

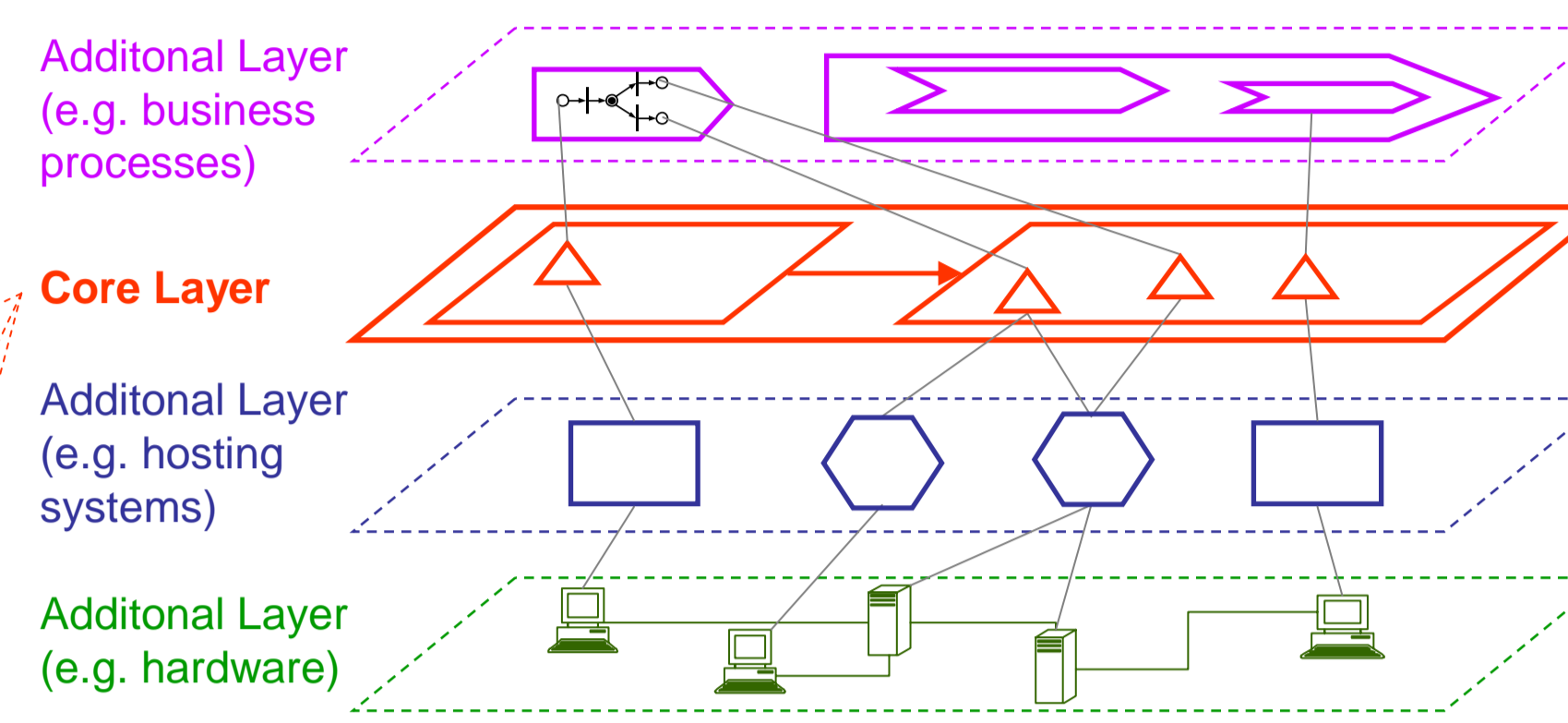
CAPTURING THE ESSENTIALS OF FEDERATED SYSTEMS

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The Idea

Today, the Web is increasingly used as a platform for distributed services, which transcend organizational boundaries to form federated applications. Consequently, there is a growing interest in the architectural aspect of Web-based systems, i.e. the composition of the overall solution into individual Web applications and Web services from different parties. The design and evolution of federated systems calls for models that give an overview of the structural as well as trust-specific composition and reflect the technical details of the various accesses. We introduce the WebComposition Architecture Model (WAM) as an overall modeling approach tailored to aspects of highly distributed systems with federation as an integral factor.

