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eu-DOMAIN - enabling users for
Distance-working & Organizational Mobility
using Ambient Intelligence Networks

D4.4 Application intelligence and web service provisioning

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1. Introduction

This document provides documentation accompanying the software deliverable D4.4 – Application intelligence and web service provisioning, developed in Workpackage 4. This deliverable is part of the server-side architecture of the eu-DOMAIN platform.

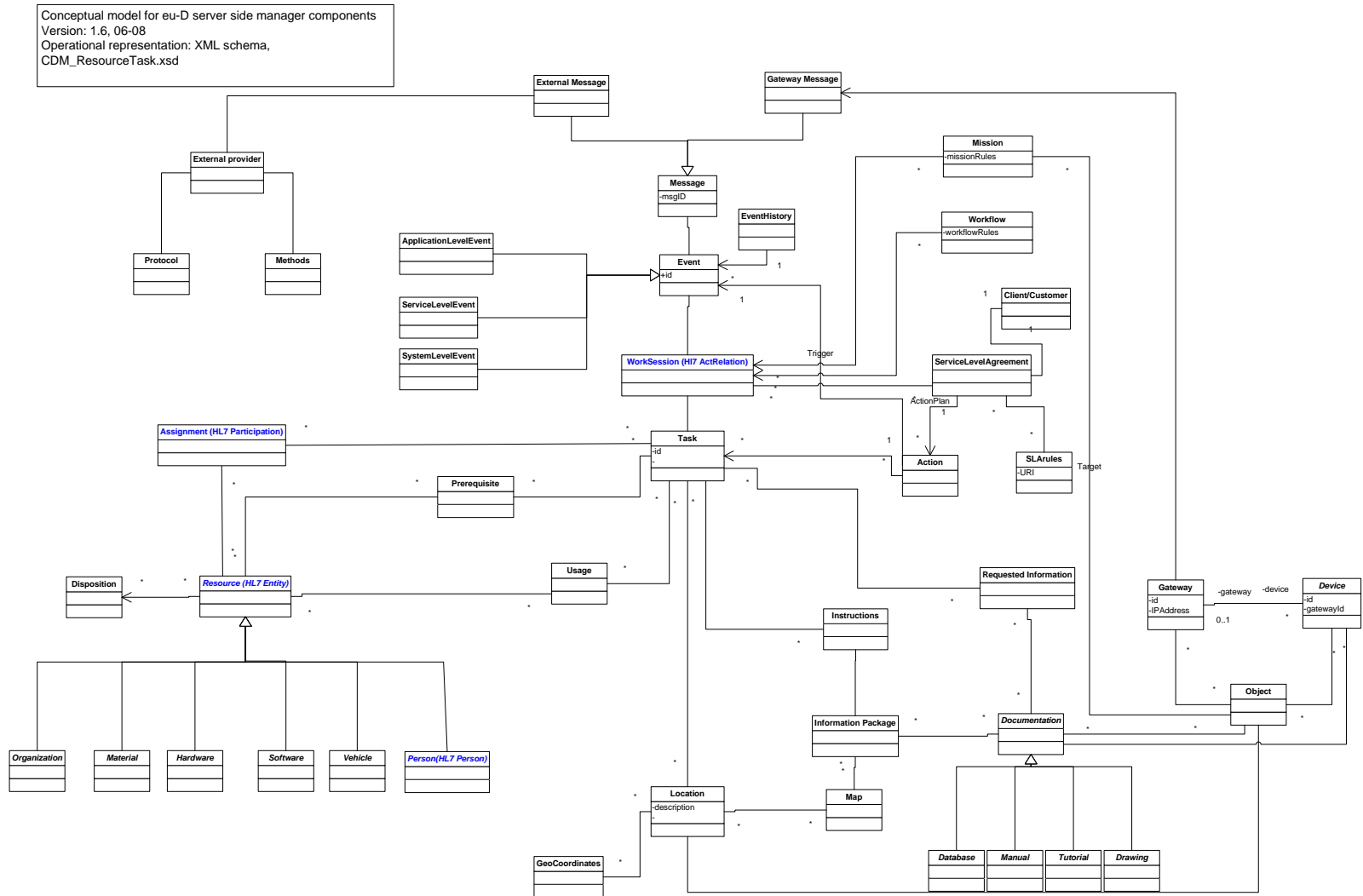
2. Domain model implementation

The implementations of the server-side manager components are based on a common conceptual domain model (CDM).

This common domain model has been mapped to an (operative) data model which is implemented by an XML schema (see appendix), and a set of web service interfaces.

The Managers operate on the structures defined in this model, providing the web service interfaces. Each externally accessible manager provides a WSDL interface, which exposes a subset of the domain model XML schema.

An analysis model view of the CDM is depicted in the following figure.



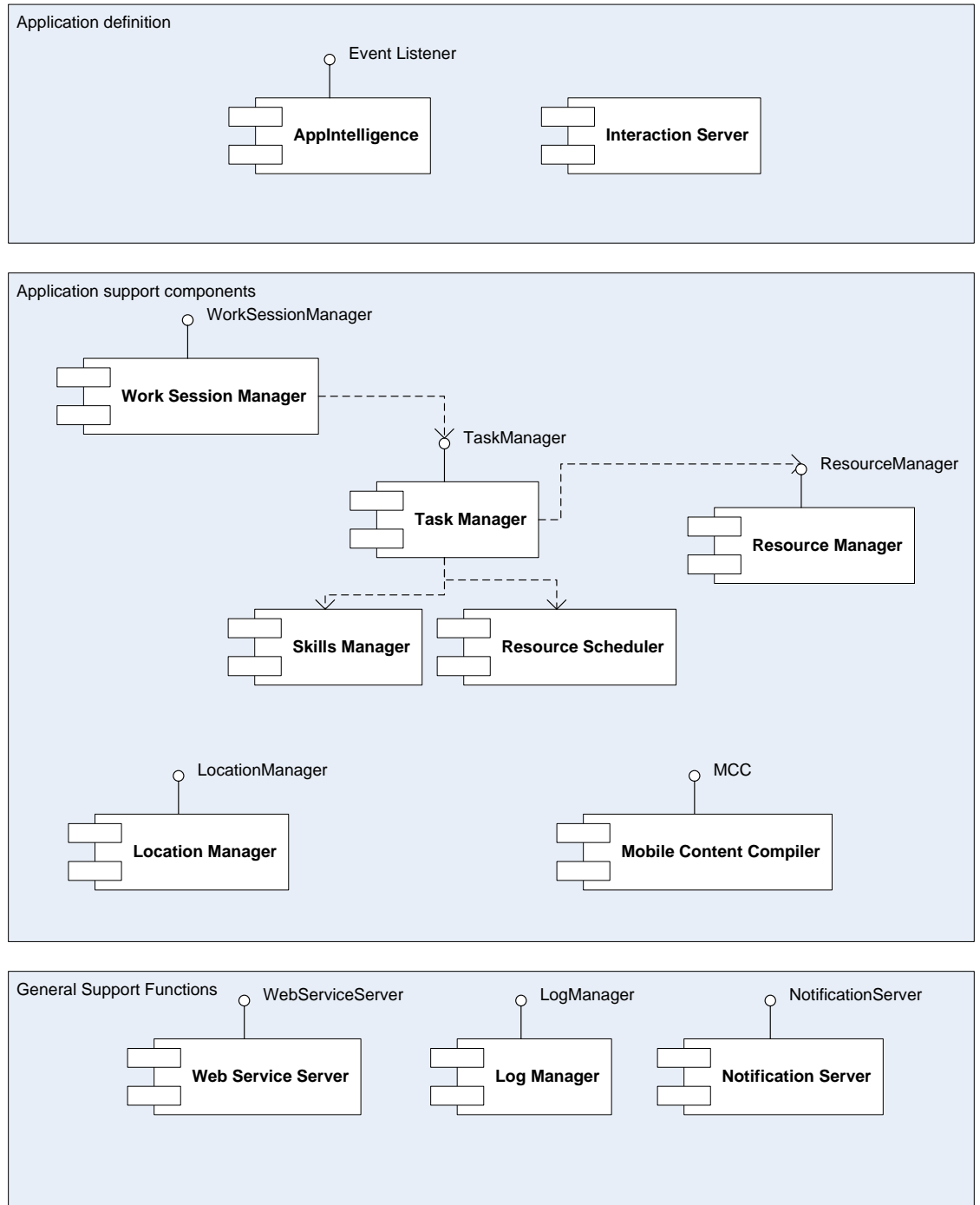
3. Manager implementation

The following components implements managers, exposing a web services (WSDL) interface:

- AppIntelligence (Rule Engine)
- Task Manager (including Resource Scheduler and Skills Manager)
- Mobile Content Compiler (MCC)
- Location Manager
- Log Manager
- Resource Manager
- Worksession Manager (Mission Manager)
- Web service server (WSS)
- Notification Manager
- Interaction Server

Below follows a short description of each manager

3.1 Overview



3.2 Application Intelligence

The application intelligence is responsible for managing the interpretation of input to the Eu-DOMAIN system and evaluating actions for these inputs. The main functional requirements of this component can be summarised as follows:

- Multiple applications should be able to run in parallel without posing any integration restrictions, i.e. the applications should be able to be fully independent of each other.
- Events should be able to “remember” previous states, i.e., we need some kind of sessions.
- Application intelligence should be easily extendable and provide a rich set of functions for managing the different inputs.
- It should be possible to express the application intelligence using rule based programming.
- Since the application intelligence should be tailored for each application it should use well known languages for expressing the rules.
- The rule engine should provide more than basic rule execution functionality, i.e., it should provide functionality for, e.g., prioritising rules and pruning
- It should be easily possible to extend the language with Eu-DOMAIN-specific constructs.

