Organizational scenarios for the use of learning objects

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Learning objects in practice 2

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Colophon

Organizational scenario's for the use of learning objects

Learning objects in practice 2

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Introduction

In Dutch higher education much attention is paid to developing and sharing of learning objects (digital resources). Within and amongst educational institutions a broad variety of projects, initiatives and applications can be identified. The instruments which have been developed within this project 'Learning objects in practice' provide various examples.

For an educational institution the key question to start with is how the application of learning objects may contribute to its educational ambitions. This process has been described in detail in Schoonenboom, Emans en Meijer (2006). When the answer is clear, the institute has to explore and define the processes of how to develop, use and manage the learning objects. Which choices have to be made from both a pedagogical and a technological perspective?

A key factor for the way in which the corresponding processes can be organized may lie in pursued degree of **regulation**. An educational institution or network organization that aims at creating maximum reusability of its educational materials has to define an explicit centralized strategy. The Dutch Digital University (DU) provides a good example of such a strategy, by (1) providing explicit guidelines and prescriptions for the development, management and use of learning objects, written down in their Handbook Technology and Standards, and (2) by using of a central software system (Learn eXact).

A completely different approach is to stimulate private initiatives for development and sharing of learning objects. Teachers, but also students, may be encouraged to start or join communities, and may be supported by offering software tools. An example of such a tool, the p2p client Kolibri, had recently been released in a beta stage. This tool makes it possible for individual teacher (and students) to start their own communities and exchange all kinds of educational materials. Also other, more generic applications such as Groove™ or MSN groups may serve as a technological solution. Typical for this approach is a high degree of self-regulation.

To support educational institutes who consider application of learning objects, three scenarios will be elaborated in the following sections. These scenarios all have their own focus and differ in organizational, pedagogical and technological implications.

The first two scenarios are opposed to each other from the regulation point of view. Scenario one is about the community scenario, in which the initiative for creating and sharing of learning objects comes from or is being placed at the teacher. Scenario two on the other hand takes the perspective of central steering from the educational institute. In scenario three this strong regulation focus is broadened to the perspective of a network organization such as SURF or the DU.

It should be mentioned that the scenarios don't exclude each other, but may exist in combination. This will be given more attention later on.

In order to compose the scenarios the documents generated within the project 'Learning objects in practice' have been analyzed on key issues. Each scenario start with a general description in prose, followed by a systematic analysis of issues related to development, management and exploitation of learning objects.

The appendices contain a list of abbreviations and an overview of the workflow in each scenario.

Scenario 1: Self-regulation (community scenario)

General description

In the community scenario each teacher or student can create and share material without any constraints, except those imposed by the creator of the material. ICT applications which 'happen' to be available are being used for the creation and sharing of learning objects. There are no specific requirements regarding the technical formats of the learning objects. The tools being used are those the users are familiar with and probably easy in use.

The size of learning objects is not fixed. Pedagogy may remain implicit and in some case added by the author. There is no clear distinction between students and teachers. Students may for example share abstracts, notes or papers. There are no central quality assurance mechanisms. Quality is the shared interest and responsibility of the community itself. Users may contribute to quality assurance by annotating and rating learning objects, based on their own experiences. It's up to the creator of the learning object to decide to what extend others may modify the objects for their own use. Users who have made modifications to learning objects are encouraged to make these versions available in the 'repository'. Pay for use of learning objects is out of the question.

One or more 'free' ICT-tools may be used; there are hardly any specific requirements. Users will probably keep copies and versions on their own computers. If users become dissatisfied with the tool(s) they use, they may easily switch.
As a consequence of the low level of organization Internet search engines and (published) lists on homepages may be used to find possible learning objects. The community may decide to use a minimum set of metadata, but this will not be mandatory.

