

The TENCompetence Domain Model

Version 1.1

Change History:

- * Name of class job/function is changed to 'competence profile'
- * Name of class job/function level is changed to 'competence profile level'
- * Name of class Competence Development Programme is changed to 'Personal Development Plan'

Reasons for these three changes: update because of renaming in current software tools.

- * Competence can contain zero or more subcompetences. Reason: needed to model trans-/metacompetences.

This document contains the 1.1 release of the TENCompetence Domain model. It is expressed as an UML class diagram and a vocabulary defining each concept (class) in the model. The Domain Model serves several functions in the project:

- a) to define the scope of the project, including the scope for the use cases,
- b) to define the vocabulary used,
- c) to define the relationship between the concepts used,
- d) to define the overall conceptual architecture,
- e) to provide a technological theory for the project that must be tested in the pilots,
- f) to provide a starting point for the design of other models, like the data model and services,
- g) to define the minimal functional components that must be present in the TENCompetence infrastructure.

The TENCompetence System that we are developing must meet at least 7 core functional requirements according to the project plan:

1. Support for new, promising, innovative pedagogical and organisational approaches for lifelong competence development that use the possibilities of new technologies available. This includes an integration of formal and informal learning.
2. Help learners to get an overview of all the possible formal and informal knowledge resources, units of learning, programmes and learning networks that are available, and to identify the most appropriate for their needs and background.
3. Stimulate the pro-active sharing of knowledge resources.
4. Provide support for competence assessment, including the assessment of the competences of applicants, employees and learners who have studied and worked in a variety of formal and informal settings.
5. Provide effective and efficient support for users during the performance of the various tasks in various roles (learner, teacher, assessor, etc.).
6. Provides support for decentralized, self-organized and empowered management.
7. Integrates four different types of models and tools used for competence development, i.e. tools and models for
 - a) knowledge sharing & management,

- b) the creation & use of learning activities and units of learning,
- c) creation & use of formal and informal personal development plans for lifelong learning and d) creation and use of learning networks & learning communities for lifelong learning.

The model is a further elaboration of the initial domain model that was specified in the project plan. It includes more details than the original version and it concentrates on the aspects of the system that will be represented in the TENCompetence System to fulfill the 7 requirements.

All primary use cases are connected to the 'goal' class in the Domain Model. In the current description a lifelong learner can use the system to get support for the attainment of the following goals:

1. I want to keep up to date within my existing function or job
2. I want to study for a new function or job or improve my current job level
3. I want to reflect on my current competences to look which functions and jobs are within my reach or to help me define new learning goals
4. I want to improve my proficiency level of a specific competence
5. Want some support on a non-trivial learning problem
6. Want to explore the possibilities in a new field (learning network) to help define new learning goals

The model was drawn with the UML tool 'MagicDraw' version 15.5. The documentation in this document is a copy of the documentation in the MagicDraw document.

The most recent version of the Domain Model can be found at <http://hdl.handle.net/1820/649>

More information about TENCompetence at: www.tencompetence.org

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The class diagrams

The domain model consists of three diagrams:

- a. The core domain model (figure 1). These concepts are also explained in the vocabulary.
- b. The rating mechanism that is available on all classes (figure 2).
- c. Some packages that should be explored for future integration conform the project plan (figure 3).