The basic idea behind the Application Intelligence module is to define an XML structure that represents a Session. This Session object keeps all the Events that happens during the Session. The main component inside the Application Intelligence is the Rule Engine. This is where operative rules are evaluated against the Session events. The Rule Engine is programmable using an XSL-T transformation sheet.

3.3 Task Manager

The Task Manager is dedicated to the tasks that need to be carried out by mobile workers, like nurses and service technicians, involved in eu-DOMAIN services. Given a task that needs to be carried out and the location, Task Manager selects the resources (in terms of personnel, vehicles, instruments, tools et c) needed.

To do this, the Task Manager

- Receives task execution orders from the Application Intelligence.
- It looks up task descriptions from the common domain model to get information of what is needed for the task and expected resource consumption (in terms of time and material).
- Task Manager then selects the resources (in terms of personnel, vehicles, instruments, tools et c) needed. It does so by using a Skills Manager that makes use of a Skills ontology to compare required skills with existing skills among the existing resources. The skills ontology is configurable for each application.
- The Skills Manager returns a ranked list of the available resources with scores that depends on how well their skills matches the task description.
- The Task Manager then uses the Resource Scheduler, that checks with a work schedule and tries to assign a resource to do the task at a given time.

3.4 Mobile Content Compiler

The Mobile Content Compiler is responsible for information management at an individual task level. Its role is to provide an optimal information package to support an individual worker carrying out a specific task. It tries to predict in advance what information the individual worker will need or request when carrying out the task.

To achieve these goals, the Mobile Content Compiler

- is responsible for retrieving and package information to support a mobile worker (like a service technician or a nurse) in a certain task,
- produces a tailored, individualised information package which is optimised for a task, and
- uses a task description but also knowledge about previous execution of similar tasks.
- It uses the Web Service Server to retrieve data, documents, manuals, instructional videos etc from external web services.
- It also uses the Location Manager to get maps and route instructions to get to the task location.
- The production of an Information Package is configurable using an XSL-T transformation sheet.

3.5 Location Manager

The Location Manager knows about different locations and their geographical positions. It is dedicated to answer questions such as the distance between two points, how to get between point A and B, and if traffic jams can be expected.

Further characteristics of the Location Manager are that

- It has two types of internal databases:
 - One with static geographical data (such as coordinates/maps etc)
 - Another with dynamic data (such as experiences from traffic situations during different hours)
- It provides an interface to services providing live traffic/weather data.
- It provides maps and drawings.
- It provides route planning.
- It provides persistent storage of locations.

Some of the functionality of the Location Manager is implemented using external web services.

3.6 Resource Manager

The Resource Manager is responsible for managing and delivering information about available resources such as workers, vehicles, tools, and medical equipment needed to provide the eu-DOMAIN service to end-users.

The purpose of the Resource Manager is to provide an efficient use of available resources. To achieve this, it provides functionality for:

- Given a profile it retrieves a list of available resources that matches the profile.

3.7 Log Manager

The Log Manager is a back-end module that is used internally for all tasks of logging and saving event information permanently.

Furthermore, the Log Manager provides runtime access to the Log so that other components can use the information in the Log to make informed decisions. It also provides to the Log Database, e.g., for billing purposes or to provide different analyses of the logged information.

3.8 Work Session Manager

The Work Session manager is responsible for tracking information regarding a specific work session (aka mission). A Work Session contains all the tasks that have been performed and all the events that have occurred for a Work Session. The Work Session is also part of the knowledge base when applying rules in the application intelligence. The Work Session also keeps track of the relationships inbetween different tasks, i.e. one task can be a child of another task.

Work Sessions together with appropriate rule bases in the application intelligence can form a simple work flow. For instance: there could be a predefined template Work Session for installing a device. This template can contain the necessary tasks as well as their relationships. The rules would decide when to trigger and execute the individual tasks.

The Work Session is also an integral part of the information needed for creating billing information since it has the knowledge of what and when tasks were performed and which events were triggered during the process.

To do this, the Work Session manager

- Offer persistent storage of Work Sessions over time.
- Interfaces for adding events.
- Interface for adding tasks.
- Search interfaces to find Work Sessions with respect to tasks and events.

3.9 Web Service Server

The Web Service Server is in charge of communication and data interchange with services of external Content Providers. Its main function is to translate requests for external data, expressed in terms of the Domain Model, into a set of web service calls.

The protocol and interface used for communication and interchange with external services are based on SOAP (Simple Object Access Protocol) and WSDL (Web Service Description Language).

To implement the desired communication, the Web Service Server

- Constructs an evaluation plan to make the web service calls correctly and efficiently,
- Composes and translates the data into calls to the Domain Model once the requested information arrives,
- Tries to optimise the evaluation of multiple requests, with respect to possible parallel solutions and data dependencies, and
- Has knowledge and meta-information about external Content Provider Services which it uses to construct its evaluation plan.
- The Web Service Server is also capable of accessing non-XML based web services such as ordinary HTML-based web sites.

3.10 Notification Manager

The Notification Manager is in charge of sending notifications to end-users. These notifications can be delivered using short messages (SMS) to mobile phones or e-mails. The notifications will be based on predefined templates and the information to be sent will be obtained from the domain model.

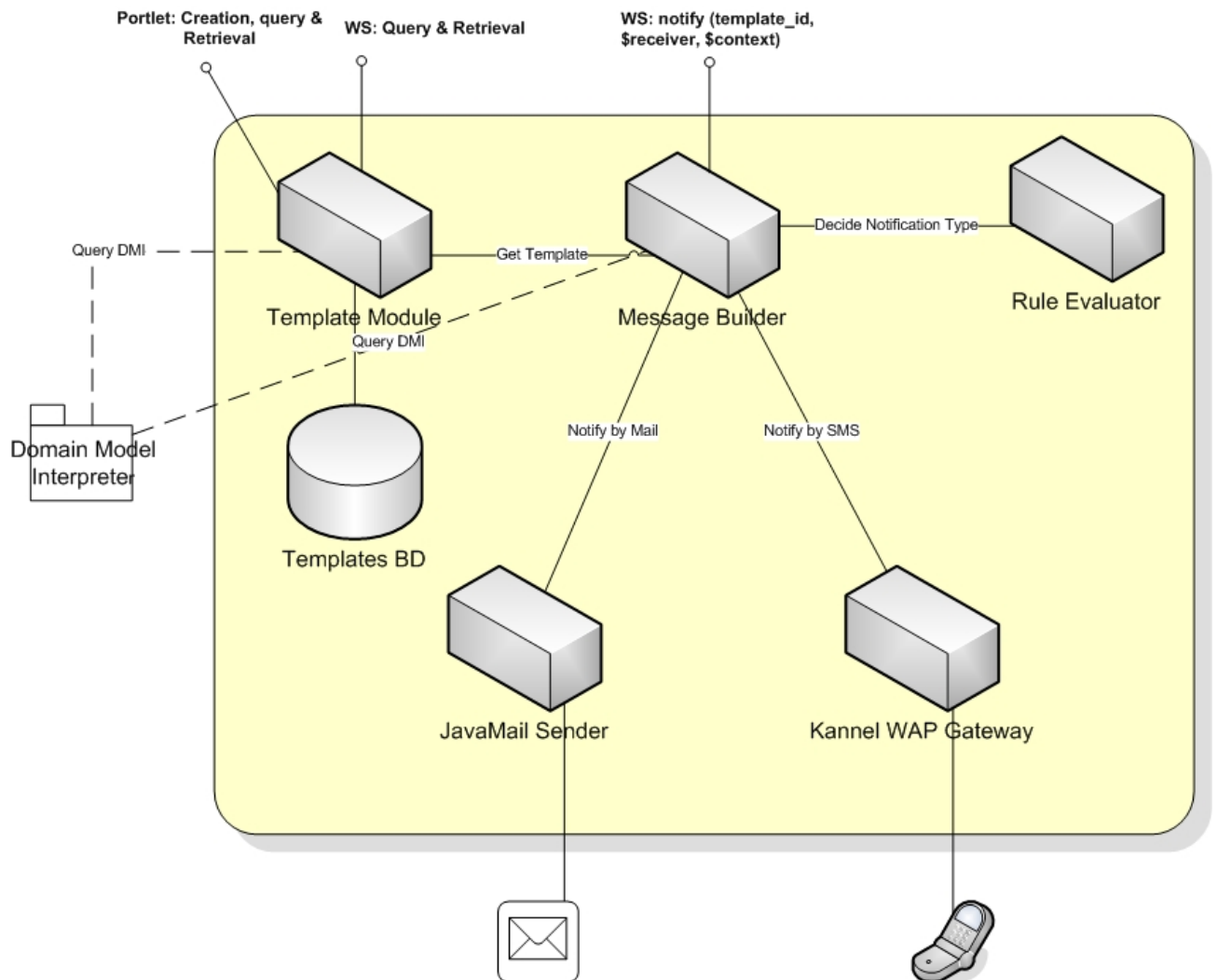
The Notification Manager will provide different interfaces (web services) regarding the functionality offered:

- The templates will be created using a portlet (user interface)
- A web service will be set to retrieve the id of the template to be used (machine interface)
- Another web service will be published to be called when a notification is needed (machine interface)

Thus, the Notification Manager

- Provides mechanisms to easily create, query and retrieve templates
- Calls the DMI to get the appropriate information to build the message
- Evaluates the type of message required and the profile of the receiver to determine the best notification to be sent
- Builds the message (SMS or plain/HTML e-mail)
- Sends the notification (using JavaMail o Kannel) to the receiver

The next figure shows the details of this manager and its interfaces:



3.11 Interaction Server

The Interaction Server is the element used in the system to provide the user interfaces. It's the entrance point of the system for end-users.

The Interaction Server is a web portal based on the open source tool Liferay. Liferay is a portlet container that includes pre-built features such as single sign-on, templates, tailored views regarding roles, etc. Although Liferay is server agnostic, the Interaction Server will be running over a Tomcat web server installation. Moreover, as part of the security architecture in eu-DOMAIN, the login system in the portal will be performed against a LDAP server where the roles and privileges of users are stored.

A number of portlets (web fragments that offer some functionality) will be developed within this framework in order to provide the functionality required by the system for the different users in the system and in the different domains (ESN and PaC).

Appendix 1: Object examples

In this appendix we give some example of the most important object structures that is managed in the EU-Domain Server.

Example Operative Rules

```
<xsl:template match="eud:event[./eud:Type]" name="rule9">
  <!-- ===== Task Map ===== -->
  <xsl:variable name="t1" select="{00000000-0000-0000-0000-000000000011}"/>

  <!-- ===== check event specific params ===== -->
  <xsl:variable name="hh" select="substring(eud:Event/eud:Time,1,2)"/>
  <xsl:variable name="mm" select="substring(eud:Event/eud:Time,4,2)"/>
  <xsl:call-template name="prepareTasks">
    <xsl:with-param name="tasks">
      <task priority="10">
        <id>
          <xsl:value-of select="$t1"/>
        </id>
        <!-- propose time constraints -->
        <start>
          <xsl:value-of select="user:addTime(number($hh),number($mm),0,0)"/>
        </start>
        <styp>recommended</styp>
        <end>
          <xsl:value-of select="user:addTime(number($hh),number($mm),8,0)"/>
        </end>
        <etyp>not later</etyp>
      </task>
    </xsl:with-param>
  </xsl:call-template>
</xsl:template>

<xsl:template match="eud:event[./eud:Type='Toilet Flooding']" name="rule0">
  <!-- ===== Task Map ===== -->
  <xsl:variable name="t1" select="{111111111-1111-1111-1111-111111111111}"/>
  <xsl:variable name="t2" select="{22222222-1111-1111-1111-111111111111}"/>
  <xsl:variable name="t3" select="{33333333-1111-1111-1111-111111111111}"/>
  <!-- Note use of client namespace, should be def in the SA -->
  <xsl:call-template name="prepareTasks">
    <xsl:with-param name="tasks">
      <xsl:variable name="hh" select="substring(eud:Event/eud:Time,1,2)"/>
      <xsl:variable name="mm" select="substring(eud:Event/eud:Time,4,2)"/>
      <task priority="0">
        <id>
          <xsl:value-of select="$t1"/>
        </id>
        <!-- propose time constraints -->
        <start>
          <xsl:value-of select="user:addTime(number($hh),number($mm),3,00)"/>
        </start>
        <styp>recommended</styp>
        <end>
          <xsl:value-of select="user:addTime(number($hh),number($mm),12,00)"/>
        </end>
        <etyp>not later</etyp>
      </task>
    </xsl:with-param>
  </xsl:call-template>
</xsl:template>
```

```

    </task>

    </xsl:with-param>
  </xsl:call-template>
</xsl:template>

```

Example Task Description

```

<Task status="planned" xmlns:xsd="http://www.w3.org/2001/XMLSchema"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance">
  <id xmlns="http://eu-domain.cnet.se/EU-DomainTask.xsd">{11111111-1111-1111-1111-
111111111111}</id>
  <name xmlns="http://eu-domain.cnet.se/EU-DomainTask.xsd">Clean toilet</name>
  <description xmlns="http://eu-domain.cnet.se/EU-DomainTask.xsd">Open door, put head inside toilet
and flush</description>
  <preRequisite xmlns="http://eu-domain.cnet.se/EU-DomainTask.xsd">
    <person xmlns="http://eu-domain.cnet.se/EU-DomainTask.xsd">
      <id xmlns="http://eu-domain.cnet.se/EU-DomainTask.xsd">{00000000-0000-0000-0000-
000000000000}</id>
      <domainSpecifics xmlns="http://eu-domain.cnet.se/EU-DomainTask.xsd">
        <number xmlns="http://eu-domain.cnet.se/EU-DomainTask.xsd">1</number>
        <startminute xmlns="http://eu-domain.cnet.se/EU-DomainTask.xsd">0</startminute>
        <endminute xmlns="http://eu-domain.cnet.se/EU-DomainTask.xsd">60</endminute>
      </domainSpecifics>
      <skills xmlns="http://eu-domain.cnet.se/EU-DomainTask.xsd">
        <skill weight="2" xmlns="http://eu-domain.cnet.se/EU-DomainTask.xsd">
          <name xmlns="http://eu-domain.cnet.se/EU-DomainTask.xsd">Plumber</name>
          <level xmlns="http://eu-domain.cnet.se/EU-DomainTask.xsd">2</level>
        </skill>
        <skill weight="1" xmlns="http://eu-domain.cnet.se/EU-DomainTask.xsd">
          <name xmlns="http://eu-domain.cnet.se/EU-DomainTask.xsd">Cleaner</name>
          <level xmlns="http://eu-domain.cnet.se/EU-DomainTask.xsd">1</level>
        </skill>
      </skills>
    </person>
  </preRequisite>
  <instructions xmlns="http://eu-domain.cnet.se/EU-DomainTask.xsd">
    <infoPackRef xmlns="http://eu-domain.cnet.se/EU-DomainTask.xsd"/>
  </instructions>
</Task>

```

Example Information Package

```

<xsl:template name="all">
  <xsl:variable name="actionplan"><xsl:copy-of
select="mcc:Execute('GetObjectActionPlan',concat($locationstreet,'',$locationnumber,',
all'))"/></xsl:variable>
  <xsl:variable name="customer_id" select="msxsl:node-set($actionplan)//@Customer_no"/>
  <actionPlan>
    <xsl:copy-of select="msxsl:node-set($actionplan)//MEASURE/MEASURE"/>
    <xsl:copy-of select="msxsl:node-
set(mcc:Execute('GetCustomer',$customer_id))//CUSTOMER/CUSTOMER"/>
  </actionPlan>
  <drawings><xsl:copy-of select="mcc:GetDrawing($locationstreet,$locationnumber)"/></drawings>
  <map><xsl:copy-of select="mcc:GetLocationMap($locationstreet,$locationnumber,$locationcity)"/></map>

