

Model filtering – how to prevent black-boxing of discourses about learning and teaching

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Version 0.8 November 6th 2005

1. Introduction

The Filter Project aims at identifying "hidden mechanisms hindering accessible, fair and affordable knowledge" (www.filternetwork.org). Filters or lenses are strong concepts bringing to our attention the old epistemological insight that every grain of knowledge is mediated through specific models of the knowledge domain. In the domain of e-learning and learning technologies this insight has to be recaptured again and again. Technologies very often present themselves as "black boxes" – they "just work" and make the political, social, cultural and other filtering of knowledge opaque. At some stage it is like loosing your spectacles on the floor – you have to find them again to see the real shapes and contours of a landscape that you have grown all too familiar with.

This paper will introduce the notion of *model filtering*. We want to explore if this concept could shed some light on what is going on at some junctions where policies concerning learning, teaching and e-learning technologies are forged. The context of the discussion is Norwegian policies and reflection on the result of three years of practice in the Norwegian eStandards Project.

2. Models and filters

Just as the eStandards Project was launched in 2003 I published a thesis with the title "Standardisation of e-learning: Is the learning technology of tomorrow building on the learning theories of yesterday?" (Hoel, 2003). After studying at great distance some of the specifications and standards coming out of the standards bodies my answer was yes. Yes, my "reverse engineering" of the Learning Object Metadata Standard (IEEE LOM) and the Sharable Content Object Reference Model (ADL SCORM) showed that the learning theories built into these specifications were not congruent with the pedagogical thinking in Norwegian schools and higher education.

This conclusion was somewhat contrary to what was preached by the powerful organisations behind these specifications. E.g. ADL (with the backing of US Department of Defence) stated that "The SCORM Content Aggregation Model represents a pedagogically neutral means for designers and implementers of instruction to aggregate learning resources for the purpose of delivering a desired learning experience" (ADL, 2001).

It seems that the ADL's understanding of their technology is that it is *given*, as a "black box" hidden from investigation. It is understood as an entity unto itself, whose ramifications are entirely external to it (Friesen & Cressman, in press).

I have always wanted to look into closed boxes, and was happy to find ways of opening them and interpret what I saw (e.g. by using the Actor Network Theory of Latour, Callon, Law a.o.). There are specific interest infested models of reality in there – and we have to unlock them to understand what they want us to do.

For students using the Norwegian made learning management system (LMS) ClassFrontier it is not obvious that this system is mimicking some very specific social and physical structures of the school institution. The metaphors are familiar: Class, Classroom, Corridor, Courses etc. – and they are not coined just to make the LMS easy to use. When the vendor designed the virtual learning space the designers consciously or not used an e-learning model that corresponded to a physical space - the public education institution with its divisions into academic years, semesters, modules, faculties, departments etc.

E-learning models emerge from the knowledge of institutions. While the LMS model derives largely from university institutions, the SCORM model emerges from an understanding of the military-industrial training institutions¹.

Confronted with a learning technology artefact you ask yourself what is the e-learning model behind the artefact – and what real world phenomenon the model is based on. Doing so you might end up with a feeling that the apple has rolled very far from the tree, the tree is rotten – and there are other fruits that taste even better.

Filtering

Also the concept of filtering gives connotations to our work in the eStandards Project. We have done a great deal to see if the Knowledge Management Community could bring interesting points of views and technologies to the e-learning world. In Norway we have a strong tradition in the use of one particular Semantic Web Technology – Topic Maps. The basic principles behind this technology revolve around three concepts - Topics, Associations and Occurrences – "the TAO of Topic Maps" (Pepper, 2000). However, there is one more concept that makes topic maps extremely useful for learning and teaching: Scope. Any topic map statement could be scoped, i.e. defined valid in a specific context. For example, we describe the same thing using different languages. The scope might be English or Norwegian - and depending on what language we want to see we filter out the one or the other. Semantically the concepts have the same meaning in the different languages. We could however, scope our domain using other categories, e.g. roles. For instance it might be the same knowledge object, but modelled by the education authorities, the teacher, the fellow learners etc.