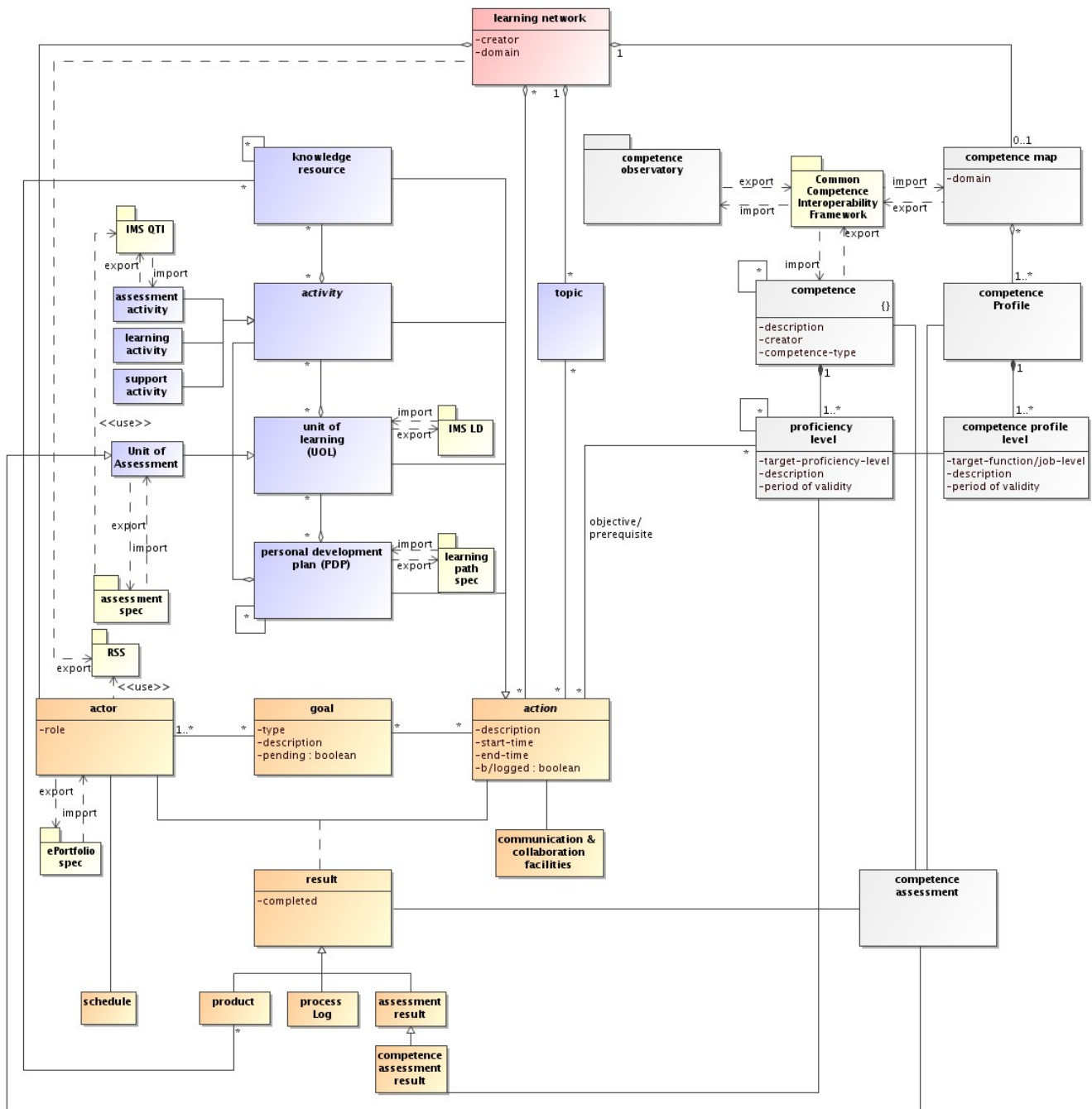


Figure 1. The Core Domain Model

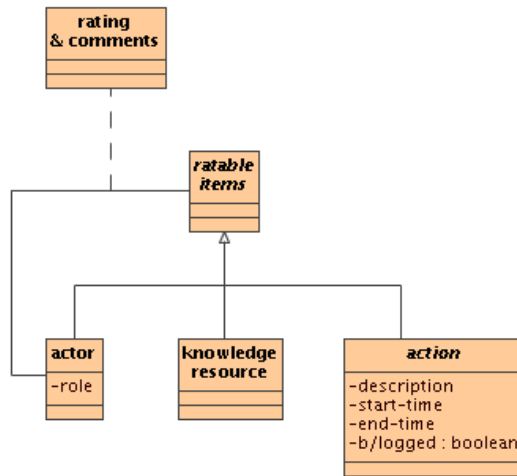


Figure 2. Rating

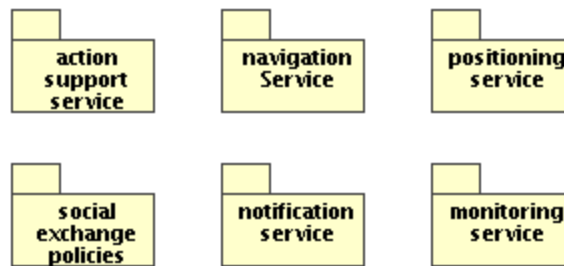


Figure 3. Packages with functionality to be elaborated in future releases

The vocabulary

<i>Class Name</i>	<i>Documentation</i>
action	<p>When a certain event occurs (eg the actor wants to solve a problem), the actor searches for an adequate action to perform.</p> <p>The selected action plan can be any of three types:</p> <ol style="list-style-type: none"> 1. A single activity (synonym: task) 2. A unit of learning 3. A personal development plan <p>The (optional) objectives of an action are defined in terms of proficiency levels of competences or in terms of the level of a specific competence profile. When the action is completed one can infer automatically that the competence is mastered. Sometimes a certificate can proof this accomplishment (part of the competence assessment).</p> <p>Prerequisites can be defined in two ways:</p> <ol style="list-style-type: none"> a. By pointing to one or more other actions that are expected to be completed before this action can be performed. b. By pointing to competences that have to be mastered before the action can be done. <p>This depends on the situation. In formal, designed learning networks the competence links would be the best solution. In informal learning the competence definitions could be absent, so a link to an action is needed.</p> <p>Actions can have time constraints, eg. a course runs from September until December. This can be modeled with the optional attributes start-time and end-time.</p> <p>Actions can be blogs (or automatically logged in case of PDP tracks) of the activities, units of learning or PDPs that an actor has performed. In that case the action should be tagged as 'blogged' with the appropriate attribute.</p>
activity	<p>Activities are descriptions of an action that an actor has to perform (or has performed) to meet some objectives, given some prerequisites. Activities (synonym: tasks) contain an activity description to tell an actor what actions to perform. It also points to the resources and services that are needed to perform the activity.</p>

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	<p>There are different types of activities:</p> <ol style="list-style-type: none"> a. Learning Activities b. Support Activities (tutoring, support students, etc.) c. Assessment activities <p>Activities can be completed in different ways:</p> <ol style="list-style-type: none"> a. For assessment activities: when the test is done. (e.g. all test items are answered and a score is calculated). b. For single learning & support activities: when the actor indicates that he has completed the activity/ c. For activities embedded in a Unit of Learning more complex, property/test based completion criteria can be set. d. Learning activities that are blogs of the activities that an actor has performed are always completed (per definition).
actor	<p>An actor is a person, a team of persons or a formal or informal organization. In our first implementations we focus on individuals as actors.</p> <p>An actor can have various roles in the learning network that can change according to the policies, but in principle each actor can have the right to perform any task in the system. This means that a person can have the role of learner and of teacher or assessor.</p> <p>The major roles for an actor are:</p> <ul style="list-style-type: none"> - learner - support provider (eg teacher, tutor, mentor, peer tutor, etc.) - assessor - author <p>Learners have goals (eg. want to improve a competence). After selection of a specific action, they perform the action. When there is no adequate action available they can make the goal 'pending'. Other actors (in the role of author) can provide an adequate action.</p> <p>Support providers will answer questions that learners have posted for other actors to answer.</p> <p>An assessor can be involved in the competence assessment, an assessment activity or the unit of assessment.</p> <p>Authors edit the learning network, the actions within the network, the competence map, the topics and the knowledge resources.</p>

