

# Using SPEM for documenting AO design processes

# The Process Description

- ▶ Three are the main elements of a design process
  - Activity
  - Process Role
  - Work Product
- AOSE processes are also affected by
  - MMM Element
  -
- ▶ SPEM (Software Process Engineering Metamodel) is based on the idea that *“a software development process is a collaboration between abstract entity called **process role** that performs operations called **activities** on tangible entities called **work products**”*.

# Modelling a design process with SPEM

- A top-down approach
- SPEM main process component we use:
  - **Activity:** Three packages:
    - **Method Content Package**
      - The set of reusable methods with their goals, resources and roles
    - **Process Package Package**
      - The main element is activity nested in breakdown structure
    - **ProcessWithMethod Package**
      - The main element is the BreakDownElement
  - **Process Component**
  - **Phase**

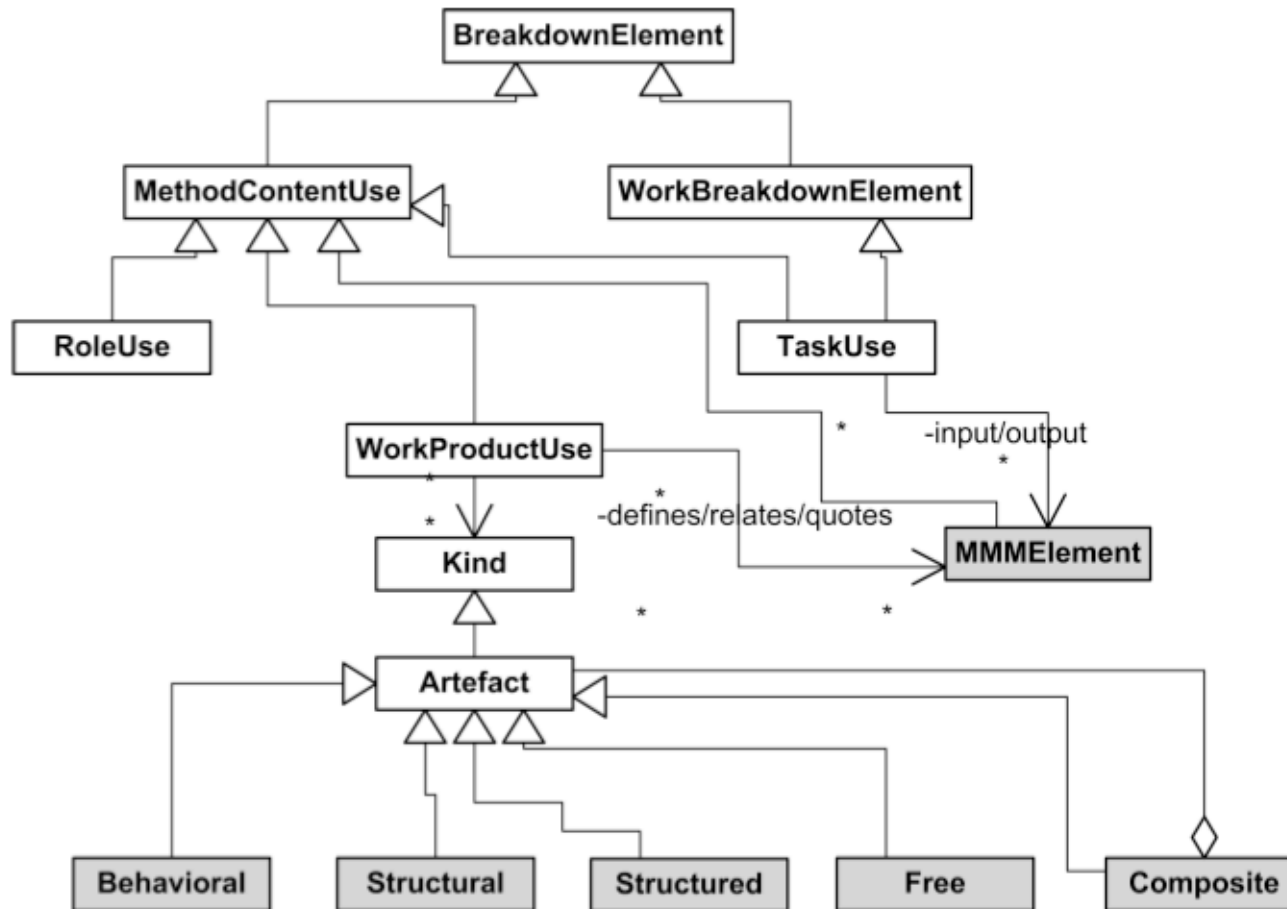
# Extending SPEM specification

- MMM is the starting point for the construction of a new design process
  - Each part (one or more elements) of this metamodel can be instantiated in one (or more) fragment(s)
- Each fragment refers to one (or more) MMM element(s)
  - Refers = instantiates/relates/quotes
- The MMM element is the constituent part of a Work Product
- The MMM is not part of the SPEM metamodel
  - It is the element which leads us in modifying and extending SPEM diagram