```

```

<route><xsl:copy-of
select="mcc:GetRoute($fromlocationstreet,$fromlocationnumber,$fromlocationcity,$locationstreet,$locationnumber,$locationcity)"/></route>
</xsl:template>

```

Example Ranked Resource List

```

<Resource xsi:type="q3:ResPerson" matchpoints="4" xmlns:q3="http://eu-domain.cnet.se/EU-
DomainTask.xsd">
  <q3:id>eee11f05-48c2-485a-9d68-4a8a9e9f5f4a</q3:id>
  <q3:personDetails>Peeter Kool</q3:personDetails>
  <q3:skills>
    <q3:skill>
      <q3:name>Cardriver</q3:name>
      <q3:level/>
      <q3:certified/>
    </q3:skill>
    <q3:skill>
      <q3:name>Plumber</q3:name>
      <q3:level/>
      <q3:certified/>
    </q3:skill>
    <q3:skill>
      <q3:name>Grundfoscertified</q3:name>
      <q3:level/>
      <q3:certified/>
    </q3:skill>
    <q3:skill>
      <q3:name>IVTcertified</q3:name>
      <q3:level/>
      <q3:certified/>
    </q3:skill>
    <q3:skill>
      <q3:name>Cardriver</q3:name>
      <q3:level/>
      <q3:certified/>
    </q3:skill>
  </q3:skills>
</Resource>
<Resource xsi:type="q1:ResPerson" matchpoints="" xmlns:q1="http://eu-domain.cnet.se/EU-
DomainTask.xsd">
  <q1:id>7843c4cd-2674-4bef-a907-ee50cf3895a1</q1:id>
  <q1:personDetails>Matts Ahlsén</q1:personDetails>
  <q1:skills/>
</Resource>
<Resource xsi:type="q2:ResPerson" matchpoints="" xmlns:q2="http://eu-domain.cnet.se/EU-
DomainTask.xsd">
  <q2:id>d98d3f51-642a-4a96-adbf-040b0fd26b7e</q2:id>
  <q2:personDetails>Fabio Gonzales</q2:personDetails>
  <q2:skills>
    <q2:skill>
      <q2:name>Grundfoscertified</q2:name>
      <q2:level/>
      <q2:certified/>
    </q2:skill>
    <q2:skill>
      <q2:name>Vandriver</q2:name>
      <q2:level/>
      <q2:certified/>
    </q2:skill>
  </q2:skills>

```

```

    </q2:skill>
    <q2:skill>
      <q2:name>Cleaner</q2:name>
      <q2:level/>
      <q2:certified/>
    </q2:skill>
  </q2:skills>
</Resource>
<Resource xsi:type="q4:ResPerson" matchpoints="" xmlns:q4="http://eu-domain.cnet.se/EU-
DomainTask.xsd">
  <q4:id>4a1a3dbc-42ed-434c-a0d2-96c1332dbe58</q4:id>
  <q4:personDetails>Oliver Nilsson</q4:personDetails>
  <q4:skills>
    <q4:skill>
      <q4:name>Inspector</q4:name>
      <q4:level/>
      <q4:certified/>
    </q4:skill>
  </q4:skills>
</Resource>
<Resource xsi:type="q5:ResPerson" matchpoints="" xmlns:q5="http://eu-domain.cnet.se/EU-
DomainTask.xsd">
  <q5:id>5dc7c1b0-a5e9-4c52-b6af-6299b8a3555a</q5:id>
  <q5:personDetails>System Operator</q5:personDetails>
  <q5:skills>
    <q5:skill>
      <q5:name>System</q5:name>
      <q5:level/>
      <q5:certified/>
    </q5:skill>
  </q5:skills>
</Resource>

```

Example WorkSession

```

<WorkSession xmlns:xsd="http://www.w3.org/2001/XMLSchema"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
  <id xmlns="http://eu-domain.cnet.se/EU-DomainTask.xsd">674ea6ef-816f-4a55-be77-e2fe6ec26f0f</id>
  <startTime xmlns="http://eu-domain.cnet.se/EU-DomainTask.xsd">0001-01-
01T00:00:00.0000000+01:00</startTime>
  <events xmlns="http://eu-domain.cnet.se/EU-DomainTask.xsd">
    <event>
      <id>9511a309-1c31-4976-b375-9d40120503c0</id>
      <eventType>business</eventType>
      <timeStamp>2006-05-02T17:07:39.1325154+02:00</timeStamp>
    </event>
    <event>
      <id>114efd94-63cd-4bb4-a455-41f9570d197f</id>
      <eventType>application</eventType>
      <timeStamp>0001-01-01T00:00:00.0000000+01:00</timeStamp>
      <Event>
        <Type>HEATING SYSTEM BROKEN</Type>
        <objectID>Heat Exchanger</objectID>
        <deviceID/>
        <locationID>ARTILLERIGATAN 63, 16325</locationID>
        <eventMessage/>
        <Time>09:00</Time>
      </Event>
    </event>
  </events>

```



```

<event>
  <id>97d16b23-4b2c-42d7-946c-2eeb3a657a88</id>
  <eventType>system</eventType>
  <timeStamp>0001-01-01T00:00:00.0000000+01:00</timeStamp>
  <Event>
    <Type>Task Scheduled and Assigned</Type>
    <taskid>c67f2ef9-2f56-4417-9673-69d2eb9457bb</taskid>
  </Event>
</event>
</events>
<tasks xmlns="http://eu-domain.cnet.se/EU-DomainTask.xsd">
  <taskRef>
    <id>c67f2ef9-2f56-4417-9673-69d2eb9457bb</id>
    <Task status="planned">
      <id>c67f2ef9-2f56-4417-9673-69d2eb9457bb</id>
      <name>Repair Heating System</name>
      <locationID>ARTILLERIGATAN 63, 16325</locationID>
      <priority>4</priority>
      <preRequisite>
        <person>
          <id>00000000-0000-0000-0000-000000000000</id>
          <domainSpecifics>
            <number>1</number>
            <startminute>0</startminute>
            <endminute>60</endminute>
          </domainSpecifics>
          <skills>
            <skill weight="3">
              <name>Heatingsystem</name>
              <level>2</level>
            </skill>
            <skill weight="2">
              <name>vandriver</name>
              <level>1</level>
            </skill>
            <skill weight="1">
              <name>Cardriver</name>
              <level>1</level>
            </skill>
          </skills>
        </person>
      </preRequisite>
      <instructions>
        <infoPackRef>
          <id>1879ebe2-c552-497e-a233-ef526588d31a</id>
          <instructions xmlns:msxsl="urn:schemas-microsoft-com:xslt"
xmlns:user="http://www.cnet.se" xmlns:eud="http://eu-domain.cnet.se/EU-DomainTask.xsd"
xmlns:mcc="urn:eu_domainMCC">
            <id>1879ebe2-c552-497e-a233-ef526588d31a</id>
            <actionPlan>
              <MEASURE ID="16325" Mesaure_code="" Objectname=""
Site_name="ARTILLERIGATAN 63" Customer_no="73974004" Map_reference="" Measure_plan=""
Fault_code="" Fault_category="" Fault_term="" isparsed="yes"/>
              <CUSTOMER ID="1679" Type="" Companyname="RAGNHILD TYSK"
Common_name="Övf ARSENALEN" Lastname="" Firstname="" Registered="" customerId="73974004"
isparsed="yes"/>
            </actionPlan>
            <drawings>

