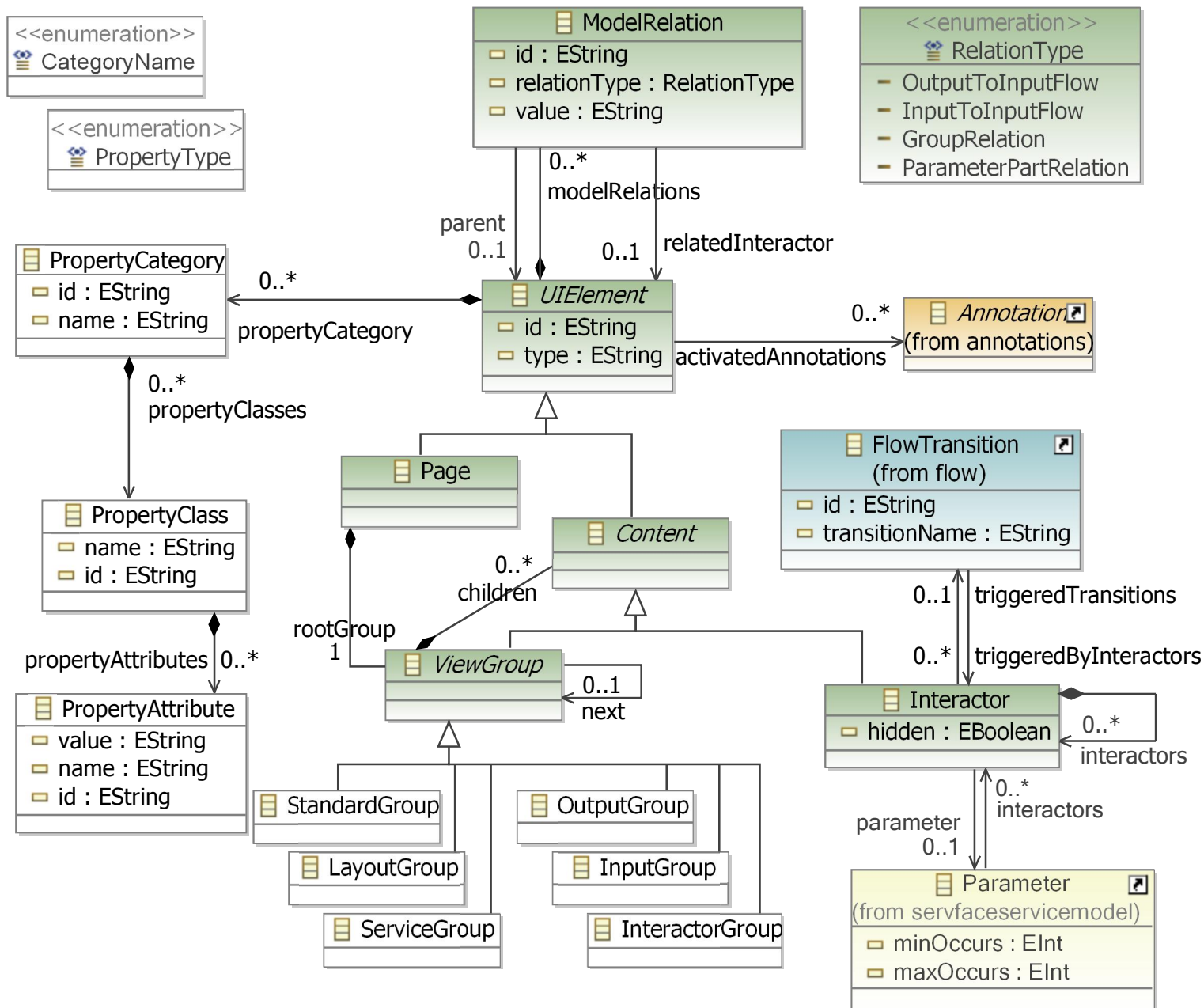
Application Model Instance
XMI

Runtime Generation



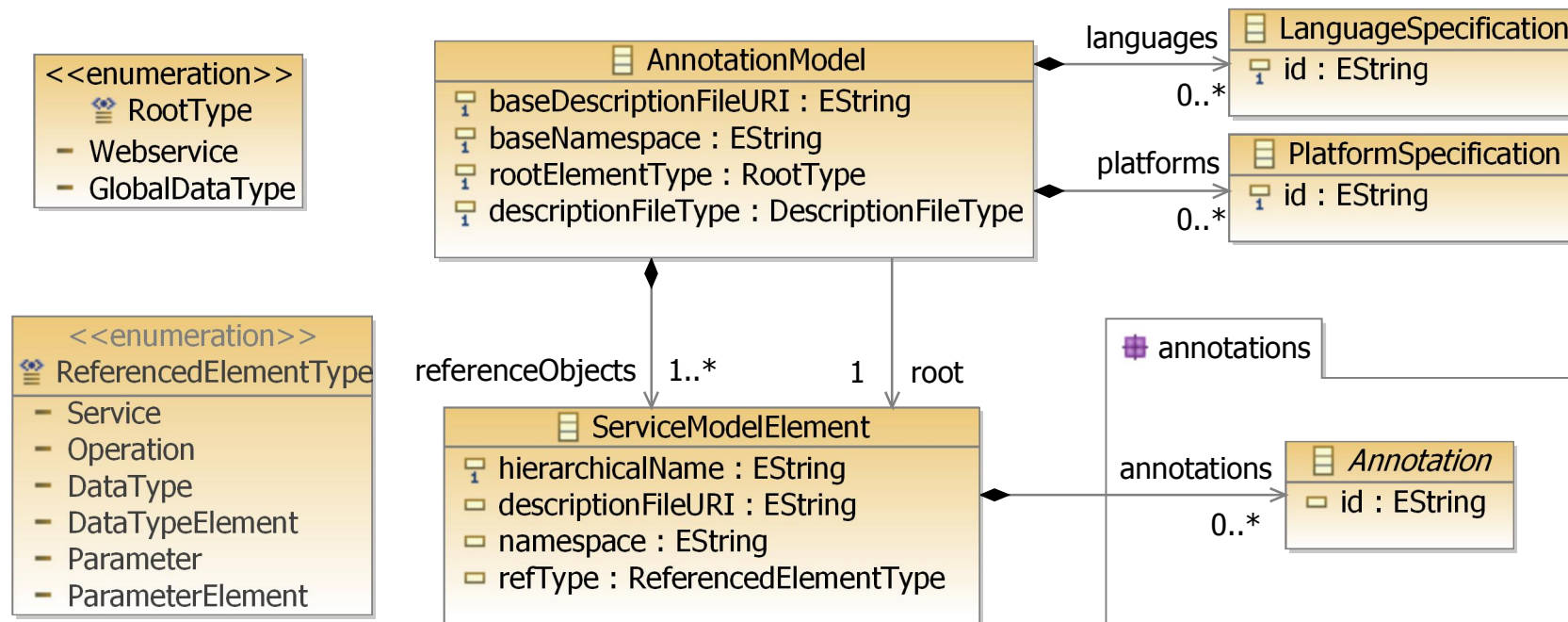