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assessment activity	<p>This type of activity represents classical tests (formative and summative).</p> <p>Examples are:</p> <ul style="list-style-type: none"> - Multiple choice tests to test whether you master certain principles - drill and practice tests to train certain skills - Intake questionnaires to assess personal preferences for personalization purposes. <p>In this case the assessment activity can contain one or more test items, including the mechanism to score the test (only straightforward scores like percentage good answers; more complicated schema's can be applied in the unit of assessment).</p> <p>The assessment activities can export to and from IMS QTI.</p> <p>Note: other kind of stimuli or tasks that are used in the context of a unit of assessment, e.g. the task to deal with incoming mail in an assessment center can be modeled as learning activities and included in a unit of assessment.</p>
assessment result	<p>This class represents the assessment results. There are many types of assessments, the classical assessments activities end up in a score.</p>
assessment spec	<p>A new testing/assessment spec will be developed in TENCompetence. The position at the moment about this is the following:</p> <ol style="list-style-type: none"> a. The QTI will be used to model classical test items (MC, short answer, etc.). In the domain model these are mainly parts of the test activities (although also non-QTI test activities exist!). b. The more advanced, newer forms of assessment like peer assessment, performance assessment, 360 degree feedback, adaptive testing, etc. are in principle workflows in which classical test items do not play a major role (probably even non at all). The hypothesis is that these types of tests can be modelled using IMS Learning Design. <p>The assessment spec so will probably be a reference model and a standards profile on a set of standard (mainly QTI and LD).</p>
common competence interoperability framework	<p>This is a Common Framework for Competences that has to be defined by CEN/ISSS, IEEE and others. TENCompetence can provide valuable input to this process, but the standardisation</p>

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	<p>activities itself are not part of the scope of the project (is also impossible because the project is not a standardisation organisation).</p> <p>The Common Framework should build on the current specs from HR-XML format and IEEE RCDEO.</p> <p>Note: the syntax of the competence format is similar to the competency formats used in the open standards. The field EVIDENCE can be filled with the evidence that is stored in the competence assessment (typical these are 'results').</p>
communication & collaboration facilities	<p>Actions contain/use communication & collaborative facilities ('services') like:</p> <ul style="list-style-type: none"> * chats * wikis * forums * VOIP * Shared white boards *Etc. <p>In principle it should be possible to connect to any open service offered at the internet. We will provide some basic support for the most basic collaborative services needed (chats, wikis, forums, VOIP through skype).</p>
competence	<p>A competence is defined as the ability ('disposition') of an actor to act effectively and efficiently upon the events in an ecological niche (an occupation, a hobby, a market, a sport, etc.). In short: the ability to perform effectively in a situation.</p> <p>Competence is an underlying characteristic (a latent variable or a trait) that cannot be measured directly: competence is estimated from the results of the actions (performance).</p> <p>The basic challenge in competence modelling is to keep it as simple as possible: it is possible to have very advanced and detailed views on competences. We will try to start with the simplest model as possible (to stimulate ease of use for end-users) and depending on validation excersises we will refine the model when there is an absolute and direct need.</p> <p>A competence is structured very simple as:</p> <p>a. a name</p>