General characteristics	
Initiative	The initiative lies at the level of the user; teachers or students may create their own communities (bottom up approach). These initiatives may be encouraged or supported by the institute or faculty.
Key aspects	There is a high degree of self-regulation. Ease of use and user appreciation (usage data) account for the 'success'.
Development	
Developers	Members of the community.
Definition of learning object	There is no prescribed definition of what a learning object is. The members of community decide themselves.
Formats of learning objects and learning technology standards	These have not been defined. Sticking to popular formats (web content, to be handled by web browsers) is obvious.
Size of learning objects, context	There are no requirements with respect to size and context.
Pedagogy	Users communicate about usability through annotations and discussions. Size of scale is a crucial factor for well functioning of annotations.
Payment	There is no financial compensation within the community for the development of the learning objects.
Development tools	The choice for development tools is up to the individual members of the community.
Management	
Metadata	Use of metadata is restricted. There is no mandatory metadata application profile. AMG (Automatic Metadata Generation) may be available in tools (e.g. Kolibri; see Benneker 2006 for more information about AMG). Usage data such as annotations and rating are important within the community. Other ways for adding metadata may be welcome; see Benneker 2006b for a discussion in this respect.
Quality assurance	There is no strong (central) quality assurance. Learning objects may be submitted without any review.
Tooling and infrastructure	To be decided upon by the community and its members. Will probably consist of public available, free to use tools. Examples: • p2p clients such as Kolibri • 'SURFgroepen' • Web based applications such as Educanext
Protection/rights	Individual members of the community decide for themselves.
Use/exploitation	
Users of learning objects	Members of the community.
Payment	There is no payment for use.

Scenario 2: Institutional regulation

General description

In this scenario an educational institute sets up and organizes the development and exchange of learning objects. The institute decides upon formats and learning technology standards to be used by the developers. Size, structure, pedagogy, and metadata are based on curriculum, course structure or competence maps. There are explicit pedagogical guidelines, which determine the size of the learning objects (see Schoonenboom, 2006). The creation, exchange and application of learning objects is the exclusive domain of teachers.

To support the development process rules and procedures have to be drawn up. Teachers are provided with the appropriate tools and are offered training facilities and support for the creation of metadata. Quality assurance is set up using internal peer review procedures, in which experts in the same domain or discipline (coming from inside or outside the institution) provide suggestions for improvement. There is a strict versioning policy. The learning objects are owned by the institute, not by the individual teachers. This makes it possible for other teachers to edit the material and make use of it for their own courses.

The institute's ICT department provides infrastructure, applications en maintenance services. Users may be supported in submitting learning objects, e.g. by automatic metadata generation or specialists from the library. One requirement on the learning objects is that they can run in the institute's virtual learning environment(s). They are primarily meant for internal use, but exchange and deals with other institutes or network organizations may be an option. In this case arrangements on payment and rights must be made.

General characteristics	
Initiative	Educational institutes or faculties are initiators and apply a central strategy.
Key aspects	Sharing and reuse are policy decisions. A pedagogical approach is present, in which working with learning objects must fit. The VLE (virtual learning environment) the learning objects are expected to run in, is known.