Model Interpretation





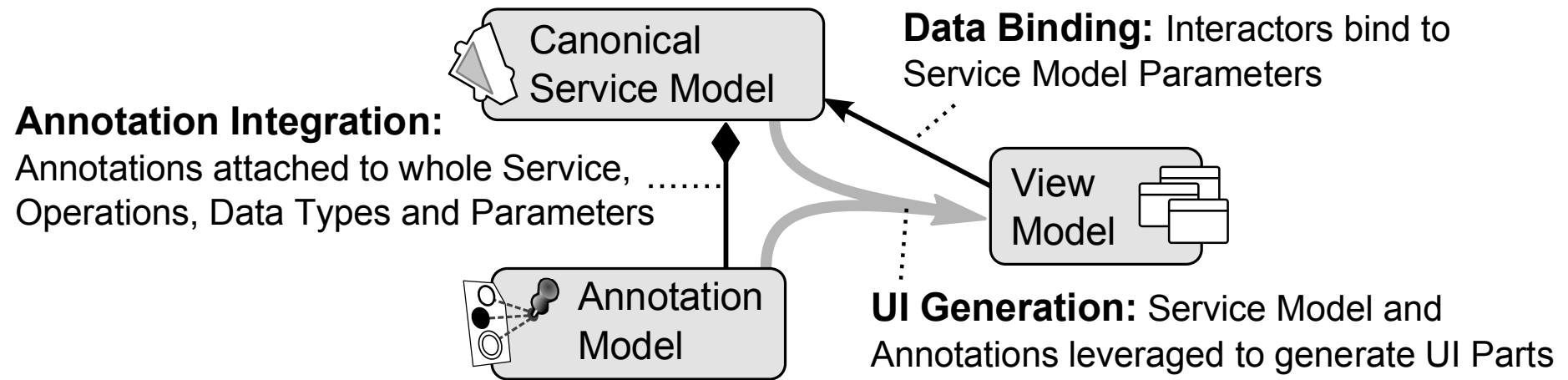
Composite Application Model

Models

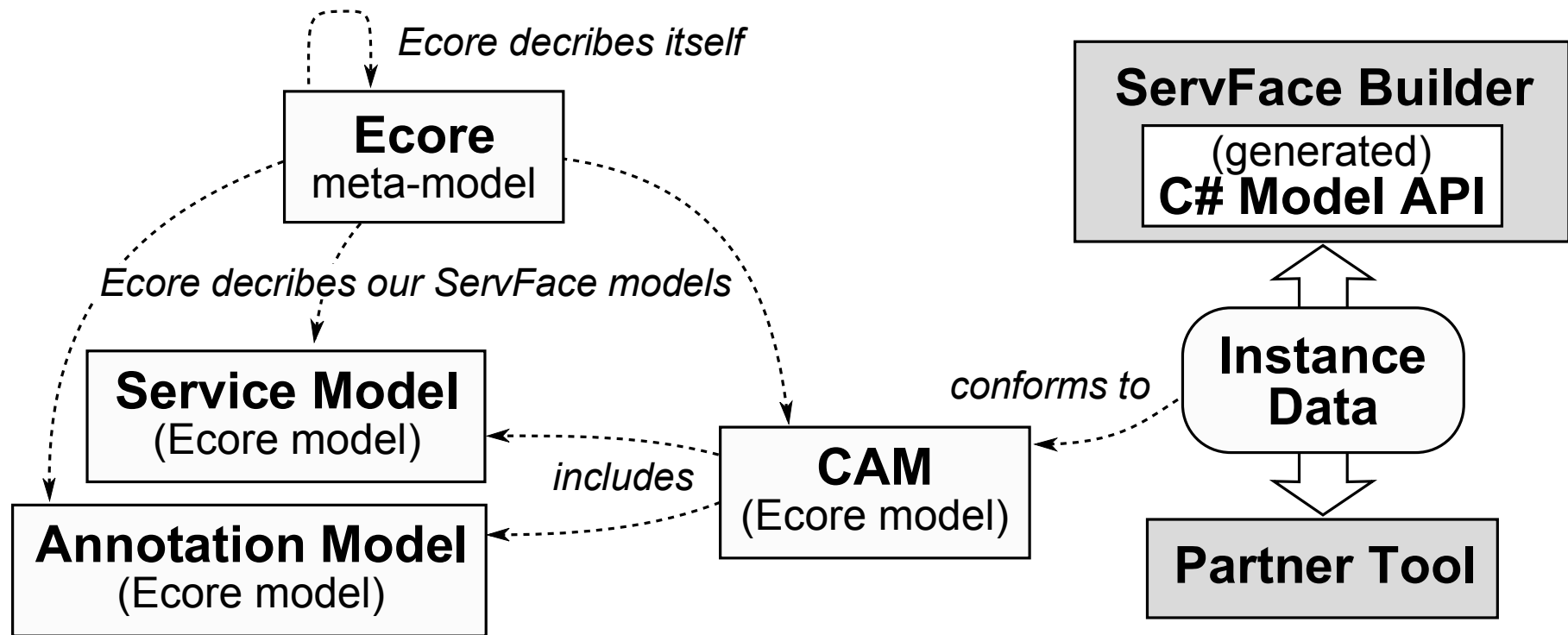