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	<p>b. a worldwide unique ID</p> <p>c. a competence description (free text)</p> <p>d. a creator (the actor who has specified the competence)</p> <p>e. a competence-type. This is a free text attribute to define the type of competence. Examples are:</p> <ul style="list-style-type: none"> - cognitive competence, transversal competence, functional competence, etc. Another example: Knowledge, Skill, Ability, Tasks, etc. <p>These attributes can be used to present the competences to the user in a structured way.</p> <p>A competence must have at least one or more proficiency levels.</p> <p>The 'description' attribute describes the competence in general, independent of the proficiency levels (e.g. the 'psychological intervention competence'.</p> <p>The 'owner' attribute can be used to specify in which job context the competence profile level requirements are defined. E.g. the job 'UHD 1/Associate Professor' at Dutch universities is defined by the VSNU: the association for universities in the Netherlands.</p>
competence assessment	<p>Competence assessment is the process in which the proficiency levels of the competences of an actor are estimated, given the historical results of his/her actions.</p> <p>In this process the results of the actions of an actor (the 'performances') are interpreted to estimate the proficiency level of each competence and to apply the competence profile level accomplishment rules to determine whether a person meets the criteria for a function or job.</p> <p>There are different phases in assessment:</p> <ol style="list-style-type: none"> a. Identifying the competences (given certain competence profile) that have to be estimated. b. Gathering evidence (eg by using tests, by asking diploma's, etc.) for the competences c. Making the decision on the proficiency levels an actor has acquired d. Making an decision whether a person complies to the requirements of the different competence profile levels to determine at which role level he/she functions. <p>The role of assessor can be fulfilled by any actor (also the person</p>

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	<p>himself, eg self-assessment) dependent on how formal the assessment must be. Methods of assessment can vary from adaptive testing, 360 degree feedback, performance assessment, peer assessment, portfolio assessment. A special case is the situation in which an action has a competence level as its objective. In that case, completing the action automatically will set the proficiency level.</p> <p>Example of estimation of proficiency levels:</p> <p>For instance when a person has successfully written a scientific article in an English journal (as the result of an action), and the competence map contains the competences for the domain Psychology, role Researcher (role/job level: postdoc):</p> <ul style="list-style-type: none"> - Be able to write an academic publication (target proficiency level = 2) - Be able to write in English (target level = 2) - Be able to present a publication at a scientific conference (target level = 2) <p>Then the assessment determines the estimated proficiency levels of all these competences, based on the results of actions (the positioning services has created the first estimates of these values when available, default these levels have the value zero). So based on a competence assessment procedure the estimated values for the person may be the following:</p> <ul style="list-style-type: none"> - Be able to write an academic publication (evel=2) - Be able to write in English (level=1) - Be able to present a publication at a scientific conference (level=0) <p>Then the competence profile accomplishment rules can be applied to determine whether the person meets the criteria for any of the defined competence profile levels.</p> <p>The competence assessment can have different forms:</p> <ol style="list-style-type: none"> a. When an actor has registered a set of results in his portfolio (acquired in different learning networks), the competence assessment has to map these activities to estimate the proficiency levels of the competences in one of the competence maps in the current learning network. The results provide the evidence/proof for the latent competence. This is a process that contains human activity. The process to estimate the proficiency levels at a given competence map is called 'positioning'. b. When an actor has performed a designed action ('closed world'