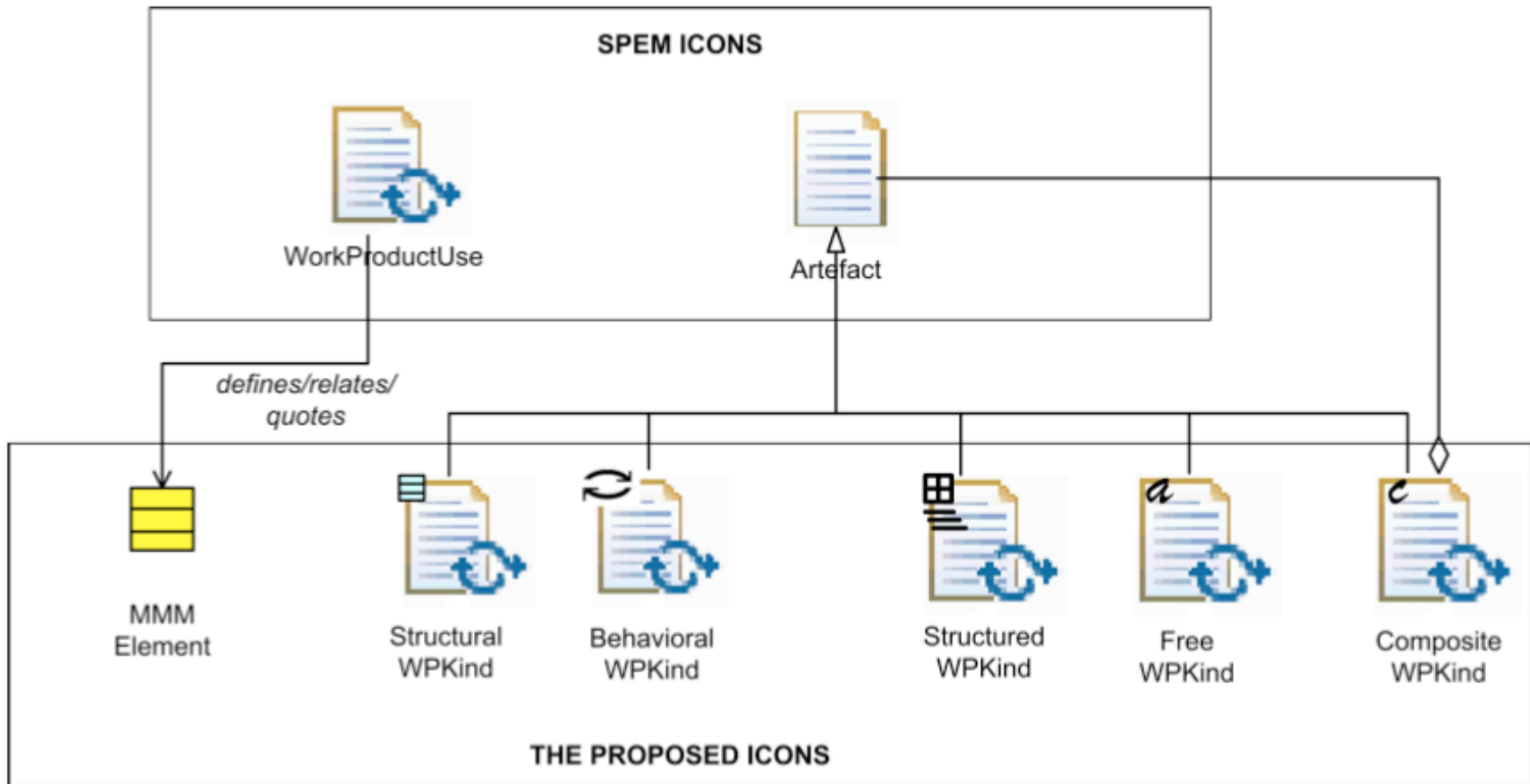
# Extending SPEM specification

- ▶ The need for establishing which is the real action a process role performs on a MMM element when he is carrying out a specific activity
  - ▶ The set of actions:
    - **Define** – it is performed when a MMM element is introduced for the first time and its features are defined in a portion of process (hence in a fragment)
    - **Relate** – when a relationship is created (defined) among two or more MMM elements previously defined in another portion of process
    - **Quote** – a MMM element or a relationship is quoted in a specific work product
  - We also find useful to specify the work product kind by referring to an explicit set of WP kinds