Annotation Model

ServFace Builder Merged Model

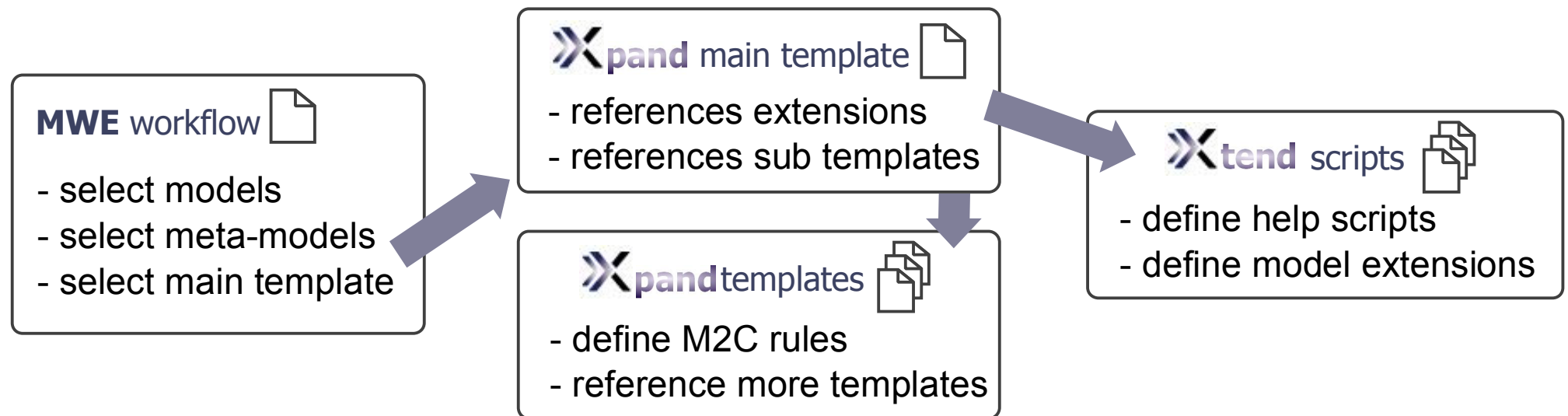
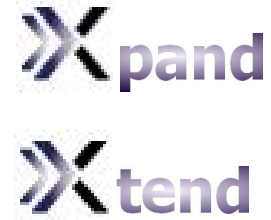