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	<p>situation) that has as its objective a proficiency level that is defined in the competence map of the learning network, then the assessment confirms that the competence is mastered at a certain level. When the actor previously had a level that was lower than the level of the objective, the level can be increased automatically.</p> <p>c. When there is a learning network with many actions, but with no competence map defined, there is no competence assessment function.</p> <p>In this situation we can try to derive a competence map by clustering the types of actions into groups (e.g. by using LSA type of techniques).</p> <p>Rule for hierarchical competences -----</p> <p>When a competence contains a competence to represent a hierarchy, the rule is as follows:</p> <p>The levels of all the sub-competences must be attained at least at the specified target level in order to conclude that the parent has been attained at the specified level. Example:</p> <p>Competence A with target level = 3; subcompetences: A1 (target level = 1) A2 (target level = 2)</p> <p>When a person has A1 at least at level 1 and A2 at least at level 2, then it can be concluded that competence A has level 3. Note: this doesn't exclude the possibility that there is a direct assessment of competence A without measuring A1 and A2 first. In that case the levels for A1 and A2 are estimated as having their target levels.</p> <p>Rule for competence profile accomplishment -----</p> <p>The rule for the accomplishment of the requirements set for a function/role are similar to the rule mentioned above.</p> <p>The requirements for a competence profile level are met by an actor when the following (simple rule) is met:</p>

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	<p>An actor meets the requirements for the function/role level when he has attained a valid proficiency level for all the competences that are specified in the function/role level that is equal or higher than the specified target-proficiency levels.</p> <p>Eg:</p> <p>Job level X requires:</p> <ul style="list-style-type: none"> - Competence A at level 3 - Competence B at level 2 - Competence C at level 0 (not required for this role) <p>Person has the following valid competences:</p> <ul style="list-style-type: none"> - Competence A at level 4 - Competence B at level 2 - Competence C at level 4 <p>In this situation, applying the rule above, the requirements for the Job level are met.</p> <p>Notice that the rules can be more difficult in future implementations. Eg when it is allowed for a competence profile to have some compensating activities (eg in the above example: when the person has A=2 he doesnt meet the requirement, but C=4 can compensate for this. For the time being we apply the simple model.</p>
competence assessment result	<p>A special kind of assessment result is the result of a competence assessment. This class represents the proficiency levels that a specific actor has attained after completion of a competence assessment. It contains at least:</p> <ol style="list-style-type: none"> a. The proficiency level on a competence that an actor has attained. b. The date that the proficiency level was attained. c. The assessor who has made the final decision about the proficiency level of the competence (eg the actor self or a testing agency, a university, etc.). d. The validity of the assessment procedure used (optional); this is expressed as a percentage. e. The reliability of the assessment procedure used (optional); this is expressed as a percentage. f. Reference to the assessment procedure (optional). This is a url to a description of the assessment procedure. <p>This can also be used to set the change rights on the result.</p>

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personal development plan (PDP)	<p>A Personal Development Plan (PDP; synonyms: competence development plan, route, learning path, curriculum, programme) is an ordered set of activities and units of learning that have to be (or are) followed to attain a certain proficiency level or the requirements for a certain competence profile. E.g. the courses and sequence of the courses to be followed in order to get a masters programme in psychology.</p> <p>Personal Development Plans can be designed (e.g. a masters programme at a university) or shared tracks (a person with a successful track shares this with other persons. These shared tracks are mostly single linear pathways).</p> <p>PDPs can have zero or more proficiency levels of competences as its objective OR can have zero or more competence profile levels as its objective. Designed PDPs have probably a competence profile level as its objective (e.g. a personal development plan to become a master in psychology).</p> <p>PDPs can be defined on a time schedule.</p>
competence map	<p>A competence map contains a structured way to represent competences, competence levels and the functions/jobs. A competence map has an owner (eg the OUNL, University of Amsterdam, UPF, Bolton or a consortium, a standards organisation).</p> <p>Theoretically a learning network can have zero or more competence maps and competence maps can be nested to model a competence map for each subdomains in the domain. The same actions in the network can be connected to competences in multiple maps. E.g. in a network there is a map from the OUNL (=specified using the creator attribute), but at the same time, there is a map of Sofia University. The mapping can be different, but the underlying actions can be shared.</p> <p>To simplify the first implementations (and also the user experience) we have restricted this functionality in the sense that only one competence map may be present in a learning network. When multiple maps are needed we can model this for the time being using the function/role in domain concept. Eg in the digital cinema pilot UPF can have the role 'UPF operator' and Unv. of Sofia the role of 'UniSofia operator' each with different competences defined.</p> <p>Example Competence Map</p>