The concept of Model Filtering is constructed for this paper. However, the concept it used before by the computer scientist Mitch Goldstein to describe a certain information architecture which is

¹ See Scott Wilson's workblog <http://www.cetis.ac.uk/members/scott> - note of October 4th Architecture of virtual spaces and the future of VLEs

of no relevance to our discussion. Though Goldstein's characterisation of model filters makes sense to us: "Model filtering operates without altering the underlying model data. This allows one set of data to be shared among multiple components, each of which may interpret the data in a different manner. Filters can be layered, enabling model data to be interpreted through several different filter objects." (Goldstein, 2001)

This expresses exactly what I want to convey with my concept of model filtering: We may share the same model data in a discourse finding place within a community of practice. By filtering the data we allow for a host of different interpretations which may be more or less instrumental to produce results to the different stake-holders. However, the ability to do model filtering serves the aims of all stakeholders enabling them to make more informed decisions. As to the Community of Learners this ability to move between scopes is very much the essence of learning. As to the Community of Policy makers what matters it is the ability to find the particular scope that releases funds or open new possibilities for alliances. Finally, as to an awareness raising agent as The Norwegian eStandards Project the challenge is to filter in the scopes that make the policy and management level happy without filtering out the models that would inform good practice in technology development.

3. Three years of eStandards work in Norway

The Norwegian eStandards Project started 2003 as a three years effort to raise awareness of the benefits of standards in e-learning and to co-ordinate the Norwegian participation in international standardisation. Through networking, seminars, consultancy work, profiling of international standards etc. we have accomplished to put the needs for standards on the national agenda and in the centre of e-learning policy thinking. The "eStandards activity" is now going to be extended for another three years, as part of the National Programme on Digital Competencies.

I will now "filter out" some of our activities and try to capture some of the different models being applied.

Metadata tagging of learning resources

I came to the eStandards work with the conclusion from my "research" on the IEEE LOM standard that it did not model what learning and teaching are all about according to a socio-cultural or social constructivist learning theory. However, it was the only e-learning standard we got. And when the learning and teaching portal utdanning.no asked us for a metadata scheme to use, and all the Learning Management Systems in the Norwegian market were prepared for LOM, we had to point to the LOM. Then we faced the challenges to develop a Norwegian application profile for LOM, NORLOM, to serve our communities with Norwegian vocabularies and recommendations for implementation.

The LOM is a monolithic standard trying to model many aspects of learning and teaching with more than 80 elements. In an application profile you choose a subset of elements from one or more metadata schemas to create a compound schema you hope would benefit your community (Duval, et. al. 2002). Community needs are often identified through a down-up process. In a way this conflicts with the lay notion that a standard is a solid finished construct that you could layer

on top of your domain. So when we were exploring the challenges of subject classification, we kept looking for a scheme that would allow us to classify every learning resource you could think of in all contexts. We did not find it, realizing that e.g. the Dewey classification system would cost money and as such could not be mandatory in a profile everyone was expected to use. Version 1.0 of NORLOM ended up with a subject classification element that is optional. And we tried to keep the number of mandatory elements as low as possible – to foster interoperability with other metadata schemes (like Dublin Core) and to ease implementation.

However, our minimalist “Norwegian LOM core” approach does not pass easily when the new learning and teaching portal crew started thinking of metadata. They think “national”, “classification of quality resources”, “search and retrieve by taxonomy keywords entered in search forms” etc. And they ask for a revised version of NORLOM with a mandatory subject classification scheme.

Standards in the learning and teaching domain are very immature. When we stress the importance of interoperability standards it is quite natural that the user communities want standards to deliver – even if that means that the abilities of the very same standards are over-stretched.

What is then our advice to the redesigned learning and teaching portal? We would like them to use the NORLOM core and explore community tagging of resource in a more bottom-up manner. The number of learning resources will not be that large to start with. We have time to experiment with folksonomies tagging (Mathes, 2004) combined with different ontology building activities to restrict choice and foster better consistency in the user generated vocabulary. This idea rests on the assumption that searching for learning resources should be part of a social, collaborative practice: It is more important to find the resources that your fellow students and other significant others have rated as good, than finding the resources that some authority has deemed to hold the truth. Or rather, the learner should have the option to choose both.

Intellectual Property Rights – how to deal with the ultimate show-stopper of e-learning

If you want to halt every development of learning technologies you should bring to the table the problems of Intellectual Property Rights and Digital Rights Management. DRM technologies are a minefield of patterns and big interests. In many Norwegian white papers you get the impression that the solution to the DRM problems are just around the corner, delivered by some chip in your computer or some magic new specification to build DRM technologies. This is far from true, as DRM models and e-learning models are completely different.