```

```

        <drawing>http://localhost/vnapps/esn/drawings/ARTILLERIGATAN
63.pdf</drawing>
        </drawings>
        <map>
          <mapRef>http://eu-domain.cnet.se/LocationManagerV2/Results/ff8e58ac-fa2b-
47e5-b619-e5e50398cdd6.jpg</mapRef>
          </map>
          <route>
            <route total_distance="8.8" whole_map="http://eu-
domain.cnet.se/LocationManagerV2/Results/c2dc28fd-33fd-414d-b712-8f7ba3c9e47.jpg"
start_map="http://eu-domain.cnet.se/LocationManagerV2/Results/d6283f74-3027-4682-868e-
c9c7106131ad.jpg" dest_map="http://eu-domain.cnet.se/LocationManagerV2/Results/09bf657d-b217-44d3-
be72-146fad7ac0d.jpg">
<routepart distance="0.0" description="Starta på Svärdvägen" distance2="140 m"/>
<routepart distance="0.1" description="Sväng vänster i rondellen till Edsviksvägen" distance2="140 m"/>
<routepart distance="0.3" description="Sväng vänster i rondellen till Gamla Landsvägen" distance2="220
m"/>
<routepart distance="0.5" description="Sväng höger i rondellen till Gamla Landsvägen" distance2="00 m"/>
<routepart distance="0.5" description="Sväng höger via påfart till Norrtäljevägen (E18)" distance2="270 m"/>
<routepart distance="0.8" description="Följ skylt mot Stockholm" distance2="1.9 km"/>
<routepart distance="2.7" description="Kör vidare in på Norrtäljevägen" distance2="0.8 km"/>
<routepart distance="3.5" description="Kör vidare in på Roslagsvägen" distance2="2.9 km"/>
<routepart distance="6.4" description="Kör rakt fram i rondellen till Valhallavägen (E20)" distance2="180
m"/>
<routepart distance="6.6" description="Håll till vänster på Valhallavägen (E20)" distance2="1.4 km"/>
<routepart distance="8.0" description="Kör vidare in på Valhallavägen" distance2="0.5 km"/>
<routepart distance="8.5" description="Kör höger in på Artillerigatan" distance2="220 m"/>
<routepart distance="8.8" description="Stopp på Artillerigatan" distance2=""/>
            </route>
            </route>
            <documentationRef>toiletcleaningfordummies.doc</documentationRef>
            <documentationRef>PumpA12Small.wmv</documentationRef>
          </instructions>
        </infoPackRef>
      </instructions>
      <timeFrame>
        <start type="recommended">2006-04-26T11:00:00.0000000+02:00</start>
        <end type="not later">2006-04-26T18:00:00.0000000+02:00</end>
      </timeFrame>
      <domainSpecifics>
        <Assignment xmlns="">
          <Taskid>c67f2ef9-2f56-4417-9673-69d2eb9457bb</Taskid>
          <Taskname>Repair Heating System</Taskname>
          <Resourceid>eee11f05-48c2-485a-9d68-4a8a9e9f5f4a</Resourceid>
          <Locationid>ARTILLERIGATAN 63, 16325</Locationid>
          <Priority>4</Priority>
          <Timescheduler>
            <Start type="estimated">
              <Date>20060426</Date>
              <Time>1200</Time>
            </Start>
            <End type="estimated" precision="0.2" duration="60">
              <Date>20060426</Date>
              <Time>1300</Time>
            </End>
          </Timescheduler>
        </Assignment>
      </domainSpecifics>
    </Task>

```

```
</taskRef>  
</tasks>  
</WorkSession>
```

Appendix 2: CDM XML schema serialization

```

<!-- edited with XMLSPY (http://www.xmlspy.com) by (CNet Svenska AB) -->
<!-- eu-DOMAIN, xml serialization of domain model -->
<!-- developers version 1.5 -->
<s:schema targetNamespace="http://eu-domain.cnet.se/EU-DomainTask.xsd"
xmlns:s="http://www.w3.org/2001/XMLSchema" xmlns:eud="http://eu-domain.cnet.se/EU-DomainTask.xsd"
elementFormDefault="qualified">
  <s:annotation>
    <s:documentation>eu-DOMAIN Common Domain Model. XML serialization.</s:documentation>
    <s:appinfo xmlns:dc="http://purl.org/dc/elements/1.1">
      <dc:creator>eu-DOMAIN consortium / CNet Svenska AB</dc:creator>
      <dc:date>2006-08-23</dc:date>
      <dc:description xml:lang="eng">xml serialization of domain model</dc:description>
      <dc:rights>Copyright eu-DOMAIN consortium</dc:rights>
      <version>developers 1.5</version>
    </s:appinfo>
  </s:annotation>
  <!-- ===== Generic types ===== -->
  <s:simpleType name="guid">
    <s:restriction base="s:string">
      <s:pattern value="{?([A-Z][a-z][0-9]){8}-([A-Z][a-z][0-9]){4}-([A-Z][a-z][0-9]){4}-([A-Z][a-z][0-9]){4}-([A-Z][a-z][0-9]){12}}?"/>
    </s:restriction>
  </s:simpleType>
  <s:simpleType name="LangCodes">
    <s:restriction base="s:string">
      <s:enumeration value="swe"/>
      <s:enumeration value="eng"/>
      <s:enumeration value="fra"/>
      <s:enumeration value="ger"/>
      <s:enumeration value="spa"/>
      <s:enumeration value="slv"/>
      <s:enumeration value="gre"/>
      <s:enumeration value="ita"/>
      <s:enumeration value="N/A"/>
    </s:restriction>
  </s:simpleType>
  <s:simpleType name="CountryCodes">
    <s:restriction base="s:string">
      <s:enumeration value="SE"/>
      <s:enumeration value="GB"/>
      <s:enumeration value="GR"/>
      <s:enumeration value="DE"/>
      <s:enumeration value="IT"/>
      <s:enumeration value="ES"/>
      <s:enumeration value="SI"/>
      <s:enumeration value="FR"/>
      <s:enumeration value="NO"/>
      <s:enumeration value="KZ"/>
      <s:enumeration value="N/A"/>
    </s:restriction>
    <!-- from iso 3166 -->
  </s:simpleType>
  <!-- ===== Object reference type defs, for dereferencing 1st class objects (with guid) ===== -
->
  <s:complexType name="Reference" abstract="true">
    <s:sequence>
      <s:element name="id" type="eud:guid"/>

```

```

        <s:element name="description" type="s:string" minOccurs="0"/>
    </s:sequence>
</s:complexType>
<!-- ===== -->
<s:complexType name="TaskRef">
    <s:complexContent>
        <s:extension base="eud:Reference">
            <s:sequence>
                <s:element name="typeName" type="s:string" fixed="Task"/>
            </s:sequence>
        </s:extension>
    </s:complexContent>
</s:complexType>
<!-- ===== -->
<s:complexType name="WorkSessionRef">
    <s:complexContent>
        <s:extension base="eud:Reference">
            <s:sequence>
                <s:element name="typeName" type="s:string" fixed="WorkSession"/>
            </s:sequence>
        </s:extension>
    </s:complexContent>
</s:complexType>
<!-- ===== -->
<s:complexType name="ResourceRef">
    <s:complexContent>
        <s:extension base="eud:Reference">
            <s:sequence>
                <s:element name="typeName">
                    <s:simpleType>
                        <s:restriction base="s:string">
                            <s:enumeration value="ResOrganization"/>
                            <s:enumeration value="ResMaterial"/>
                            <s:enumeration value="ResHardware"/>
                            <s:enumeration value="ResSoftware"/>
                            <s:enumeration value="ResVehicle"/>
                            <s:enumeration value="ResPerson"/>
                        </s:restriction>
                    </s:simpleType>
                </s:element>
            </s:sequence>
        </s:extension>
    </s:complexContent>
</s:complexType>
<!-- ===== -->
<s:complexType name="ObjectRef">
    <s:complexContent>
        <s:extension base="eud:Reference">
            <s:sequence>
                <s:element name="typeName" type="s:string" fixed="Object"/>
            </s:sequence>
        </s:extension>
    </s:complexContent>
</s:complexType>
<!-- ===== -->
<s:complexType name="DocumentationRef">
    <s:complexContent>
        <s:extension base="eud:Reference">
            <s:sequence>
                <s:element name="typeName">

```

```

        <s:simpleType>
          <s:restriction base="s:string">
            <s:enumeration value="Database"/>
            <s:enumeration value="Manual"/>
            <s:enumeration value="Graphic"/>
          </s:restriction>
        </s:simpleType>
      </s:element>
    </s:sequence>
  </s:extension>
</s:complexType>
</s:complexType>
<!-- ===== -->
<s:complexType name="InformationPackageRef">
  <s:complexContent>
    <s:extension base="eud:Reference">
      <s:sequence>
        <s:element name="typeName" type="s:string" fixed="InformationPackage"/>
      </s:sequence>
    </s:extension>
  </s:complexContent>
</s:complexType>
<!-- ===== -->
<s:complexType name="ServiceAgreementRef">
  <s:complexContent>
    <s:extension base="eud:Reference">
      <s:sequence>
        <s:element name="typeName" type="s:string" fixed="ServiceAgreement"/>
      </s:sequence>
    </s:extension>
  </s:complexContent>
</s:complexType>
<!-- ===== -->
<s:complexType name="EventRef">
  <s:complexContent>
    <s:extension base="eud:Reference">
      <s:sequence>
        <s:element name="typeName" type="s:string" fixed="Event" nillable="false"/>
      </s:sequence>
    </s:extension>
  </s:complexContent>
</s:complexType>
<!-- ===== -->
<s:complexType name="MapRef">
  <s:complexContent>
    <s:extension base="eud:Reference">
      <s:sequence>
        <s:element name="typeName" type="s:string" fixed="Map"/>
      </s:sequence>
    </s:extension>
  </s:complexContent>
</s:complexType>
<!-- ===== -->
<s:complexType name="LocationRef">
  <s:complexContent>
    <s:extension base="eud:Reference">
      <s:sequence>
        <s:element name="typeName" type="s:string" fixed="Location"/>
      </s:sequence>
    </s:extension>
  </s:complexContent>
</s:complexType>