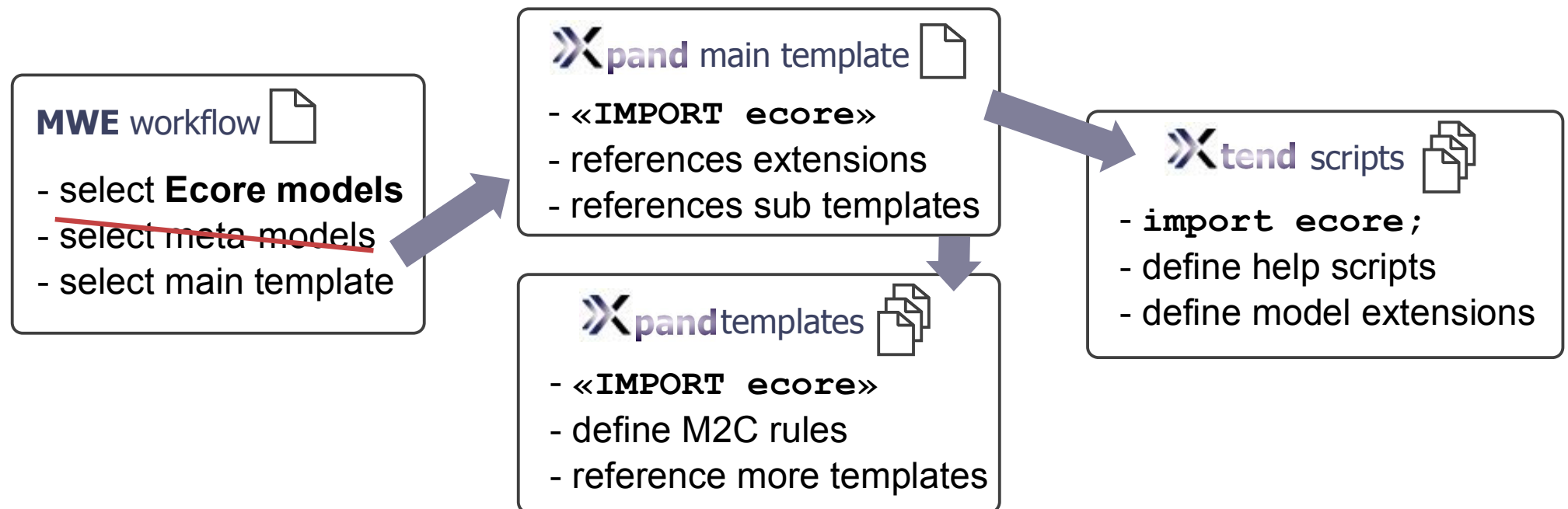
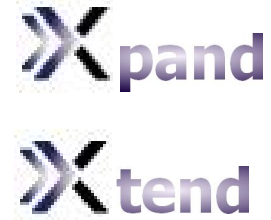
Usage and Integration of Models



Why Code Generation?