Development	
Developers	1. Teachers of faculty or institution. 2. Service departments e.g. for audiovisual productions or computer based applications.
Definition of learning object	Learning objects may be defined on various (aggregation) levels based on the pedagogical models used (see Poortman & Sloep, 2006). The amount of context present in the learning object depends on function and level of the object.
Formats of learning objects and learning technology standards	Formats to use have been prescribed and depend on: 1. Data type (text, audio, video, et cetera) 2. Delivery media or carriers to be used (worldwide web, paper, high or low resolution, et cetera). Use of learning technology standards depends on the desired level of (technical) interoperability and type of learning object, but is not a necessary condition.
Size of learning objects, context	The size of learning objects has to be decided upon in accordance with the pedagogical models applied.
Pedagogy	The pedagogical models used are leading for the definition of (types of) learning objects.
Payment	The institute or faculty the developer is affiliated to accounts for the costs of the development of the learning objects.
Development tools	Tools and infrastructure for the development are provided by the institute or faculty. They also must take care of proper training facilities.
Management	
Metadata	The use of own metadata application profiles is obvious, preferably based on metadata standards such as IEEE-LOM of DublinCore, as it increases third party searching options (e.g. LoreNet). The creation of metadata may be a shared responsibility: 1. authors/developers provide default metadata; 2. specialists add specific metadata; 3. AMG is optional, depending on available tooling.
Quality assurance	Quality assurance using peer-review procedures is a recommended option.
Tooling and infrastructure	Are put to disposal by institute or faculty, in the form of repositories or (L)CMS. Support structures have to be set up, and clear roles and responsibilities have to defined. If faculties use different software applications, agreements on interfaces have to be made. Explicit attention should be paid to versioning matters.
Protection/rights	Rights on use and maintenance of learning objects are taken care of at institutional level.
Use/exploitation	
Users of learning objects	Primary target group for use of the learning objects are colleagues within the institute or faculty. External use is optional.
Payment	Internal use of the learning objects is for free.

Scenario 3: Network organization

General description

A network organization (such as the Digital University or SURF) offers its members centralized services for management, sharing en (re)use of learning objects. There are sound rules for the application of metadata profiles and formats, including learning technology standards. The size of the learning objects is not specified at a central level, but is usually agreed upon within a project or participating institute (see Schoonenboom, 2006). The learning objects are designed to be published to a website and to most prevalent VLEs.

The repository used is structured according to the disciplines or domains offered in the Netherlands. For each domain a team of experts is hired for creation and maintenance of learning objects. Adding metadata is a well organized process. Review of the learning material is also done by a professional team, hired from higher education institutes. All activities are paid for; rights have been transferred to the network organization

Educational institutes can subscribe to the services offered by the network organization. Teachers of these institutes are free to use the available materials within their own institution. Users are invited to give suggestions for improvements. This may result in updated versions and the development of new learning objects.

One or more repositories are available and are managed centrally according to the procedures mentioned before.

General characteristics	
Initiative	Network organizations
Key aspects	National service provider with publisher perspective. There may be a variety of partners or 'customers' with divergent pedagogical approaches. Delivery or publishing to different VLEs must be supported. Working with semi-manufactured learning materials is obvious in this scenario.
Development	
Developers	In this scenario development is regulated by contract. In most cases teachers from different educational institutes will be hired as developers.
Definition of learning object	Specifications and templates for learning objects and their components (e.g. 'assets') are provided by the network organization.
Learning object formats and learning technology standards	Standardized formats are used to meet the demand of technical interoperability.
Size of learning objects, context	There are no central agreements about the size of the learning objects.

Development (continued)	
Pedagogy	In this scenario the challenge is to find the balance between pedagogy and reusability. By definition learning objects are not pedagogically neutral. Creation of components which can be assembled to larger entities is a likely approach.
Payment	Development is regulated by contract. Partners contribute to the network organization according to the agreements. Another possibility is to hire individual authors externally.
Development tools	Specific development tools are provided by the network organization along with templates and training facilities.
Management	
Metadata	Metadata application profiles are used, based on metadata standards such as IEEE LOM or DublinCore. The creation of metadata is a shared responsibility: 1. authors/developers provide a default set of 'simple' metadata; 2. specialists add specific metadata; 3. AMG is optional, depending on available tooling. For a description of working with metadata within the context of the Digital University see Benneker (2006).
Quality assurance	Quality assurance is a key issue. A well defined review procedure like in MERLOT is to be used. Reviewers are hired in experts. Benneker 2006a gives a detailed description of the MERLOT quality procedures.
Tooling and infrastructure	Management tools and infrastructure are provided by the network organization or specialized service providers.
Protection/rights	Copyrights are settled by contract.
Use/exploitation	
Users of learning objects	Users are teachers of institutes participating in the network organization. The following usage scenarios are possible: • Import packages (e.g. ZIP, SCORM or IMS of IMS Content Packages) in the institutes' VLE and run or play them; • Integrate learning objects/assets in existing courses; • Assemble learning objects/assets to larger entities.
Payment	Depends on the business model of the network organization and the way it is funded.