```

```

    </s:complexContent>
  </s:complexType>
<!-- ===== -->
<s:complexType name="DeviceRef">
  <s:complexContent>
    <s:extension base="eud:Reference">
      <s:sequence>
        <s:element name="typeName" type="s:string" fixed="Device"/>
      </s:sequence>
    </s:extension>
  </s:complexContent>
</s:complexType>
<!-- ===== -->
<s:complexType name="GatewayRef">
  <s:complexContent>
    <s:extension base="eud:Reference">
      <s:sequence>
        <s:element name="typeName" type="s:string" fixed="Gateway"/>
      </s:sequence>
    </s:extension>
  </s:complexContent>
</s:complexType>
<!-- ===== -->
<!-- ===== Main Type Defs ===== -->
<!-- ===== typedef resource ===== -->
<s:complexType name="Resource" abstract="true">
  <s:sequence>
    <s:element name="id" type="eud:guid"/>
    <s:element name="cost" type="s:string" minOccurs="0"/>
    <s:element name="costUnit" type="s:string" minOccurs="0"/>
    <s:element name="disposition">
      <s:complexType>
        <s:sequence>
          <s:element name="start" type="s:string" minOccurs="0"/>
          <s:element name="end" type="s:string" minOccurs="0"/>
        </s:sequence>
        <s:attribute name="percentage" type="s:string" use="optional"/>
      </s:complexType>
    </s:element>
    <s:element name="domainSpecifics" minOccurs="0">
      <s:complexType>
        <s:sequence>
          <s:any namespace="##any" minOccurs="0" maxOccurs="unbounded"/>
        </s:sequence>
      </s:complexType>
    </s:element>
  </s:sequence>
</s:complexType>
<!-- ===== -->
<s:complexType name="ResOrganization">
  <s:complexContent>
    <s:extension base="eud:Resource">
      <s:sequence>
        <s:element name="orgRegistration" type="s:string" minOccurs="0"/>
        <s:element name="orgName" type="s:string" minOccurs="0"/>
        <s:element name="orgForm" type="eud:OrgFacet" minOccurs="0"/>
        <s:element name="name" type="s:string" minOccurs="0"/>
      </s:sequence>
    </s:extension>
  </s:complexContent>

```

```

</s:complexType>
<s:simpleType name="OrgFacet">
  <s:restriction base="s:string">
    <s:enumeration value="private"/>
    <s:enumeration value="public"/>
    <s:enumeration value="facilitySurveillance"/>
    <s:enumeration value="facilityManagement"/>
    <s:enumeration value="primCare"/>
    <s:enumeration value="secCare"/>
    <s:enumeration value="careGP"/>
    <s:enumeration value="other"/>
  </s:restriction>
</s:simpleType>
<!-- ===== -->
<s:complexType name="ResMaterial">
  <s:complexContent>
    <s:extension base="eud:Resource">
      <s:sequence>
        <s:element name="taxonomy" type="s:string" minOccurs="0"/>
        <s:element name="taxonLink" type="s:anyURI" minOccurs="0"/>
        <s:element name="taxonId" type="s:string" minOccurs="0"/>
        <s:element name="taxonName" type="s:string" minOccurs="0"/>
        <s:element name="productId" type="s:string"/>
        <s:element name="productName" type="s:string"/>
      </s:sequence>
    </s:extension>
  </s:complexContent>
</s:complexType>
<!-- ===== -->
<s:complexType name="ResHardware">
  <s:complexContent>
    <s:extension base="eud:Resource">
      <s:sequence>
        <s:element name="name" type="s:string" minOccurs="0"/>
        <s:element name="supplierRef" type="s:string"/>
        <s:element name="supplierProdId" type="s:string"/>
        <s:element name="prodSupportLink" type="s:anyURI" minOccurs="0"/>
        <s:element name="description" type="s:string"/>
        <s:element name="hardwareEnviron" type="s:string"/>
        <s:element name="hwDependency" type="eud:ResourceRef" minOccurs="0"
maxOccurs="10"/>
        <s:element name="swDependency" type="eud:ResourceRef" minOccurs="0"
maxOccurs="10"/>
      </s:sequence>
    </s:extension>
  </s:complexContent>
</s:complexType>
<!-- ===== -->
<s:complexType name="ResSoftware">
  <s:complexContent>
    <s:extension base="eud:Resource">
      <s:sequence>
        <s:element name="name" type="s:string" minOccurs="0"/>
        <s:element name="hardwareReference" type="eud:ResourceRef" minOccurs="0"/>
        <s:element name="vendorContact" type="eud:ResourceRef" minOccurs="0"/>
        <s:element name="installInstruction" type="s:anyURI"/>
        <s:element name="applicationDomain" type="eud:swApplicationDomain" minOccurs="0"/>
        <s:element name="swDependency" type="eud:ResourceRef" minOccurs="0"
maxOccurs="10"/>
        <s:element name="hwPlatform" type="s:string" minOccurs="0"/>
      </s:sequence>
    </s:extension>
  </s:complexContent>
</s:complexType>

```



```

        </s:sequence>
      </s:extension>
    </s:complexContent>
  </s:complexType>
  <!-- ===== -->
  <s:complexType name="ResVehicle">
    <s:complexContent>
      <s:extension base="eud:Resource">
        <s:sequence>
          <s:element name="name" type="s:string"/>
          <s:element name="type" type="s:string"/>
          <s:element name="capacity" type="s:string" minOccurs="0"/>
          <s:element name="operatedBy" type="s:string" minOccurs="0"/>
          <s:element name="operatorsRegId" type="s:string" minOccurs="0"/>
          <s:element name="homePort" type="s:string" minOccurs="0"/>
          <s:element name="homeGeoLocation" type="eud:Location"/>
          <s:element name="currGeoLocation" type="eud:Location" minOccurs="0"/>
          <!-- value set TBD -->
        </s:sequence>
      </s:extension>
    </s:complexContent>
  </s:complexType>
  <!-- ===== -->
  <s:complexType name="ResPerson">
    <s:complexContent>
      <s:extension base="eud:Resource">
        <s:sequence>
          <s:element name="personDetails">
            <s:complexType>
              <s:sequence>
                <s:element name="firstName" type="s:string"/>
                <s:element name="lastName" type="s:string"/>
                <s:element name="email" type="s:string" minOccurs="0"/>
                <s:element name="phone" type="s:string" minOccurs="0"/>
                <!-- name acc to vCard -->
              </s:sequence>
            </s:complexType>
          </s:element>
          <s:element name="vCard" type="s:string" minOccurs="0"/>
          <s:element name="skills" type="eud:SkillsFacet" minOccurs="0"/>
          <!-- link to real vCard repr -->
        </s:sequence>
      </s:extension>
    </s:complexContent>
  </s:complexType>
  <s:complexType name="SkillsFacet">
    <s:sequence>
      <s:element name="skill" maxOccurs="unbounded">
        <s:complexType>
          <s:sequence>
            <s:element name="name" type="s:string"/>
            <s:element name="level" type="s:string" minOccurs="0"/>
            <s:element name="years" type="s:int" minOccurs="0"/>
            <s:element name="certified" type="s:string" minOccurs="0"/>
          </s:sequence>
          <s:attribute name="weight" type="s:int" use="optional"/>
        </s:complexType>
      </s:element>
    </s:sequence>
  </s:complexType>