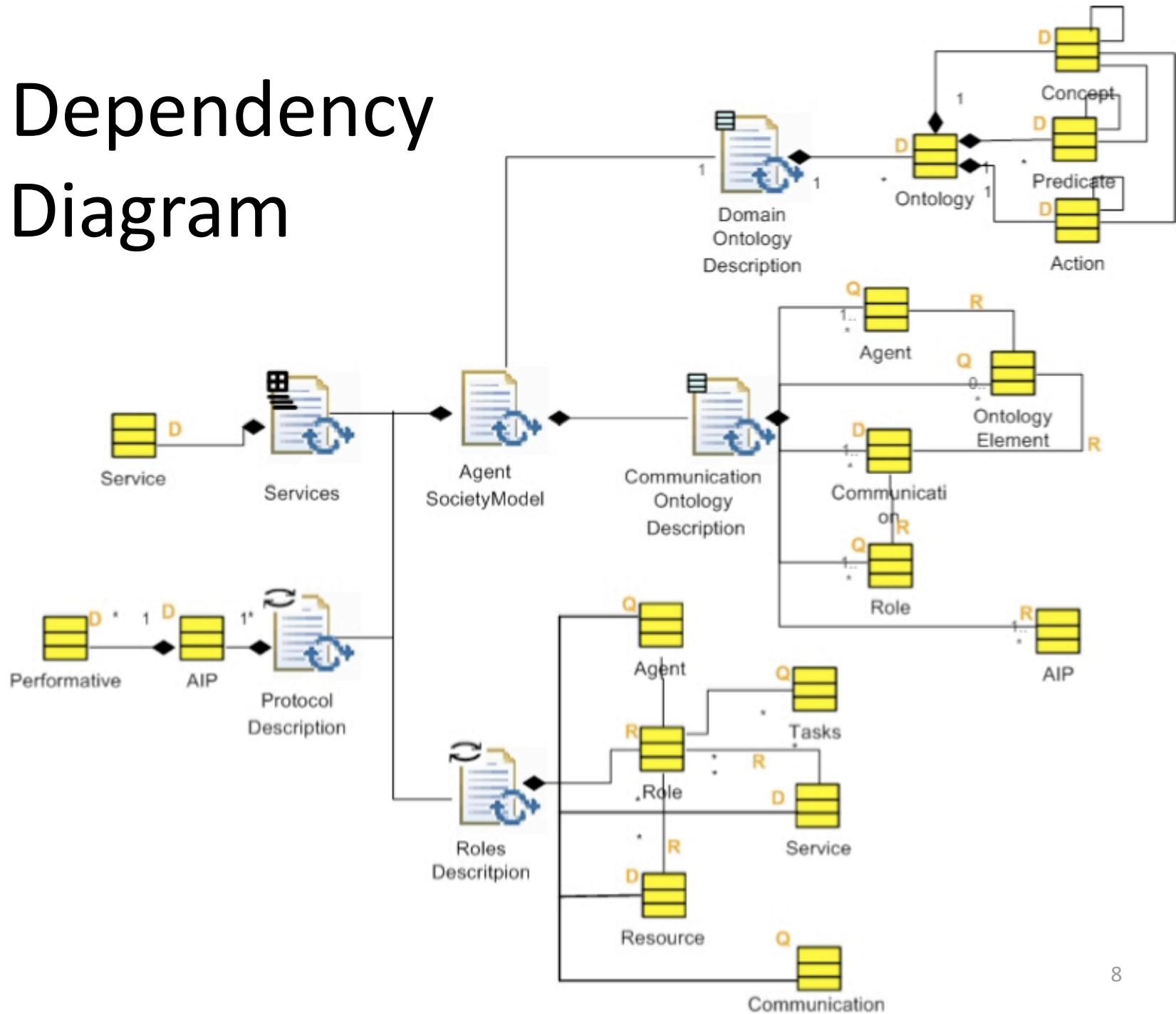
# Extending SPEM specification



# The proposed icons



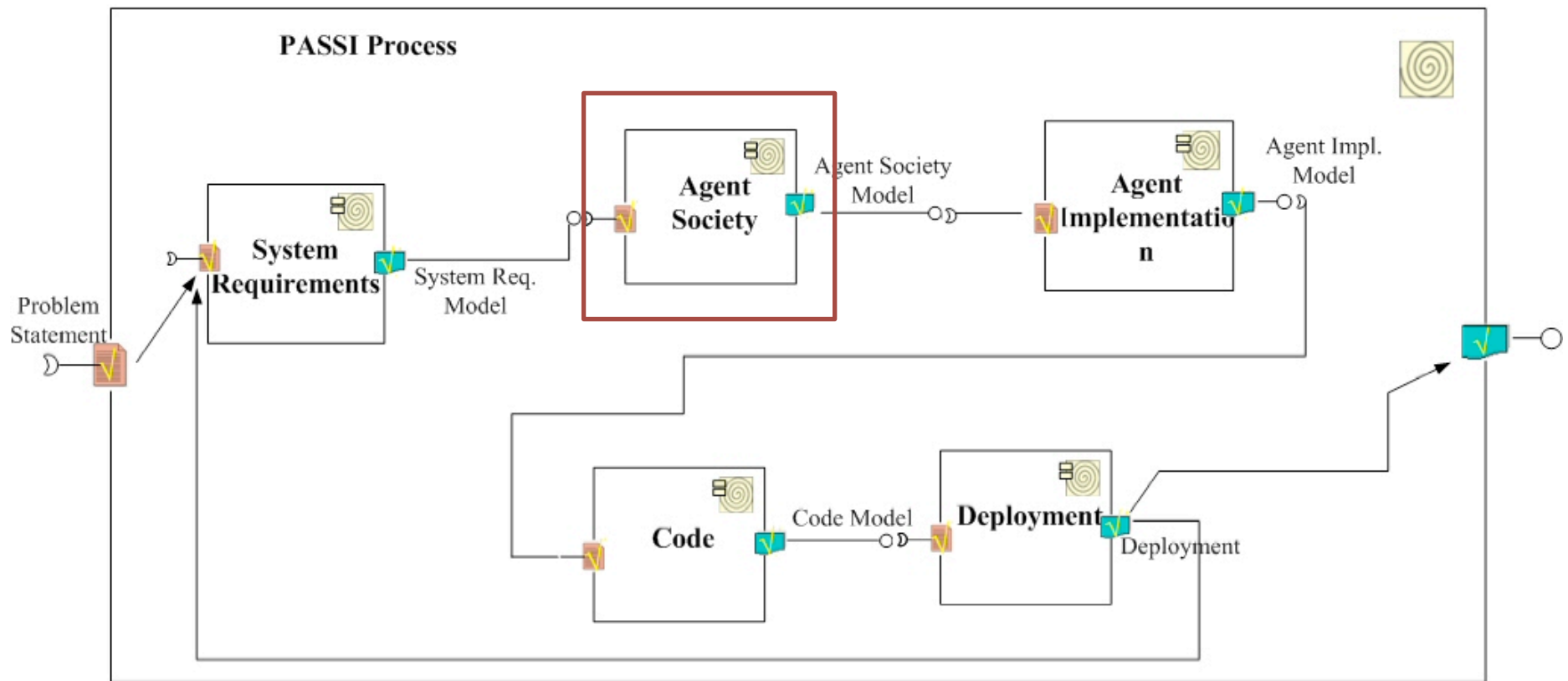
# The Dependency Diagram



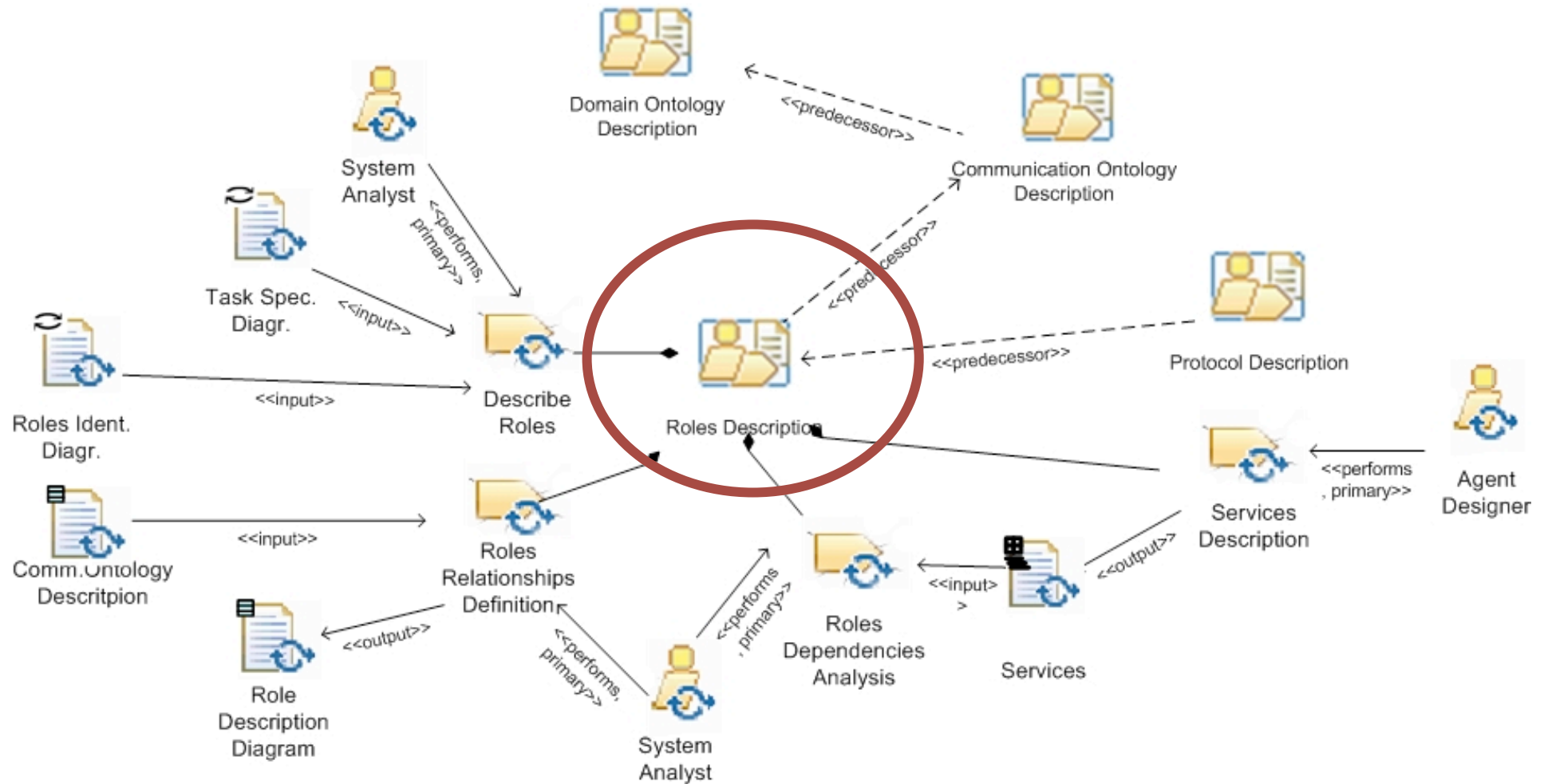


# Representing PASSI

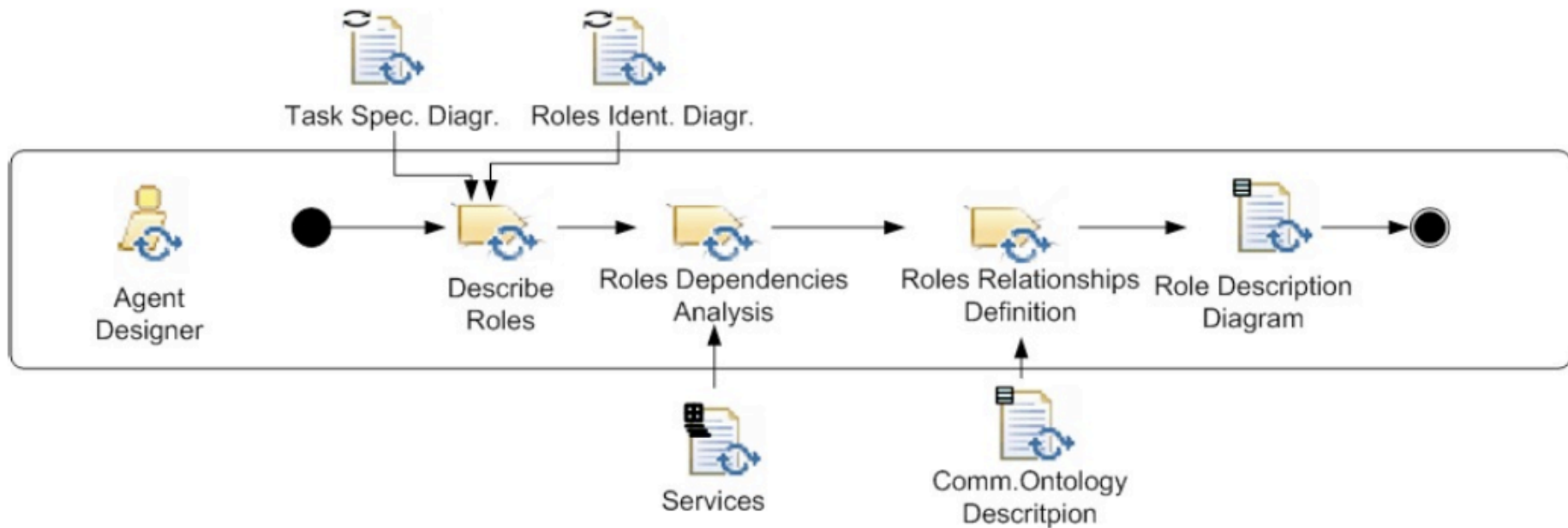
# Component Diagram

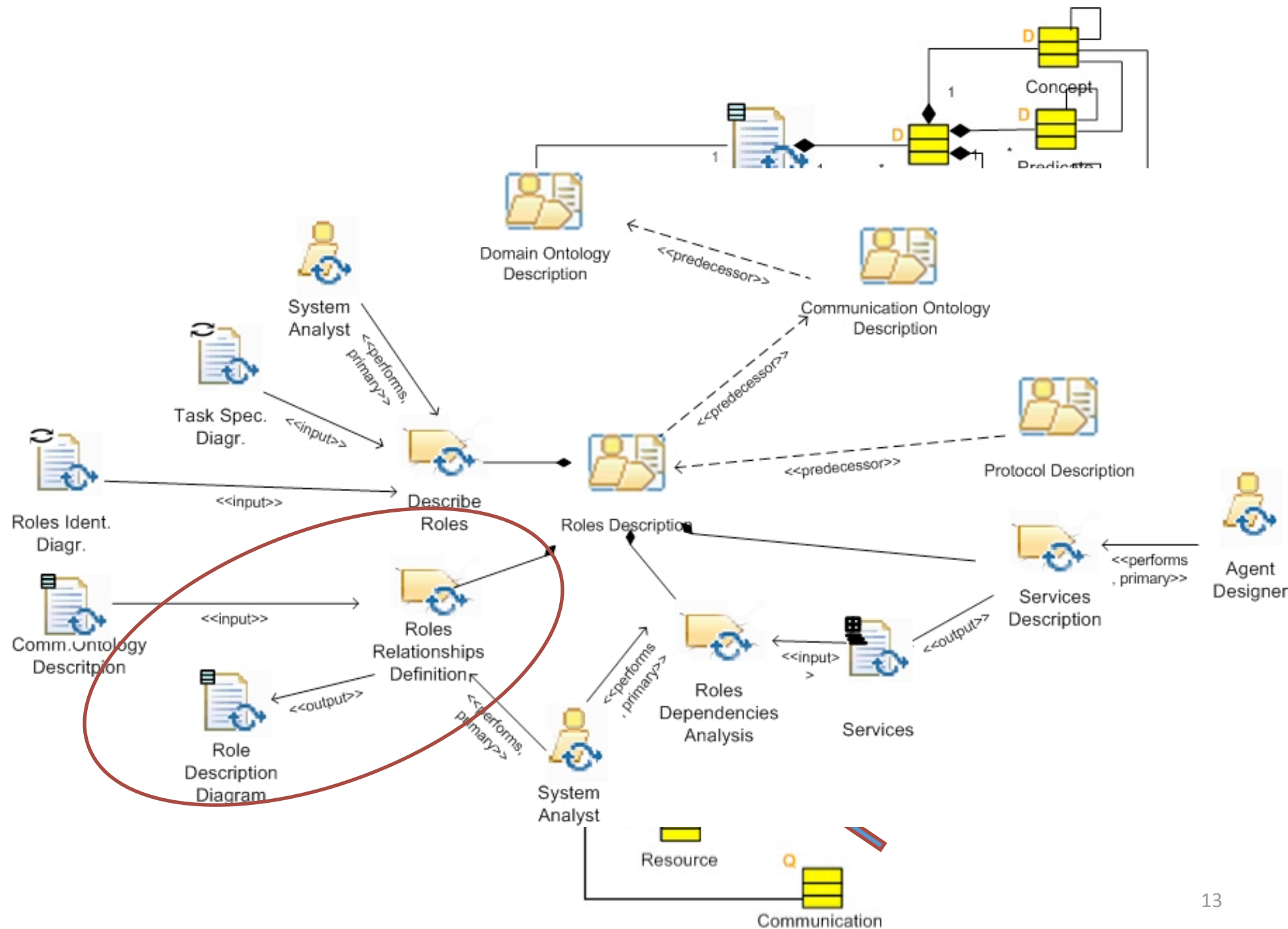


# A portion of the process activity diagram



# The "Roles Description" Fragment Description