Some thoughts on choosing scenarios

Choosing a proper scenario for the use of learning objects is not simply about taking one of the three scenarios off the shelf and working it out. As mentioned earlier these scenarios don't exclude each other and may be used in combination. However they vary to a large extent in organizational and technical implications. Table 1 gives a concise description of the differences.

Table 1
Comparison of scenarios for the use of learning objects

	Community scenario	**Institutional regulation**	**Network organization**
Key aspects	Freedom of use and participation, self-regulation	Strong regulation	Professional services with a variety of usage options
Definition of learning object	Anything that is digital and can somehow be used for educational purposes by teacher or student	Strictly defined units of learning or building blocks that fit within the pedagogical approach	Any definition may be used
Size, pedagogy and structure of learning objects	Undefined	Institute/faculty decides	The experts decide
Rights	The author decides	Teachers have assigned rights to institute/faculty	Authors assign rights to network organization
Sharing	Any suitable and available tool	Within the intranet using provided tools	Between repositories, p2p
Formats	Undefined	Explicitly defined and in line with the VLE used	Most dominant and supported learning technology specifications
Life span	Determined by actual use	Under control of institute/faculty	Expert group
Metadata	May be added by author or user; AMG is optional	By specialists; AMG is optional	By specialists; AMG is optional
Rating	User annotations	Peer review	Peer review and user annotations
Quality assurance	Low	Strong with respect to own curriculum	Strong with respect to domain
Payment	No payments	Institute/faculty pays, free to use for own staff	National funds possibly with contributing members
Management	Distributed	ICT-department	Services of network organization

All scenarios described take place in practice. There may be also the case of mixed scenarios, that combine several aspects of the different scenarios. An example is the 'Anno Onderwijsportaal voor

het VMBO[1]'. In this example teachers are encouraged to exchange educational resources within the area of history using a web based facility. In this case there is no strict definition of what a learning object is (scenario 1). On the other hand there is a central repository and the resources provided are evaluated by an editorial staff (scenario 3).

So the scenarios described are not absolute, but can be used in conjunction or in mixed mode. It's up to policy makers to seek for smart solutions for creating and sharing learning objects at acceptable costs. An overview of success and fail factors in this respect would be very valuable, but requires additional study. It is obvious that known community enabling factors such as critical mass, shared goals and mutual interest play an important role here. The next part will eventually provide some thoughts and examples of the three scenarios.

Community scenario

In this scenario the threshold to create and share is low. It's a 'cheap' and liberal scenario, in which members can fulfil their own needs. If there appears to be no urge to share or exchange learning objects the community will die in a natural way. This may also be the case if some basic conditions for the operating of communities haven't been met. The absence of a critical mass of members is probably the best example here.

A point of concern may be the quality and the heterogeneity of the material provided. The practical usefulness probably has to be determined by each individual user. However within the emergent area of social software there appear to be quite promising solutions such as user rating, annotating and tagging.

Another problem could be the absence of (technical) interoperability agreements. There is a growing urge amongst educational institutes and providers to standardize on formats for testing material (such as items ands tests), competency definitions, transport protocols, user information et cetera, the so-called learning technology specifications. This is in order to create plug and play educational material that can run in a variety of technical environments and software tools. In a scenario where the private initiative dominates, use of these learning technology specifications will hardly be an issue as it often demands much effort and specific tooling. Furthermore the use of these specifications sometimes is put into perspective and the most import criterion for reusability is conceived to be the ability "to render properly in most browsers […]" (Wiley, 2006).