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	<p>LN: Domain:=Medical Profession; Owner:=University of Amsterdam Competence Map: Domain:=Medical Profession; Owner:=University of Amsterdam</p> <p>competence profile: Doctor at Expert level Competence1: diagnosis (level 3) Competence1.1: using a stethoscope (level 3) Competence1.2: taking an anamnese (level 3) Competence2: intervention/treatment (level 3) Competence3: bed care (level 1)</p> <p>competence profile: Nurse at Expert level Competence 3: bed care (level 3) Competence 3.1: etc.</p> <p>In this example some of the competences are shared for different functions/jobs.</p> <p>Because of technical reasons (mainly authorisation) a competence map is part of exactly one learning network. This means that a change in a map that is shared among different LNs should be made to every instance of the map in every LN. Changes to a shared map cannot be propagated to all the other using Networks (because than the owner should be authorised in all the other networks). The import/export mechanism is of help to support this process.</p>
competence observatory	<p>The competence observatory is a function in which the actors of a profession or knowledge domain discuss and decide upon the competences/proficiency levels per competence profile level that are relevant in the domain. This includes the definition of the assessment criteria for the different proficiency levels. The outcome of the competence observatory is imported as a competence map, using an interoperable competence description format from the Common Competence Interoperability Framework). This map can then be imported in the competence map of a learning network.</p>
eportfolio spec	<p>The portfolio is not a separate entity in the system, but a view on the data in the system for different purposes, eg:</p> <ul style="list-style-type: none"> a. to reflect on ones accomplishments b. to make a profile that can be published to the LN c. to make a profile (a CV) that can be published to a specific group (eg an employer).

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	<p>These views can be printed and exported (to be used in another ePortfolio system) in a standard format like IMS ePortfolio (however this seems not a very adequate spec).</p> <p>The data that are typically of interest in an ePortfolio view are:</p> <ul style="list-style-type: none"> - stopped not completed actions - completed actions - results of completed actions - results of the competence assessments of completed actions (evidence for having attained a competence in the learning network) - data stamps for all data (order of completion can be derived from this for track analysis). - rating scores - actions on resources and services (within an action). <p>Furthermore the portfolio also contains identity information and personal profiles. The actor can make selections of this information available for others to view (and so creating multiple identities).</p> <p>Import of portfolio data will be supported later.</p> <p>Historical data can also be entered manually in the portfolio view (e.g. previous acquired competence levels and products and diplomas/certificates (as a proof for the proficiency levels).</p>
competence profile	<p>A domain of knowledge can contain different actors with different functions (in work called job functions/job titles or competence profiles). Functions/jobs are constructs to use in competence maps to provide for a natural way to specify different types of competence maps, especially when a domain contains different job functions at different levels.</p> <p>A competence profile in the domain can be the focus of learning. E.g. in the domain medical profession there are functions/job titles like doctors, nurses, etc.</p> <p>A competence profile has a set of competences defined that define the minimum requirements for that function.</p> <p>The competences that are specified under each competence profile specify the target-proficiency levels of that competence that must be met in order to obtain the function or job (at the specific level of the competence profile).</p> <p>In a Competence Map at least one competence profile should be defined.</p>

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competence profile level	<p>Competence profiles for a function or a jobs can be performed at one or more levels, like Trainer, Master, Trainee.</p> <p>In science there are undergraduate students, PhD students, postdocs and professors.</p>
goal	<p>An actor can have several goals to use the system. These goals can be specified in the system so that the system can help the user to fulfill his specific requirements (eg by a wizard).</p> <p>An actor specifies his/her goal in the system. This goal is of any of the following types:</p> <ol style="list-style-type: none"> a. Search a resource/activity/UOL (‘want to know something’) b. Search for a PDP (study a new competence profile level) c. Keep up-to-date within an existing competence profile level d. Improve a proficiency level of a competence e. Browse the learning network (meta goal to define a goal) f. Want to reflect on my competences (meta goal to define a goal) g. Want some support <p>The optional ‘description’ of a goal is used when the goal itself must be made explicit (the actor formulates his/her goal in a text box).</p> <p>Examples of concrete goals are:</p> <ol style="list-style-type: none"> ad a) Want to know how to tune the guitar ad b) Want to attain a masters degree in psychology ad c) I am an optician: what are the current trends, new competences, new knowledge required, etc. ad d) Want to improve my UML modelling competence ad e) I want to explore the learning network about psychology to get an overview of the domain ad f) Which competence profile levels do fit my current competence levels? How does my competence levels compare to the others in the learning network? ad g) Is there anybody available who can help me with ... (in the context of an action) <p>The goal of the actor occurs in the relationship between the actor and the ecological niche (a problem occurs, a goal is set).</p>