# Method Fragment extraction and Repository creation

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- We already introduced in our method base the following design processes:
  - Adelfe
  - PASSI
  - Tropos
  - Gaia (partially)

# Method Fragment extraction

- The repository is a data base where method fragments are stored in terms of (usually text) documents
- Fragments extraction is Work Product- and MMMElement-oriented
- A fragment is identified as a portion of process that produces a significant work product (a diagram or other kind of WP)
  - Fragments can also be composed: Phase fragment, Composed fragment, Atomic fragment



# The Categorization

- The aim is to unify different elements (from different approaches) under a unique definition
  - A set of common phases of software engineering design processes
  - The principal process role performing these phases
  - A set of work product kind
- The repository allows the classification of fragments according to a set of categories based on the most important metamodel elements
  - Phase
  - ProcessRole
  - WorkProduct
  - MMMElement

# The need for a taxonomy

- All the processes we studied were created by different research groups and deal with different design philosophies
- Differences in names and definitions of the design process elements
  - Sixteen different process roles
  - Seventeen phases
  - Several work products and MAS MetaModel elements

# Phases

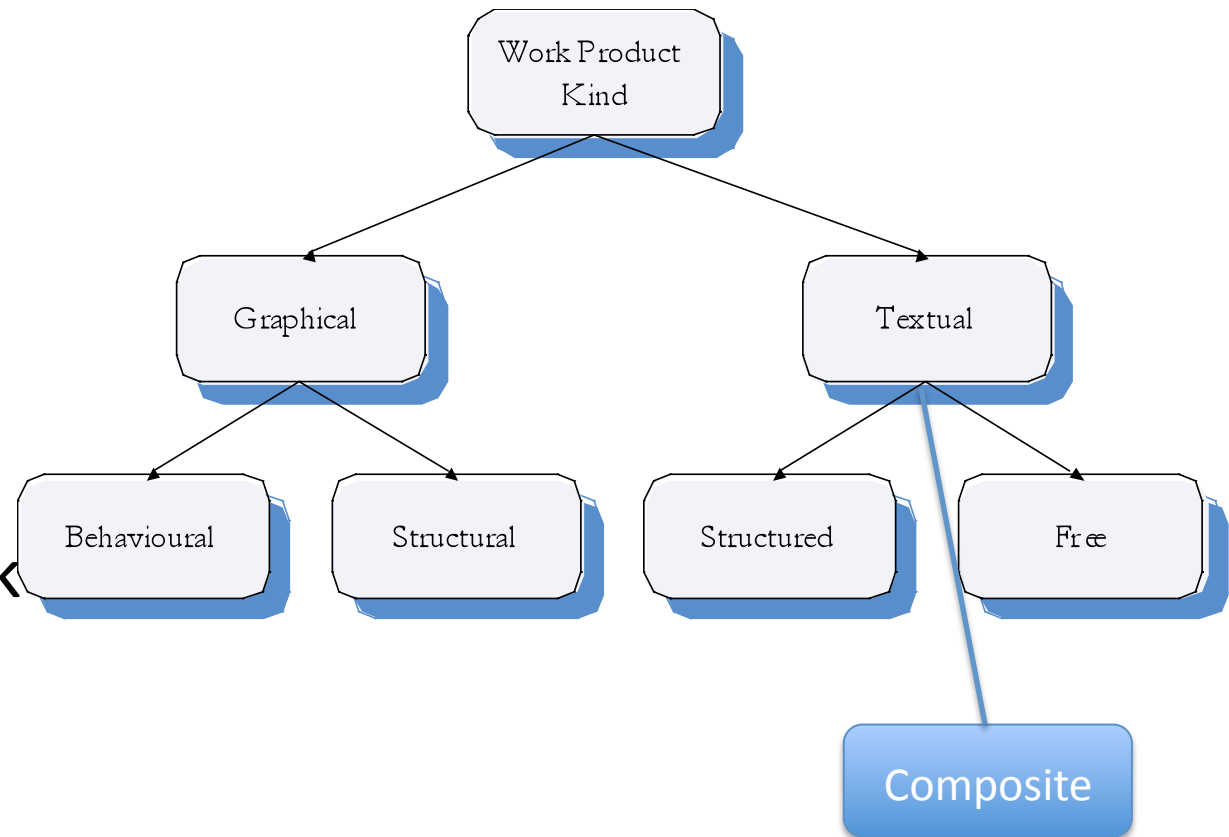
- Any kind of design process can be decomposed in phases
- High level of abstraction for phases resulting from the studied processes
- Some of them are specific for agent based design process
- Requirements
- Analysis
- Design
- Implementation
- Testing
- Deployment
- Coding