```

```

<!-- ===== -->
<s:complexType name="swApplicationDomain">
  <!-- stub, value set TBD -->
</s:complexType>
<!-- ===== -->
<!-- =====typedef task ===== -->
<s:complexType name="Task">
  <s:sequence>
    <s:element name="id" type="eud:guid"/>
    <s:element name="name" type="s:string"/>
    <s:element name="description" type="s:string" minOccurs="0"/>
    <s:element name="locationID" type="eud:guid" minOccurs="0"/>
    <s:element name="priority" type="s:string"/>
    <s:element name="preRequisite" minOccurs="0">
      <s:complexType>
        <s:choice>
          <s:choice>
            <s:sequence>
              <s:element name="resource" type="eud:Resource" maxOccurs="unbounded"/>
            </s:sequence>
            <s:choice maxOccurs="unbounded">
              <s:element name="organisation" type="eud:ResOrganization"/>
              <s:element name="material" type="eud:ResMaterial"/>
              <s:element name="hardware" type="eud:ResHardware"/>
              <s:element name="software" type="eud:ResSoftware"/>
              <s:element name="vehicle" type="eud:ResVehicle"/>
              <s:element name="person" type="eud:ResPerson"/>
            </s:choice>
            <!-- using resource element only, requires instance to be casted to coorrect substyp
with xsi:type -->
          </s:choice>
          <s:choice maxOccurs="unbounded">
            <s:element name="resourceRef" type="eud:ResourceRef"/>
          </s:choice>
        </s:choice>
      </s:complexType>
    </s:element>
    <s:element name="instructions" minOccurs="0">
      <s:complexType>
        <s:sequence>
          <s:element name="link" type="s:anyURI"/>
          <s:element name="infoPackRef" type="eud:InformationPackageRef" minOccurs="0"/>
        </s:sequence>
        <s:attribute name="language" type="eud:LangCodes"/>
      </s:complexType>
    </s:element>
    <s:element name="requestedInfo" type="eud:RequestedInformation" minOccurs="0"/>
    <s:element name="timeFrame">
      <s:complexType>
        <s:sequence>
          <s:element name="start">
            <s:complexType>
              <s:simpleContent>
                <s:extension base="s:dateTime">
                  <s:attribute name="type" type="s:string" use="required"/>
                </s:extension>
              </s:simpleContent>
            </s:complexType>
          </s:element>
          <s:element name="end">

```

```

        <s:complexType>
          <s:simpleContent>
            <s:extension base="s:dateTime">
              <s:attribute name="type" type="s:string" use="required"/>
            </s:extension>
          </s:simpleContent>
        </s:complexType>
      </s:element>
    </s:sequence>
  </s:complexType>
</s:element>
<s:element name="replacedByTask" minOccurs="0">
  <s:complexType>
    <s:sequence>
      <s:element name="taskID" type="eud:guid" maxOccurs="unbounded"/>
    </s:sequence>
  </s:complexType>
</s:element>
<s:element name="resourceUsage" minOccurs="0">
  <s:complexType>
    <s:sequence>
      <s:element name="consumedResource" type="eud:ConsumedResource"
maxOccurs="unbounded"/>
    </s:sequence>
  </s:complexType>
</s:element>
<s:element name="domainSpecifics" minOccurs="0">
  <s:complexType>
    <s:sequence>
      <s:any namespace="##any" minOccurs="0" maxOccurs="unbounded"/>
    </s:sequence>
  </s:complexType>
</s:element>
</s:sequence>
<s:attribute name="status" type="eud:TaskStatus" use="required"/>
</s:complexType>
<s:simpleType name="TaskStatus">
  <s:restriction base="s:string">
    <s:enumeration value="planned"/>
    <s:enumeration value="confirmed"/>
    <s:enumeration value="started"/>
    <s:enumeration value="suspended"/>
    <s:enumeration value="aborted"/>
    <s:enumeration value="replaced"/>
    <s:enumeration value="finished"/>
  </s:restriction>
</s:simpleType>
<!-- ===== used to specify resource usage in a task, subtype to ResourceRef->
===== -->
<s:complexType name="ConsumedResource">
  <s:complexContent>
    <s:extension base="eud:ResourceRef">
      <s:sequence>
        <s:element name="quantity" type="s:decimal" minOccurs="0"/>
        <s:element name="usedTime" minOccurs="0">
          <s:complexType>
            <s:attribute name="hrs" type="s:int"/>
            <s:attribute name="min" type="s:int"/>
            <s:attribute name="sec" type="s:int"/>
          </s:complexType>
        </s:element>
      </s:sequence>
    </s:extension>
  </s:complexContent>
</s:complexType>

```

```

        </s:element>
      </s:sequence>
    </s:extension>
  </s:complexContent>
</s:complexType>
<!-- ===== -->
<s:complexType name="InformationPackage">
  <s:sequence>
    <s:element name="id" type="eud:guid"/>
    <s:choice maxOccurs="unbounded">
      <s:element name="documentationRef" type="eud:DocumentationRef"/>
      <s:element name="database" type="eud:Database"/>
      <s:element name="manual" type="eud:Manual"/>
      <s:element name="drawing" type="eud:Graphic"/>
      <!-- using ObjectDocumentation element only, requires instance to be casted to correct subtype
with xsi:type -->
    </s:choice>
    <s:element name="actionPlan" type="eud:ActionPlan"/>
    <s:element name="map" type="eud:MapRef" minOccurs="0" maxOccurs="unbounded"/>
  </s:sequence>
</s:complexType>
<!-- ===== typedef Object Documentation ===== -->
<s:complexType name="ObjectDocumentation" abstract="true">
  <s:sequence>
    <s:element name="id" type="eud:guid"/>
    <s:element name="forObject" type="eud:ObjectRef"/>
    <s:element name="documentId" type="s:string"/>
    <s:element name="title" type="s:string"/>
    <s:element name="description" type="s:string" minOccurs="0"/>
    <s:element name="added" type="s:dateTime" minOccurs="0"/>
    <s:element name="lastUpdate" type="s:dateTime" minOccurs="0"/>
    <!-- should we reference the object or have it inline ? -->
    <!-- ref to object or inline ? -->
  </s:sequence>
  <s:attribute name="language" type="eud:LangCodes"/>
</s:complexType>
<!-- ===== -->
<s:complexType name="Database">
  <s:complexContent>
    <s:extension base="eud:ObjectDocumentation">
      <s:sequence>
        <s:element name="source" type="s:string" minOccurs="0"/>
        <s:element name="link" type="s:anyURI" minOccurs="0"/>
        <s:element name="userName" type="s:string" minOccurs="0"/>
        <s:element name="pwd" type="s:string" minOccurs="0"/>
      </s:sequence>
    </s:extension>
  </s:complexContent>
</s:complexType>
<s:complexType name="Manual">
  <s:complexContent>
    <s:extension base="eud:ObjectDocumentation">
      <s:sequence>
        <s:element name="type" type="s:string" minOccurs="0"/>
        <s:element name="content" type="s:anyURI" minOccurs="0"/>
        <s:element name="attachmentRef" type="eud:DocumentationRef" minOccurs="0"
maxOccurs="unbounded"/>
      </s:sequence>
    </s:extension>
  </s:complexContent>