- over 80 classes in the models
- frequently changing in the beginning
- better consistency
- faster adoption of Model API





C#-Code Generation

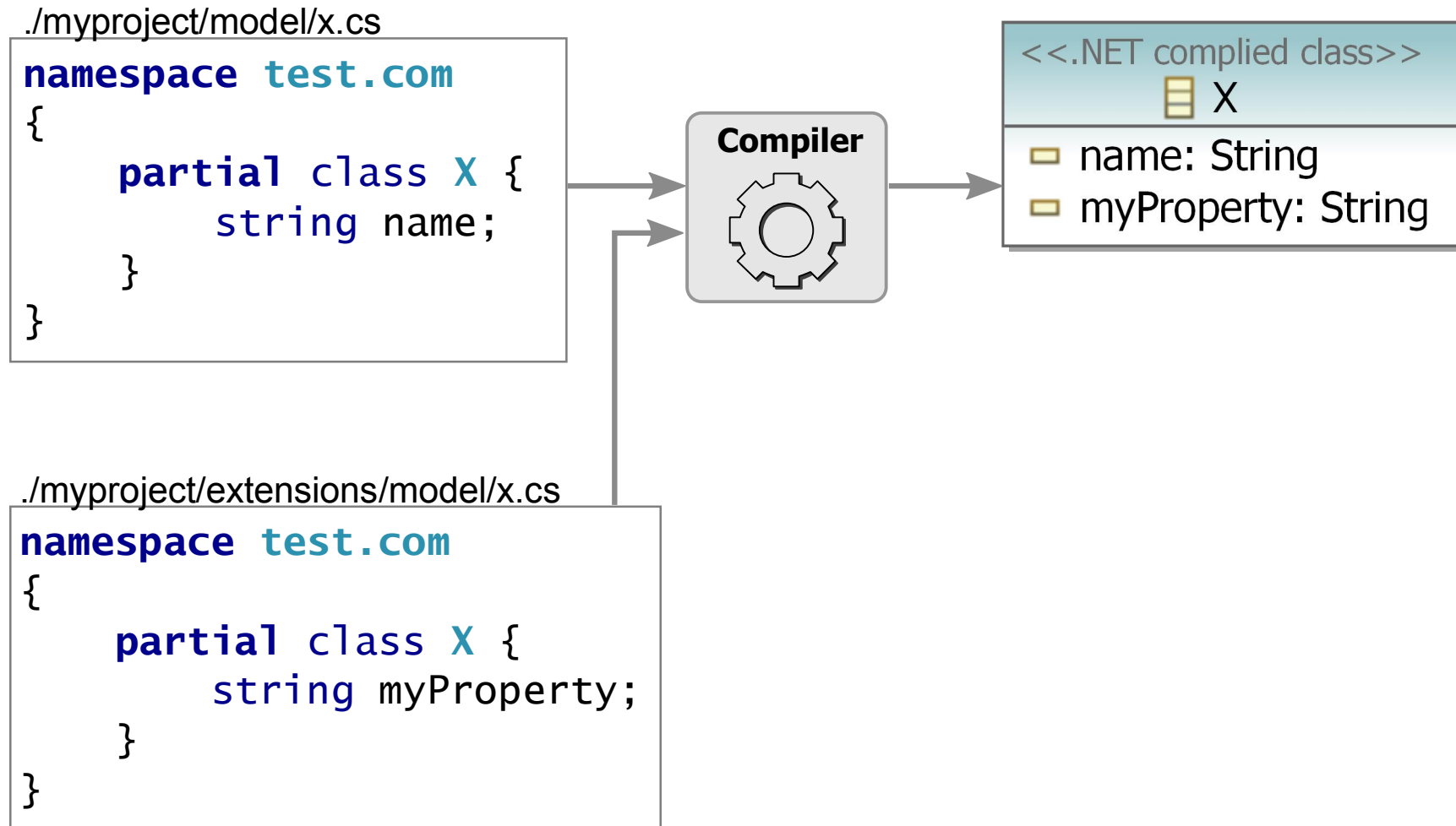


```
String removeKeyword(String this) :  
    {"abstract", "event", "new", "struct", "as", "explicit", "null", "switch", "base",  
     "extern", "object", "this", "bool", "false", "operator", "throw", "break", "finally",  
     "out", "true", "byte", "fixed", "override", "try", "case", "float", "params", "typeof",  
     "catch", "for", "private", "uint", "char", "foreach", "protected", "ulong", "checked",  
     "goto", "public", "unchecked", "class", "if", "readonly", "unsafe", "const", "implicit",  
     "ref", "ushort", "continue", "in", "return", "using", "decimal", "int", "sbyte", "virtual",  
     "default", "interface", "sealed", "volatile", "delegate", "internal", "short", "void",  
     "do", "is", "sizeof", "while", "double", "lock", "stackalloc", "else", "long", "static",  
     "enum", "namespace", "string"}.contains(this) ? "_" + this : this;  
  
String name(ENamedElement this) : removeKeyword(this.name);
```