# Process Roles

- Identification of an high level process role for each phase
- Detailing process roles basing on studied processes
- System Analyst
- Domain Analyst
- User
- Agent Analyst
- Agent Designer
- User Interface Designer
- Programmer
- Test Designer
- Test Developer

# The Taxonomy – Work Product

- Two main categories
  - Graphical
  - Textual
- Combination of two+ kinds of work products
  - Composite



# MMMElements

- Three kinds of MAS Metamodel elements
  - Problem domain → all aspects of users' problem description including environment representation
  - Agency Domain → agent based concepts useful to define a solution
  - Solution Domain → the structure of the code solution

# Repository Content

Repository	
<b>Phase</b>	
Requirements	8
Analysis	16
Design	11
Implementation	4
Testing	1
Deployment	1
Coding	3
<b>Process Role</b>	
System Analyst	14
Domain Analyst	7
User	1
Agent Analyst	6
Agent Designer	11
User Interface Designer	1
Programmer	2
Test Designer	1
Test Developers	1
<b>WorkProduct Kind</b>	
Behavioural	9
Structural	24
Structured	6
Free	14
<b>MMM Element</b>	
Problem	12
Social	45
Solution	2

# Method Fragments retrieval

The screenshot shows a Microsoft Internet Explorer browser window displaying an applet titled "Applet HTML Page - Microsoft Internet Explorer". The address bar shows the URL: <http://mozart.csai.unipa.it:8080/appletfragment/AppletMain.html>. The applet interface is organized into four columns of checkboxes, each with a header:

Phases/Activities	Process Roles	Work Product Kind	MMM Element
<input type="checkbox"/> Requirements	<input type="checkbox"/> System Analyst	<input type="checkbox"/> Behavioural	<input type="checkbox"/> Problem
<input type="checkbox"/> Analysis	<input type="checkbox"/> Domain Analyst	<input type="checkbox"/> Structural	<input type="checkbox"/> Social
<input type="checkbox"/> Design	<input type="checkbox"/> User	<input type="checkbox"/> Structured	<input type="checkbox"/> Solution
<input type="checkbox"/> Implementation	<input type="checkbox"/> Agent Analyst	<input type="checkbox"/> Free	
<input type="checkbox"/> Testing	<input type="checkbox"/> Agent Designer		
<input type="checkbox"/> Deployment	<input type="checkbox"/> User Interface Designer		
<input type="checkbox"/> Coding	<input type="checkbox"/> Programmer		
	<input type="checkbox"/> Test Designer		
	<input type="checkbox"/> Test Developer		

Below the checkboxes, there is a search section labeled "Search by Name" with an input field and a "Search" button.

The status bar at the bottom of the browser window shows "Applet appletfragment/AppletMain started" and the system tray includes the "Internet" icon and the number "24".



# How to represent a process for introduction in the fragment repository

- Existing design processes adopt different notations and documentation styles.
- The process has to be represented in an unified way before fragment extraction
- We adopted a precise template and notation that is based on a few SPEM extensions

Thanks for your attention

**Questions?**