```

```

</s:complexType>
<s:complexType name="Graphic">
  <s:complexContent>
    <s:extension base="eud:ObjectDocumentation">
      <s:sequence>
        <s:element name="fileReference" type="s:string"/>
        <s:element name="mediaType" type="eud:MediaType"/>
        <s:element name="size" type="s:int" minOccurs="0"/>
        <s:element name="width" type="s:int" minOccurs="0"/>
        <s:element name="height" type="s:int" minOccurs="0"/>
      </s:sequence>
    </s:extension>
  </s:complexContent>
</s:complexType>
<s:complexType name="MediaType">
  <s:sequence>
    <s:element name="mimeType" type="s:string"/>
    <s:element name="name" type="s:string"/>
    <s:element name="extension" type="s:string"/>
  </s:sequence>
</s:complexType>
<!-- ===== -
->
<s:complexType name="ActionPlan">
  <!-- stub for now, action plan decl anonymous type in ServiceAgreement -->
</s:complexType>
<!-- ===== -->
<s:complexType name="RequestedInformation">
  <s:sequence>
    <s:element name="requestDate" type="s:dateTime"/>
    <s:element name="documentationRef" type="eud:DocumentationRef" minOccurs="0"
maxOccurs="unbounded"/>
  </s:sequence>
</s:complexType>
<!-- =====location related===== --
>
<!-- ===== -->
<s:complexType name="Map">
  <s:sequence>
    <s:element name="id" type="eud:guid"/>
    <s:element name="issuedBy" type="s:string" minOccurs="0"/>
    <s:element name="scale" type="s:string" minOccurs="0"/>
    <s:element name="type" type="s:string"/>
    <s:element name="source" type="s:anyURI"/>
    <s:element name="location" type="eud:LocationRef" minOccurs="0" maxOccurs="unbounded"/>
  </s:sequence>
</s:complexType>
<s:complexType name="Location">
  <s:sequence>
    <s:element name="id" type="eud:guid"/>
    <s:element name="description" type="s:string"/>
    <s:element name="position" type="eud:GeoCoordinates" minOccurs="0"/>
    <s:element name="locationAdress" minOccurs="0">
      <s:complexType>
        <s:sequence>
          <s:element name="streetName" type="s:string"/>
          <s:element name="streetNo" type="s:string"/>
          <s:element name="floorNo" type="s:string" minOccurs="0"/>
          <s:element name="roomNo" type="s:string" minOccurs="0"/>
          <s:element name="postalCode" type="s:string"/>
        </s:sequence>
      </s:complexType>
    </s:element>
  </s:sequence>
</s:complexType>

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        <s:element name="city" type="s:string"/>
        <s:element name="country" type="s:string" minOccurs="0"/>
        <s:element name="countryCode" type="eud:CountryCodes" minOccurs="0"/>
    </s:sequence>
</s:complexType>
</s:element>
</s:sequence>
</s:complexType>
<s:complexType name="GeoCoordinates" abstract="false">
    <s:sequence>
        <s:element name="lat" type="s:string"/>
        <s:element name="long" type="s:string"/>
        <s:element name="mapReference" type="eud:guid" minOccurs="0"/>
        <s:element name="source" type="s:string" minOccurs="0"/>
    </s:sequence>
</s:complexType>
<!-- =====Events & eventlogg ===== -->
<s:complexType name="Event">
    <s:sequence>
        <s:element name="id" type="eud:guid"/>
        <s:element name="eventType">
            <s:simpleType>
                <s:restriction base="s:string">
                    <s:enumeration value="business"/>
                    <s:enumeration value="application"/>
                    <s:enumeration value="system"/>
                    <s:enumeration value="external"/>
                </s:restriction>
            </s:simpleType>
        </s:element>
        <s:element name="eventName" type="s:string" minOccurs="0"/>
        <s:element name="timeStamp" type="s:dateTime"/>
        <s:element name="description" minOccurs="0">
            <s:complexType>
                <s:sequence>
                    <s:any namespace="##any" maxOccurs="unbounded"/>
                </s:sequence>
            </s:complexType>
        </s:element>
        <s:element name="location" type="eud:Location" minOccurs="0"/>
        <s:element name="gatewayRef" type="eud:GatewayRef" minOccurs="0"/>
        <s:element name="deviceRef" type="eud:DeviceRef" minOccurs="0"/>
        <s:element name="objectRef" type="eud:ObjectRef" minOccurs="0"/>
        <s:element name="sessionID" type="eud:guid" minOccurs="0"/>
    </s:sequence>
</s:complexType>
<!-- event logg, perehaps use worksession for logging all events ? -->
<s:complexType name="EventLogg">
    <s:sequence>
        <s:element name="id" type="eud:guid"/>
        <s:element name="name" type="s:string"/>
        <s:element name="loggEntry" minOccurs="0" maxOccurs="unbounded">
            <s:complexType>
                <s:sequence>
                    <s:element name="timeStamp" type="s:dateTime"/>
                    <s:element name="eventRef" type="eud:EventRef"/>
                </s:sequence>
            </s:complexType>
        </s:element>
    </s:sequence>

```

```

</s:complexType>
<!-- ===== WorkSession ===== -->
===== -->
<s:complexType name="WorkSession">
  <s:sequence>
    <s:element name="id" type="eud:guid"/>
    <s:element name="saID" type="eud:guid"/>
    <s:element name="description" type="s:string" minOccurs="0"/>
    <s:element name="startTime" type="s:dateTime"/>
    <s:element name="closeTime" type="s:dateTime" minOccurs="0"/>
    <s:element name="events" minOccurs="0">
      <s:complexType>
        <s:sequence>
          <s:element name="eventRef" type="eud:EventRef" minOccurs="0"
maxOccurs="unbounded"/>
          <s:element name="event" type="eud:Event" minOccurs="0" maxOccurs="unbounded"/>
          <!-- we dont use choice compositor, in order to simplify generated class structure -->
        </s:sequence>
      </s:complexType>
    </s:element>
    <s:element name="tasks" minOccurs="0">
      <s:complexType>
        <s:sequence>
          <s:element name="taskRef" type="eud:TaskRef" minOccurs="0"
maxOccurs="unbounded"/>
          <s:element name="task" type="eud:Task" minOccurs="0" maxOccurs="unbounded"/>
        </s:sequence>
      </s:complexType>
    </s:element>
  </s:sequence>
</s:complexType>
<!-- ===== Mission ===== -->
<!-- rev 0608 -->
<s:complexType name="Mission">
  <s:sequence>
    <s:element name="id" type="eud:guid"/>
    <s:element name="sessionID" type="eud:guid"/>
    <s:element name="forObject" type="eud:Object" minOccurs="0"/>
    <s:element name="objectives" type="s:string"/>
    <s:element name="missionRules" type="s:anyURI"/>
  </s:sequence>
</s:complexType>
<!-- ===== Workflow ===== -->
<!-- rev 0608 -->
<s:complexType name="Workflow">
  <s:sequence>
    <s:element name="id" type="eud:guid"/>
    <s:element name="sessionID" type="eud:guid"/>
    <s:element name="workflowRules" type="s:anyURI" minOccurs="0"/>
  </s:sequence>
</s:complexType>
<!-- ===== Service (Level) Agreement including ActionPlan ===== -->
<!-- ===== SLA rules implemented in an XSL-t rule base ===== -->
<s:complexType name="ServiceAgreement">
  <s:sequence>
    <s:element name="id" type="eud:guid"/>
    <s:element name="validFrom" type="s:dateTime"/>
    <s:element name="validTo" type="s:dateTime"/>
    <s:element name="name" type="s:string" minOccurs="0"/>
    <s:element name="customer" type="s:string" minOccurs="0"/>

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<s:element name="description" type="s:string" minOccurs="0"/>
<s:element name="actionPlan">
  <s:complexType>
    <s:sequence>
      <s:element name="action" minOccurs="0" maxOccurs="unbounded">
        <s:complexType>
          <s:sequence>
            <s:element name="trigger" minOccurs="0">
              <s:complexType>
                <s:sequence>
                  <s:element name="eventType" type="s:string"
maxOccurs="unbounded"/>
                </s:sequence>
              </s:complexType>
            </s:element>
            <s:element name="task" minOccurs="0">
              <s:complexType>
                <s:sequence>
                  <s:element name="taskRef" type="eud:TaskRef"
maxOccurs="unbounded"/>
                </s:sequence>
              </s:complexType>
            </s:element>
          </s:sequence>
        </s:complexType>
      </s:element>
    </s:sequence>
  </s:complexType>
</s:element>
<s:element name="domainSpecifics" minOccurs="0">
  <s:complexType>
    <s:sequence>
      <s:any namespace="##other" maxOccurs="unbounded"/>
    </s:sequence>
    <s:attribute name="serviceAgreementRules" type="s:anyURI" use="optional"/>
  </s:complexType>
</s:element>
</s:sequence>
</s:complexType>
<!-- ===== Objects, Gateways and Devices ===== -->
<s:complexType name="Object">
  <s:sequence>
    <s:element name="id" type="eud:guid"/>
    <s:element name="objName" type="s:string" minOccurs="0"/>
    <s:element name="locationRef" type="eud:LocationRef" minOccurs="0"/>
    <s:element name="objectSpecifics">
      <s:complexType>
        <s:sequence>
          <s:any namespace="##any" maxOccurs="unbounded"/>
        </s:sequence>
      </s:complexType>
    </s:element>
    <s:choice>
      <s:element name="deviceRef" type="eud:DeviceRef" maxOccurs="unbounded"/>
      <s:element name="gatewayRef" type="eud:GatewayRef" maxOccurs="unbounded"/>
    </s:choice>
  </s:sequence>
</s:complexType>
<!-- ===== -->

```



```

<s:complexType name="Gateway">
  <s:sequence>
    <s:element name="id" type="eud:guid"/>
    <s:element name="gwName" type="s:string" minOccurs="0"/>
    <s:element name="deviceList">
      <s:complexType>
        <s:sequence>
          <s:element name="deviceRef" type="eud:DeviceRef" minOccurs="0"
maxOccurs="unbounded"/>
        </s:sequence>
      </s:complexType>
    </s:element>
    <s:element name="gatewaySpecifics">
      <s:complexType>
        <s:sequence>
          <s:any namespace="##any" maxOccurs="unbounded"/>
        </s:sequence>
      </s:complexType>
    </s:element>
  </s:sequence>
</s:complexType>
<!-- ===== -->
<!-- rev 0608 -->
<s:complexType name="Device">
  <s:sequence>
    <s:element name="id" type="eud:guid"/>
    <s:element name="devName" type="s:string" minOccurs="0"/>
    <s:element name="documentation" type="eud:ObjectDocumentation" minOccurs="0"/>
    <s:element name="gatewayRef" type="eud:GatewayRef" minOccurs="0"/>
    <s:element name="deviceSpecifics">
      <s:complexType>
        <s:sequence>
          <s:any namespace="##any" maxOccurs="unbounded"/>
        </s:sequence>
      </s:complexType>
    </s:element>
  </s:sequence>
</s:complexType>
</s:schema>

```