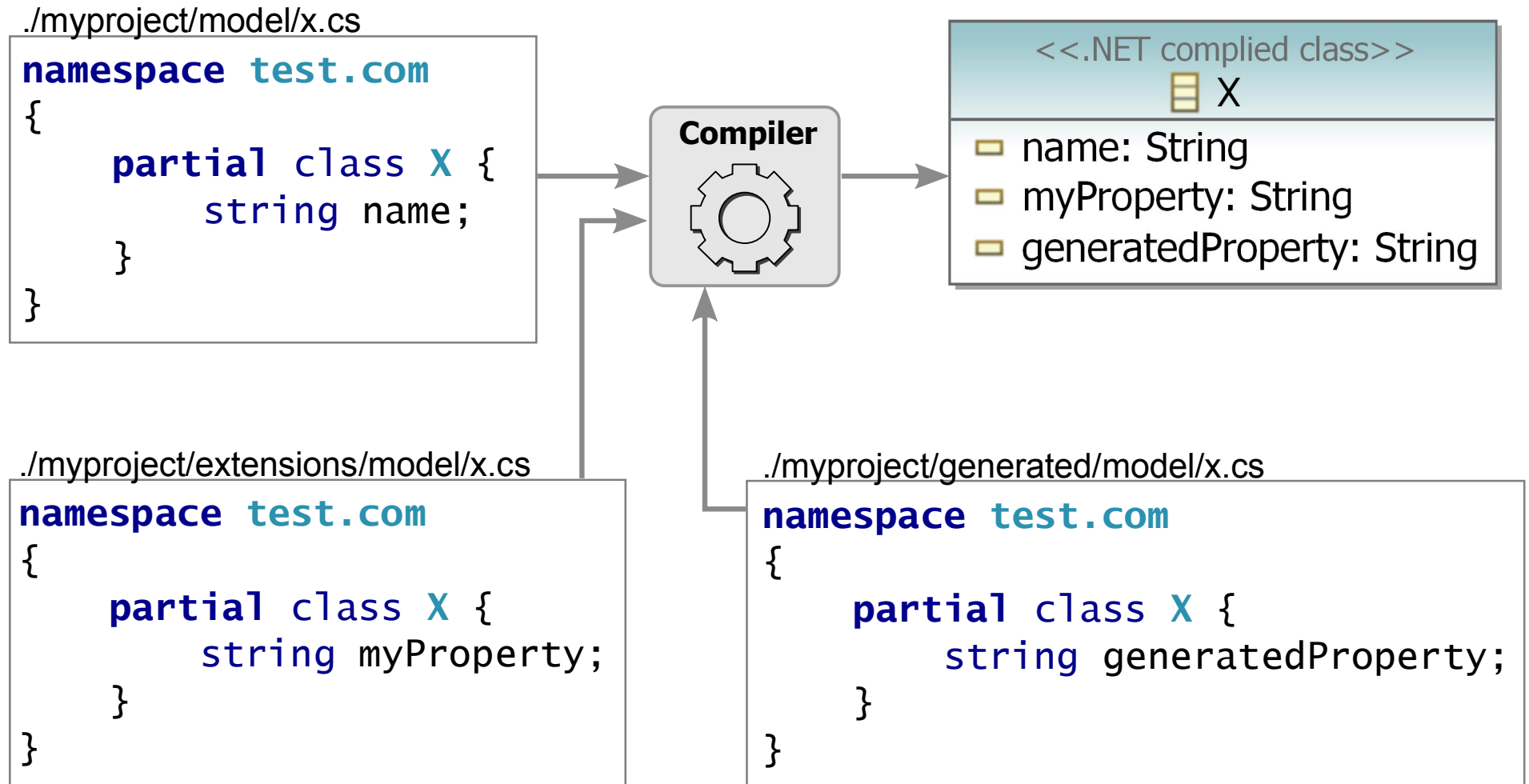
```
String cType(EClassifier this) :
    switch(name){
        case "EBigDecimal" : "System.Decimal"
        case "EBigInteger" : "System.Decimal"
        case "EBoolean" : "bool"
        case "EBooleanObject" : "System.Boolean"
        case "EByte" : "sbyte"
        case "EByteArray" : "sbyte[]"
        case "EByteObject" : "System.SByte"
        case "EChar" : "char"
        case "ECharacterObject" : "System.Char"
        case "EDate" : "System.DateTime"
        case "EDouble" : "double"
        case "EDoubleObject" : "System.Double"
        case "EFloat" : "float"
        case "EFloatObject" : "System.Single"
        case "EInt" : "int"
        case "EIntegerObject" : "System.Int32"
        case "EJavaClass" : "System.Type"
        case "EJavaObject" : "System.Object"
        case "ELong" : "long"
        case "ELongObject" : "System.Int64"
        case "EMap" : "System.Collections.
            [ Generic.IDictionary"
        case "EShort" : "short"
        case "EShortObject" : "System.Int16"
        case "EString" : "System.String"
        default: name
    };
```

```
String cDefaultValue(EClassifier this) :
    switch(name){
        case "EBigDecimal" : "0"
        case "EBigInteger" : "0"
        case "EBoolean" : "false"
        case "EBooleanObject" : "false"
        case "EByte" : "0x00"
        case "EByteArray" : "null"
        case "EByteObject" : "0x00"
        case "EChar" : "\u0000"
        case "ECharacterObject" : "\u0000"
        case "EDate" : " 01.01.0001 00:00:00"
        case "EDouble" : "0.0D"
        case "EDoubleObject" : "0.0D"
        case "EFloat" : "0.0F"
        case "EFloatObject" : "0.0F"
        case "EInt" : "0"
        case "EIntegerObject" : "0"
        case "EJavaClass" : "null"
        case "EJavaObject" : "null"
        case "ELong" : "0L"
        case "ELongObject" : "0L"
        case "EMap" : "null"
        case "EShort" : "0"
        case "EShortObject" : "0"
        case "EString" : "null"
        default: name
    };
```