Some actual examples of the community-scenario are the following:

- Kolibri (http://www.du.nl/uvo); a p2p software tool, provided by the Digital University (DU), allowing individual members to set up their own communities and share resources
- the use of MSN groups by students Cultural Sciences at the Open University of the Netherlands for e.g. sharing abstracts of course material
- www.scholieren.com, meant for Dutch students in secondary education, a web site where abstracts and book reviews can be shared, annotated and rated
- Educanext, a web based facility, created with European funding, with the aim 'to create an innovative, trustable and scalable environment to allow the secure exchange of learning materials over the internet' (http://www.educanext.org/ubp)

Institutional regulation

Not every department and each teacher is free to create their own (small scale) initiative, but there is centrally stated policy. It is clear what has to be developed and it is clear how these materials fit

[1] http://onderwijs.anno.nl/anno.onderwijs/anno.onderwijs/home.html, last visited 11-04-2006.

in courses en pedagogical approaches of faculty or institute. This scenario demands professional management and support.

Although the VLE or delivery system is known in this scenario, it may be wise to separate development and delivery services as delivery tools (VLE's) may be subject to change (different versions and vendors).

A possible disadvantage from a national point of view is that a variety of similar services and repositories may grow throughout the country. There may be some form op cooperation and exchange, but the institutes' own interests prevail.

It is quite imaginable that the materials from scenario 1 may find their ways in this scenario, if the rights on these materials cause no problems.

Furthermore this scenario may well exist next to scenario 3 (network organization). If profitable institutes may also migrate to scenario 3 without many burdens.

An actual example of this scenario is the LCMS Psychology at the Erasmus University Rotterdam. The department of psychology at this university has set up a repository in which all possibly useful material such as articles, chapters, lectures, animations, videos and powerpoint slideshows are stored and supplied with practical (not standardized) metadata; this example has been described in detail in Schoonenboom, Emans and Meijer (2006).

Network organization

Through its large-scale and professional approach, this scenario may be assumed to increase the quality of educational materials. The scenario is also well-suited for institutes and faculties with less students in that it provides the possibility to join forces.

This scenario implies on the other hand that participating institutes or faculties will – even more than in the scenario of institutional regulation - have to give up a part of their autonomy and will have to comply with carefully worked-out procedures, styles, formats and learning technology standards.

This scenario may serve as an example and a source of inspiration for scenarios one and two.

Examples of this scenario are:

- Digital University (http://www.du.nl/), in which nine Dutch institutes for higher education cooperate in the production of high quality educational content
- Landelijk Onderwijsweb Kennistechnologie (http://www.ou.nl/lok)
- www.heoictkenniscentrum.nl, a collaboration of institutes of professional education for the development and use of educational materials for Business Intelligence

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List of Abbreviations

(L)CMS	(learning) content management system
AMG	Automatic Metadata Generation
DU	Digital University [Digitale Universiteit] Network organization in the area of higher education and research
DublinCore	metadata standard, developed by the Dublin Core Metadata Initiative (http://dublincore.org/)
Groove	virtual office tool (http://www.groove.net/home/index.cfm)
IEEE-LOM	IEEE Learning Object Metadata (http://ieeeltsc.org/wg12LOM)
P2P	peer to peer
VLE	Virtual Learning Environment

Appendix: Activity-structuring for each scenario

To support the scenarios described a visual representation of these scenarios (using UML[2] activity diagrams) is provided below. From the left to the right each diagram shows columns or 'swim lanes' for each of the identified actors in the scenario including their names. Each column shows the activities and steps for the corresponding actor. The arrows indicate the intended workflow.

The diagrams show an increasing number of steps as complexity grows. Also the number of participating actors increases in this respect.