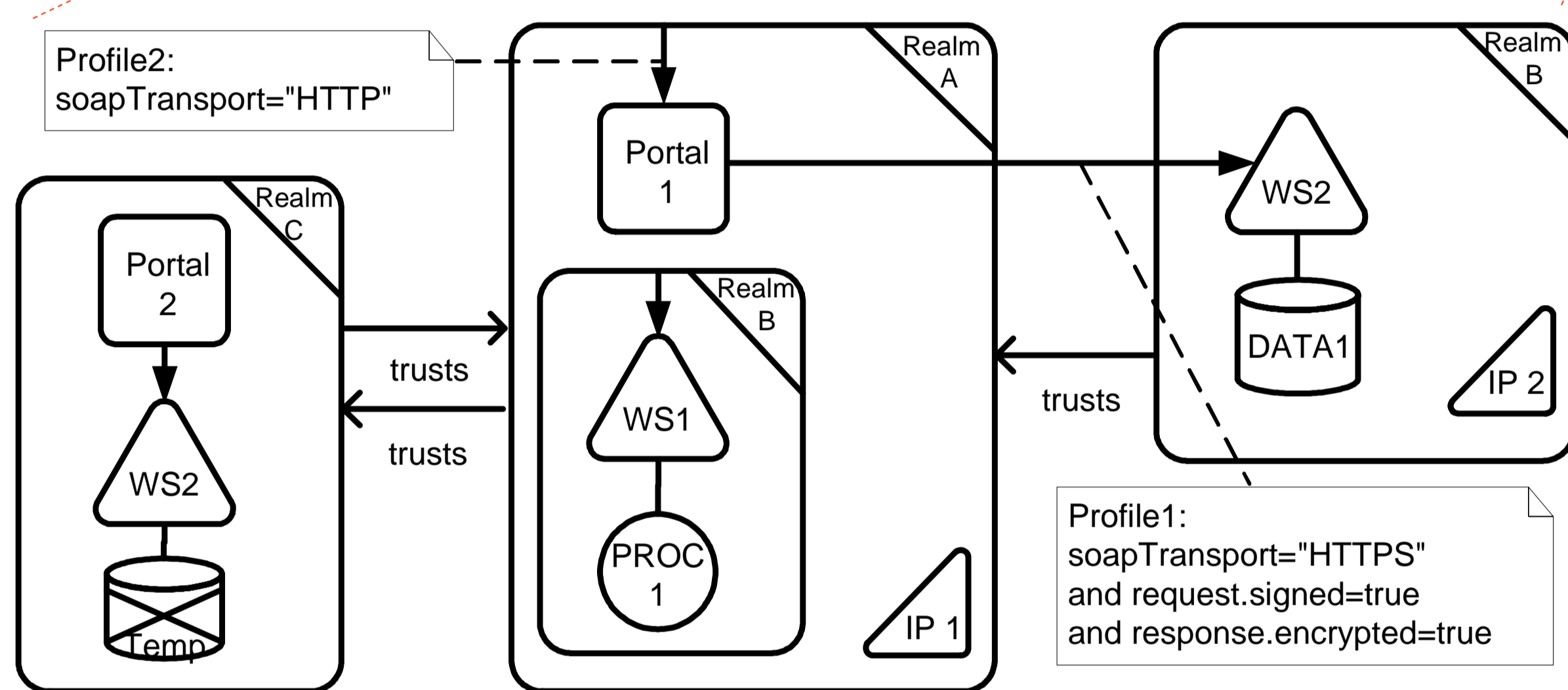
WAM Modeling Framework



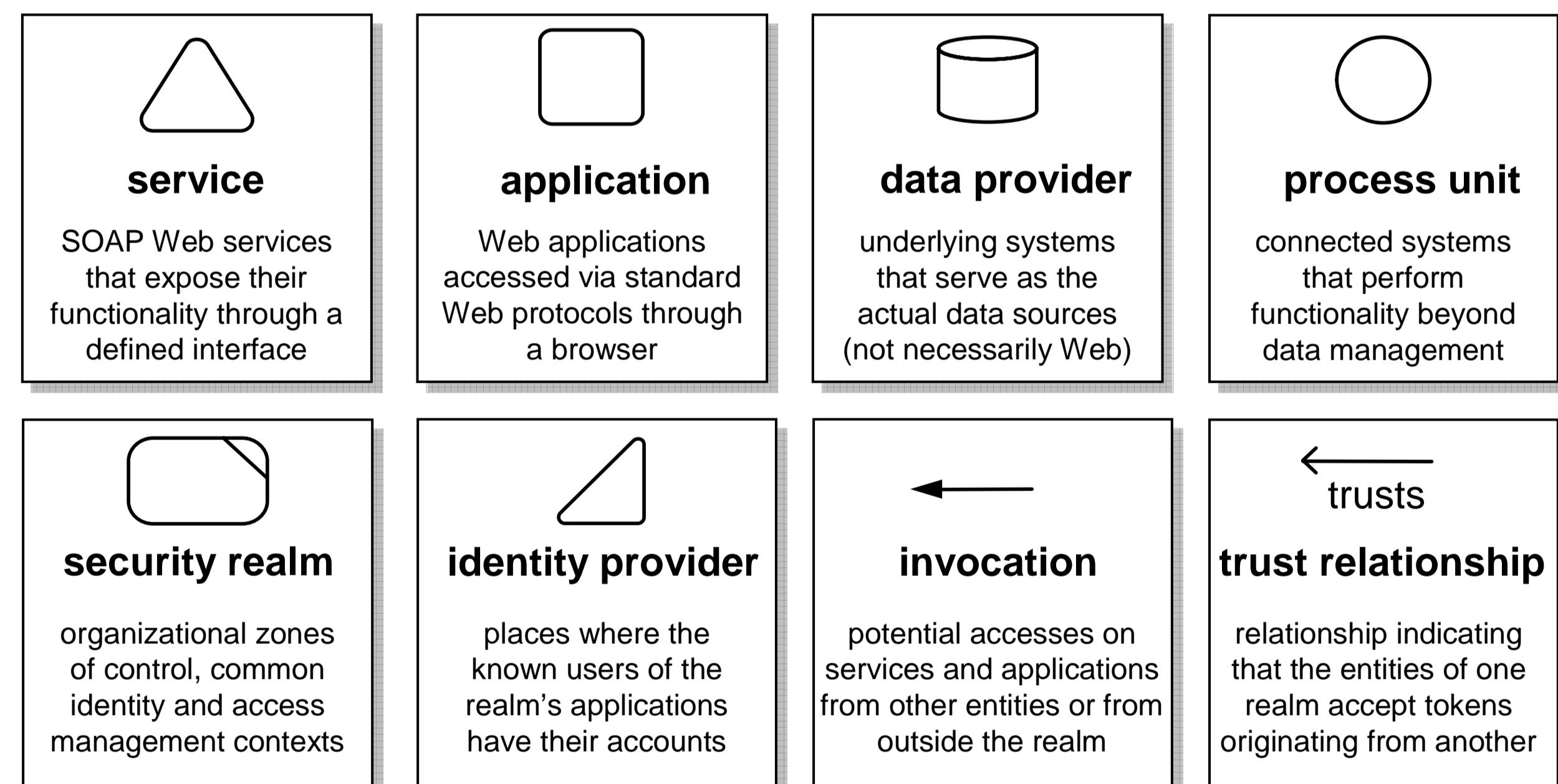
- Multiple models that each target different concerns / system layers
- WAM as the foundation model that covers the most vital aspects
- More layers can be added as extensions, possibly by third parties
- Entities from different layers can be related with inter-model relationships