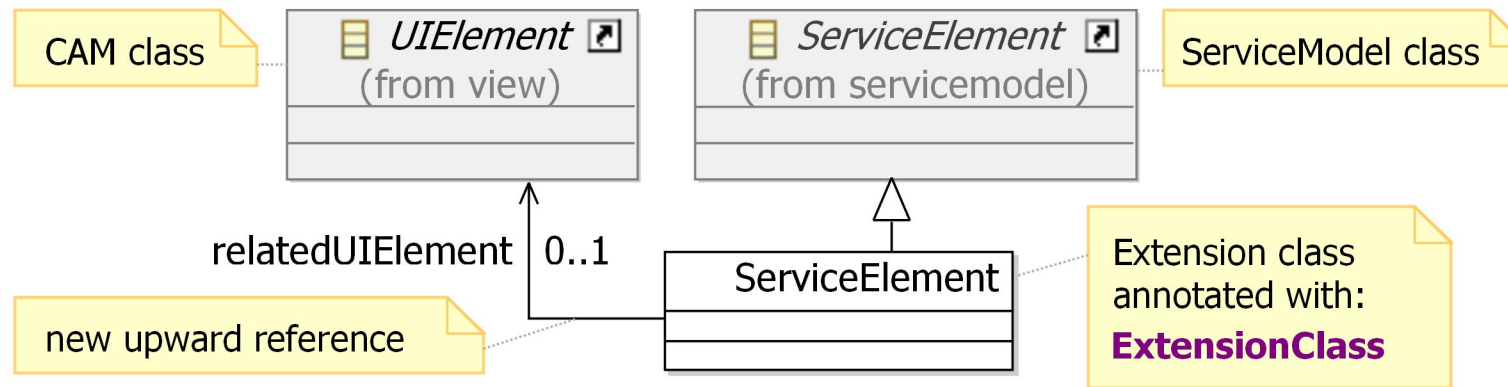
Partial Classes in C#



Partial Classes in C#



Pragmatic Model Extension



Xpand template 

- check for **ExtensionClass** Annotation
- generate additional **partial class**