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	<p><i>Action Requests:</i></p> <p>When a person has specifies his goal, this leads to an action request. Two situations can occur:</p> <p>Start searching for an appropriate action within the current network that fits the goal.</p> <p>When an adequate action exists the person actor can perform this action.</p> <p>When no adequate action exist, the action request itself will hold the request. These requests can be read by another actor who can author an adequate action to the system (e.g. add a learning activity).</p> <p>This mechanism takes care for the social exchange based on user-requests and is governed by social exchange policies.</p>
IMS LD	<p>IMS LD level A, B and C is used as a standard to import/export and exchange Units of Learning (and Units of Assessment).</p> <p>IMS LD uses different other specs like:</p> <ul style="list-style-type: none"> - IMS Content Packaging - IMS/IEEE LOM or any other metadata schema -IMS QTI for the inclusion of test activities -IMS Simple Sequencing (rare case, will not be supported in early releases)
IMS QTI	<p>Assessment activities (items and collections of items) can be exported to (and imported from) the IMS QTI format (latest version).</p>
knowledge resource	<p>Knowledge resources are any kind of resources that can be used in learning. Typical resources are:</p> <ol style="list-style-type: none"> a. HTML pages b. Podcasts / Vodcasts c. digital documents d. computer programmes e. ... <p>A knowledge resources have a URL as identifier.</p> <p>Knowledge resources can be searched at the level of the learning network or by browsing the topics.</p> <p>Knowledge resources can be grouped using specifications like SCORM.</p>

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learning activity	Learning activities are tasks for learners that describe what they are advised to do in order to attain certain learning or assessment objectives, given some prerequisites.
learning network	<p>A learning network is an ensemble of actors, learning resources (actions & knowledge resources) and competence maps which are mutually connected through and supported by information and communication technologies to support lifelong competence development.</p> <p>A learning network is defined on a domain that represents the profession or the domain of knowledge. This domain is also used as the default value for the Competence Map.</p> <p>The creator of a Learning Network is also the 'owner', i.e. the one who has admin rights on the learning network and can set rights for others (also admin rights).</p> <p>At a higher level than the learning networks it is expected that there is a discovery service to find, subscribe and rate adequate learning networks.</p>
learning path spec	<p>This spec will be developed as part of the TENCompetence activities in WP7.</p> <p>It must include a scheduling specification for the elements in the PDP, including information about its availability (e.g. face to face settings, or a minimum number of students to be able to start in a collaborative course).</p>
process log	<p>The process log contains all digital available data that are produced during the performance of an action, e.g. what did a person access, in what order, how long, who did he/she contact, how often did he logon to the system, etc.</p> <p>These data needs to be designed. All or parts of these data will be stored in the portfolio and the data are available for the competence assessment procedure.</p> <p>The process logs in the portfolio provide the basis means for datamining and collaborative filtering (navigation/recommendor systems).</p>
product	The products that are produced by the actor during the performance of an action (in fact, these products are added as knowledge resources to the learning network). Examples are:

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	<ul style="list-style-type: none"> - reports - mail messages - wiki contributions - blog texts - audio/video recordings - computer programmes developed - etc.
proficiency level	<p>A competence has 1 or more proficiency levels that are an integral part of the competence itself.</p> <p>The proficiency level can be any range of Integer numbers and indicates the minimum level that needs to be attained for the attainment of a certain competence profile in the domain (eg. being a proficient postdoc researcher in psychology).</p> <p>Zero means that the competence is absent. Depending on the community one can decide to make dichotomies (0 is absent, 1 is present), or a number of discrete levels (eg in a psychology curriculum 12 levels of proficiency are distinguished for the diagnosis competence: 0-11).</p> <p>For each role a set of competences is defined together with the target proficiency-level that must be met in order to meet the requirements for the competence profile level. E.g.:</p> <p>competence profile level A requires:</p> <ul style="list-style-type: none"> - Competence A at level 3 - Competence B at level 4 - Competence C at level 1 <p>A proficiency level can have two states: a) valid or b) invalid. This is used for competences that must be updated frequently. For a doctor and a pilot the competences must be updated frequently to keep the proficiency level.</p> <p>When a proficiency level is invalid a new competence assessment has to take place to make it valid again. By default a proficiency level is valid and it can only change to invalid when the attribute 'period of validity' has set to a value (it is an optional attribute; when it has no value the proficiency level is always valid). The proficiency level is invalid when</p> <p>the current date > registration date of the proficiency level + period</p>

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	<p>of validity</p> <p>The registration date of the proficiency level must be registered in the actors portfolio. It is the date that the competence assessment has set the competence level for the actor.</p> <p>Example:</p> <p>For instance, pilots must have at least a minimum number of flying hours to keep the validity of the proficiency level on the flying competence. Doctors must have at least a number of training points per year in order to keep their certificate (=role). How this is modelled is as follows:</p> <p>Job level = medical doctor in child care</p> <p>Competence=´state-of-the-art knowledge of the field´</p> <p>Proficiency level = 1 (period of validity = 12 month)</p> <p>After 12 month the proficiency level of the competence will be invalid. This means that the role of doctor is also invalid at that moment. A new competence assessment is needed to turn it to valid again. In this competence assessment one can look whether the doctor has attained the required number of points (looking at the results).</p>
result	<p>Results of actions are:</p> <ol style="list-style-type: none"> a. All types of products that are produced during learning. These products can be large (a report, thesis, etc) or very small (an email, forum contribution, wiki contribution, etc.). b. Process logs. This contains a logging off all the logged actions of the user, including the time stamps. c. Assessment results. All results of all assessments are recorded together with the dates started/attained, the results and the possible links to products and/or logs. <p>Results are used as ´evidence´ for the competence assessment to decide which proficiency level a person has on several competences (and as a result on the competence profile levels).</p> <p>For a result it can be recorded in the attribute ´completed´ whether the action was completed (true or false).</p>
RSS	<p>An actor can use RSS feeds from the learning network. Feeds can include:</p> <ol style="list-style-type: none"> a. New Actions in a learning network