WAM Core Model

Example



Modeling Elements



WAM-XML

WAM-XML is a language for providing machine-readable representations of WAM-models at design- and operation-time. It is defined by a flexible XML-Schema that incorporates existing XML-based specifications and allows future extensions. Modeling layers are represented by separate XML namespaces.

```

...
<wam:Application xmlns:wam="http://wsis.net...">
  <dc:Identifier xmlns:dc="http://purl.org...">
    http://mwrq.tm.uka.de/portal1
  </dc:Identifier>
  <dc:Title>Portal1</dc:Title>
  ...
</wam:Application>
<wam:Service>
  <dc:Identifier>
    http://mwrq.tm.uka.de/ws2
  </dc:Identifier>
  <dc:Title>WS2</dc:Title>
  ...
</wam:Service>
<wam:Invocation xlink:from="P1"
  xlink:to="WS2" xmlns:xlink="http://www.w3...">
  <core:Profile urn:mwrq:profile1</core:Profile>
</wam:Invocation>
<core:Selector xlink:label="P1"
  xlink:href="xpointer(/core:Model/core:Body/*
  [dc:Identifier='http:...'])"/>
<core:Selector xlink:label="WS2"
  xlink:href="xpointer(/core:Model/core:Body/*
  [dc:Identifier='http:...'])"/>
<hst:System xmlns:wam="http://third.party/...">
  <dc:Identifier>
    http://mwrq.tm.uka.de/server1
  </dc:Identifier>
  <dc:Title>Server1</dc:Title>
  ...
  <hst:Type>WebServer</hst:Type>
  ...
</hst:System>
...
    
```