./myproject/extensions/model/ServiceElement.cs

```
namespace servicemodel
{
    partial class ServiceElement {
        UIElement relatedUIElement;
    }
}
```

Conclusion

Benefits

- less code
- no Model-to-API adoption errors
- models are first-class citizens

Misperceptions

- developers did not use ExtensionClass Annotation
- they did all tool-internal extensions manually

Problems

- Xpand templates and Xtend scripts get bloated with Model-specific code
- stricter supervision and enforcement of SoC needed
- current code generator not generic

Outlook

Generic Generator

- more WPF/C# projects starting now
- many EMF/Ecore based models
- model-specific code has to be separated

Special-Purpose Generators

- improve API Usability
- lighten models, e.g., by reducing property/method access

Thank you for listening!

A Slide about my Slides



All slides and drawings were created in **Inkscape**



Javascript added to SVG by Inkscape Plugin **Jessyink**

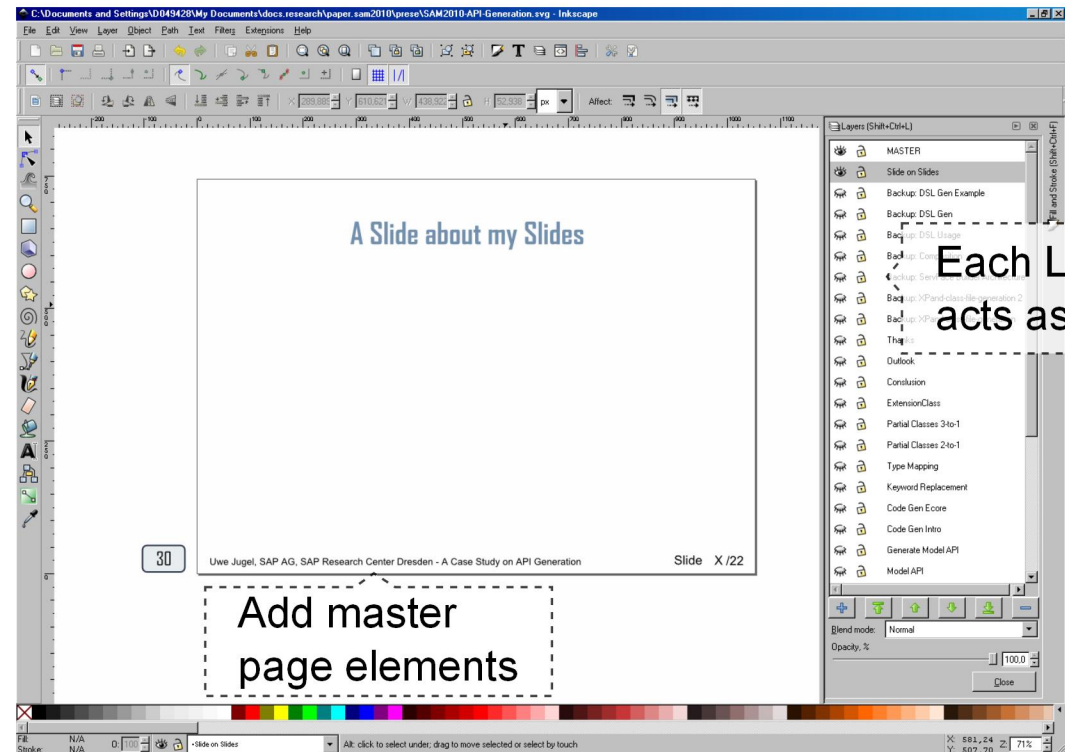
Jessyink SVG+JS works quite well in FireFox and even better in Chrome.

Unfortunately not all SVG-features are correctly rendered in either browser.

Links

www.inkscape.org

code.google.com/p/jessyink



Screenshot of this slide in Inkscape, when I started creating it

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