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	<p>b. New knowledge resources (e.g. podcasts, vodcasts, blogs, digital files)</p> <p>c. New Competences/proficiency levels</p> <p>d. New Roles</p> <p>e. Requests from other actors with pending goals</p> <p>Required is minimal RSS 2.* for v/podcasts. Possibly also Atom feeds can be supported.</p>
schedule	<p>Actions can be scheduled by an actor.</p> <p>The design of the schedule is rather complex and has to be elaborated separately. At this moment it is represented in the domain model as a single class to indicate that the schedule is available.</p>
support activity	<p>Support activities are activities of an actor to help or support other actors, e.g. provide help, tutoring activities, advise.</p>
topic	<p>Actions (including resources, services) and Competences can be organised in 'topics'. E.g. in the domain psychology, the knowledge resources can be organised into topics like:</p> <ul style="list-style-type: none"> a. Methodology b. Clinical psychology c. Educational psychology d. etc. <p>The topics can be used to browse the actions in the network from a topic view instead of a competence view.</p> <p>For first implementations, the topics are nothing more than one or more keywords that can be added to (the metadata of) each action. The system should help the user to type in a key word that already exists. When the user types a new keyword it will be added to the list of keywords.</p> <p>The keywords can be viewed alfabetically (maybe also on 'number of times used') and people can use the keywords to filter actions and knowledge resources.</p> <p>This topic structure can later be quite advanced (e.g. structured as an ontology or as a topic map). As a standard ISO Topic Maps or RDF can be used to import or export them.</p> <p>Just like competence maps: a topic cannot be shared between networks because of authorisation issues.</p>

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	<p>In this diagram, the topic structure is only represented with one class. Depending on the implementation this topic structure should be more elaborated.</p>
unit of assessment	<p>A Unit of Assessment (UOA) is a part of the new Assessment Spec that will be developed in WP6 of TENCompetence. At the moment it is:</p> <p>a. A specialised unit of learning that is responsible for the processing of the workflow behind more advanced assessments. A single test is represented by a assessment activity. The UOA can bundle various test activities, learning activities and support activities and can put them in a workflow to represent new assessment types like peer assessment and 360 degrees feedback.</p> <p>Units of Learning (possibly also with the inclusion of one or more assessment activities) can be combined with a UOA by using a PDP, eg a sequence of [UOL; UOA] or a selection of [UOL;UOA]. In a sequence the UOL (eg a course) is done before the assessment. In a selection the UOL and the assessment are done in parallel.</p> <p>This same mechanism can also be used to support the competence assessment.</p> <p>To summarize:</p> <ul style="list-style-type: none"> * QTI tests are used to model classical tests in the form of an assessment activity. * Assessment activities can be used separately or in a PDP in combination with other actions. * Assessment activities can be used in the context of a UOL (the mechanisms proposed in IMS to include IMS LD with IMS QTI) * Units of Assessments are specialised Units of Learning that combine a series of assessment activities, learning activities and support activities with a multi-role workflow to model advanced, workflow based tests like peer assessment. * Units of Assessment can be combined with Units of Learning using PDPs * Units of Assessment will also be used for competence assessment.
unit of learning (UOL)	<p>A unit of learning is a plan for a learning and/or teaching process that could be performed to attain certain learning objectives, given certain prerequisites. They are modelled in IMS Learning Design (XML file that conforms to the spec; authored with IMS LD tools). This will be</p>

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	<p>included when WP6 work is finished.</p> <p>Examples of units of learning are: course plans, lesson plans, workshop plans, etc. A unit of learning contains (references to):</p> <ul style="list-style-type: none"> - learning objectives and prerequisites - learning activities - support activities - a description of the roles that perform activities in the unit of learning - a description of the learning objects and services that are needed during the execution of the activities - a description of the information that should be stored during the unit of learning, including portfolio information - a description of the teaching-learning process (learning design): which role performs which activities in which sequence? - a description of personalisation/adaptation aspects (certain persons get different resources/activities depending on their profile) Units of Learning are formally modelled and interchanged using the IMS Learning Design specification. <p>Units of learning can contain time information that is related to the schedule.</p>