reference on profile with protocol details

Dublin Core metadata about modeled entities

selector: placeholder for resources

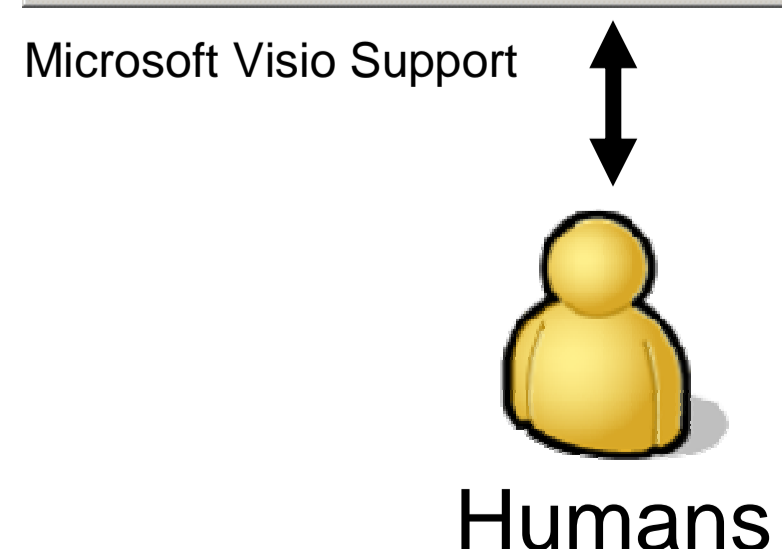
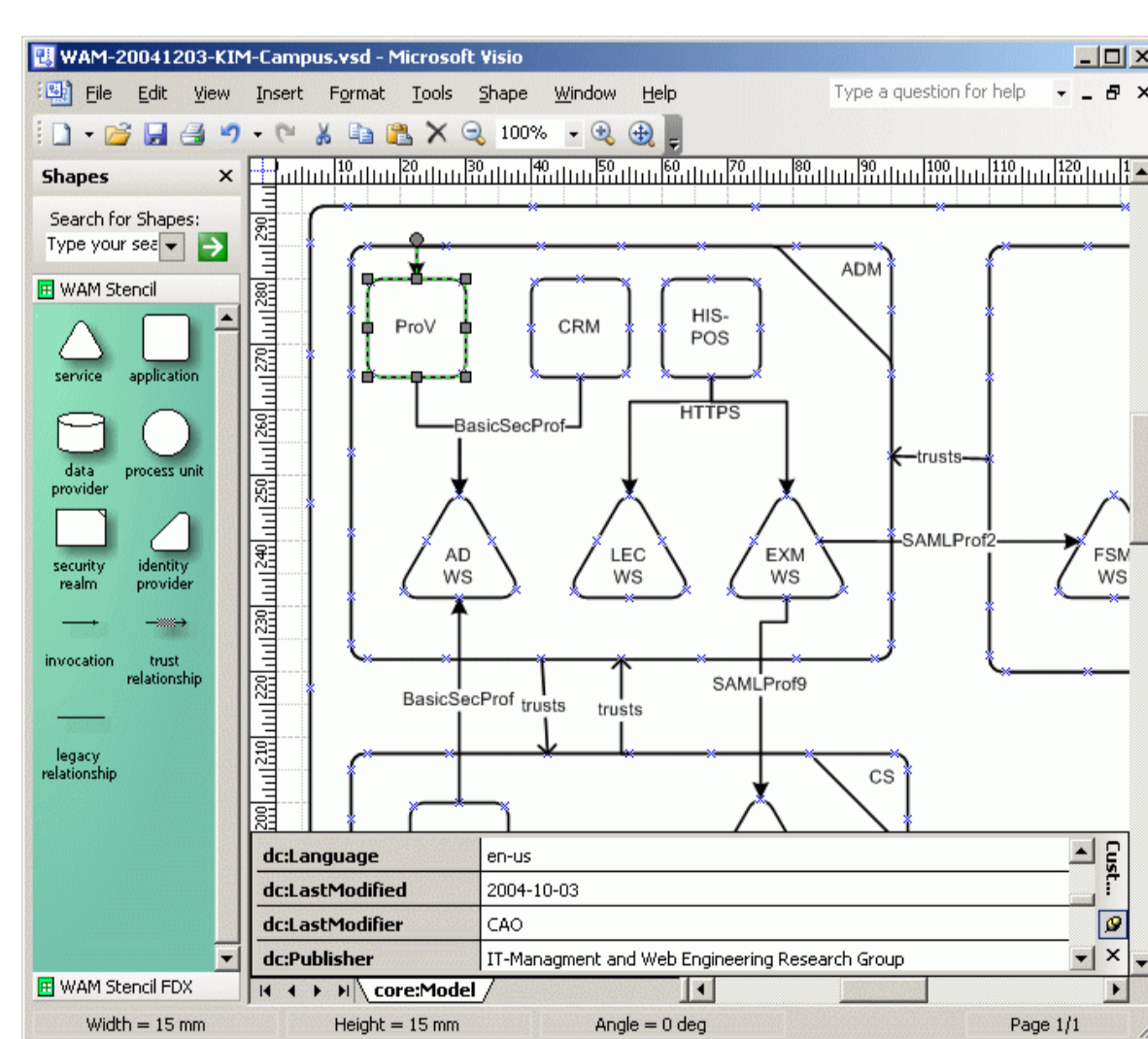
XLink-compliant relationships

additional namespace for layer extensions

Support Systems

Modeling Tool

- Tool for supporting model engineers in creating and modifying system descriptions
- Microsoft Visio customization with dedicated support for WAM diagrams
- Drag & drop interface editor
- XSLT-based transformation engine to generate WAM-XML
- Resulting code is written into the model database managed by the WAM Service



WAM-XML Store

WAM Infrastructure Service



Infrastructure Service

- Web service for querying and changing the model at runtime
- Bridges the gap between modeled world and real world
- CRUDS (Create, Read, Update, Delete, Search) service interface with support for different data formats
- Modeling data is exposed to supporting infrastructure services (e.g. monitoring service, RSS feeds, ...)