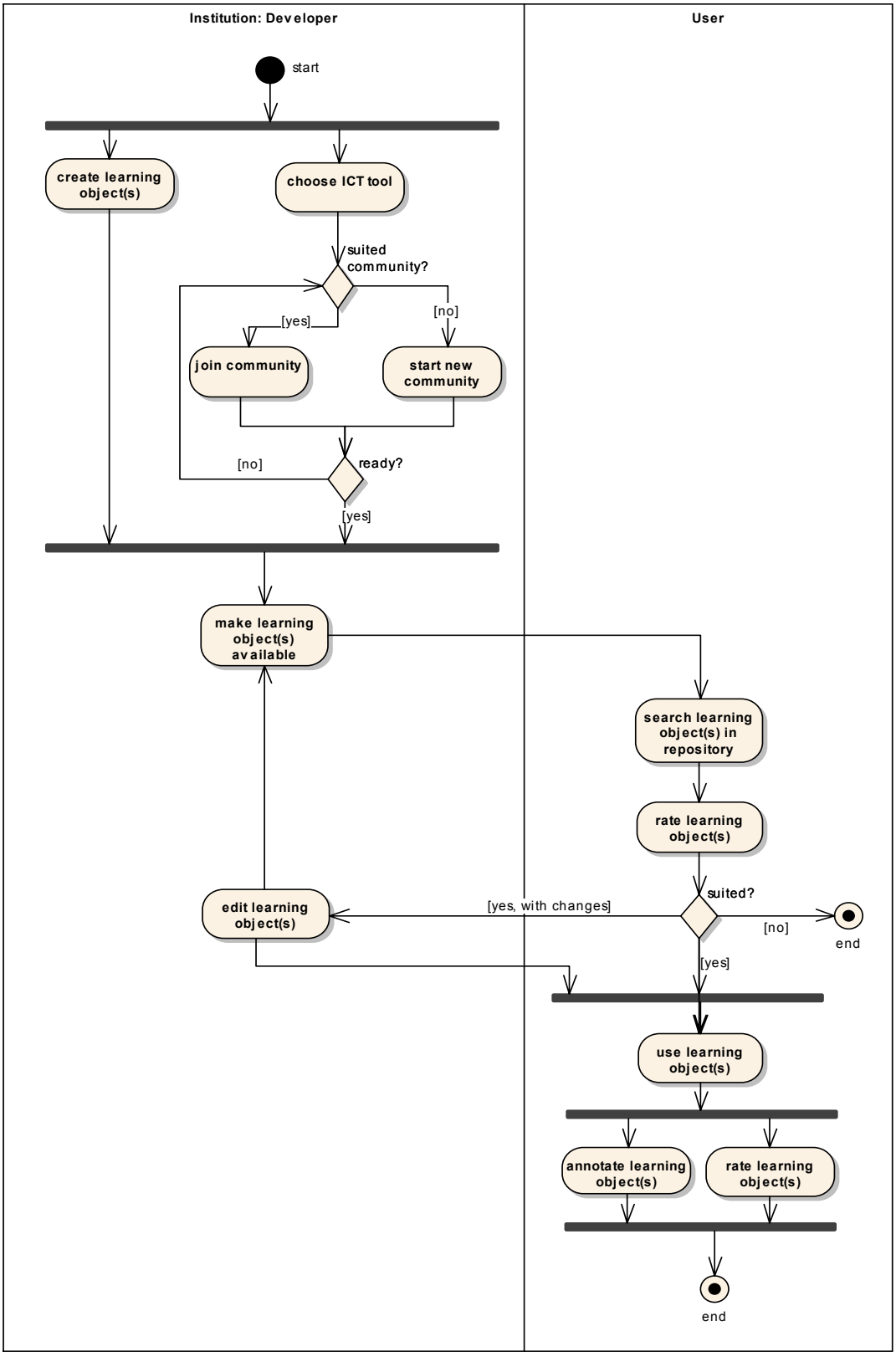
In practice the workflow of course will differ from the workflow presented, as any implementation of learning objects will have its own characteristics and organization. As mentioned in the discussion scenarios may also be combined.

Meaning of symbols:

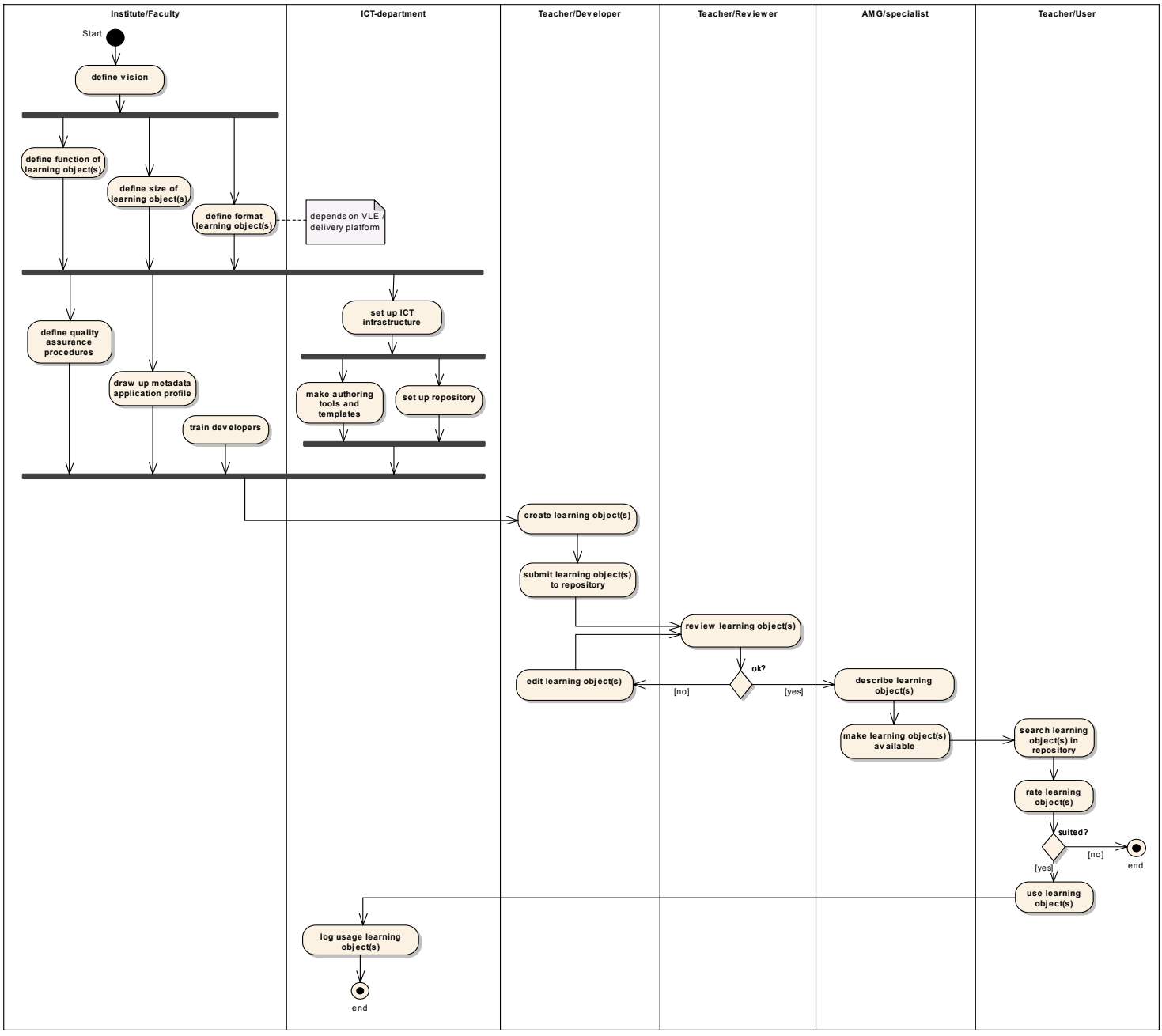
	activity
	decision
	start
	end
	fork/join
	fork/join
	flow

[2] Unified Modelling Language (http://www.uml.org)

Community scenario



Institutional regulation



Network organization