Needless to say DRM focuses on control of property rights and e-learning on learning. If these two models are combined you tend to end up with a learning object that is just to be *played*, not *deconstructed* (disaggregated) and *reconstructed* (changed and aggregated). The problem is that the first model plays into the hands of the popular and traditionalist learning theory that sees learning as a matter of transmission. If teaching is a question of moving content from one container into another, and learning just about cognition, then “play”, “rewind” and “replay” are good enough. However, if learning is about social and cultural construction of knowledge within communities of learners, you need to be able to remould and share your knowledge objects.

In a Norwegian setting we might be able to solve some of the issues concerning IPR and learning resources – if we could convince the publishers and the authorities to filter in on the right models.

First, we have got to filter out the content where there is no real DRM issue. Most of the learning resources are made by fellow learners and teachers colleagues. They are not concerned about protecting their economic interests because they will never earn a cent on sales of their slides, notes, conference papers etc. What they are concerned about is attribution and fair use. So the answer is support for acknowledgement and fair use by being explicit about conditions for reuse, e.g. by using the Creative Commons framework (www.creativecommons.org).

So then we are left with the content that will not be created unless there is a revenue stream back to the creators. How do we filter out individual (asset) control and filter in on what really is at stake: the sustainability of authors in the digital knowledge society? If you for a moment leave the idea of fine grain control of every single intervention with your intellectual property, and build some element of trust into the equation and observe the fact that Norwegian is more or less an encrypted language to the outside world, you might come up with an alternative model: If you are able just to have some idea of who your users are, you might strike a deal with an aggregate of users, e.g. a local education authority (at the municipality or county level) – and you might just let the learners use the material as they like. In Norway we have plans to roll out an authentication and identity management scheme, giving the learners the benefit of single sign-on and the service providers the benefit of identifying some roles of the users approaching their systems. So if a learner from the county of Nordland wants access to a publisher's learning resources, and there is contract, the student will have access.

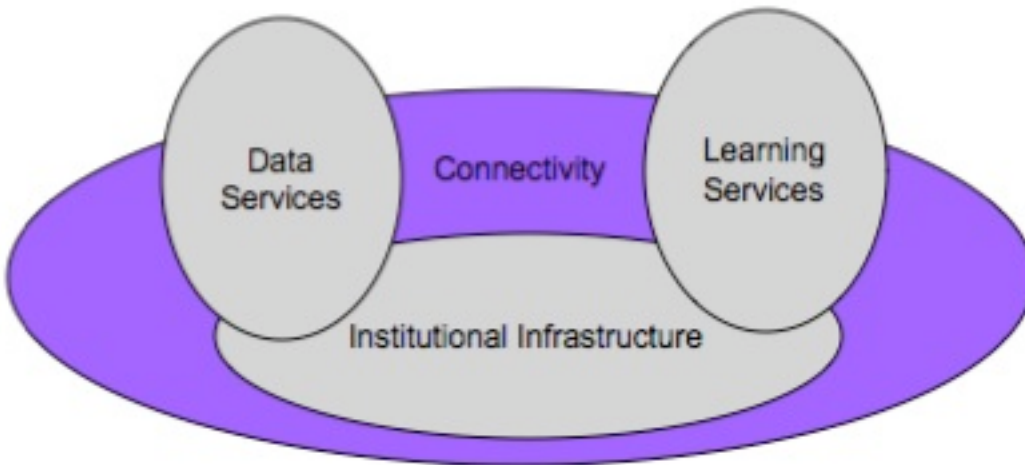
You might ask about the threat to IPR if the student shares the resource openly with everybody else in our country? Then the publisher will lose money. Then again it is a question of which model you filter in: In Norway we have defined digital competencies as the fifth basic skill. Education as an organised activity will not be based on stolen intellectual property. And if students do not learn to discern the legal use from illegal use, they fail in one of the basic skills! And as to leakage of learning resources outside of Norway: for at least textual resources you will have a hard time using them if you not know the Norwegian language!

Are our LMS/VLE/MLE killing learning – how should we model the next generation learning support systems?

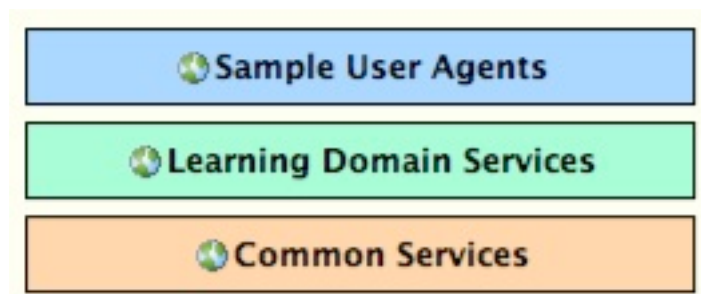
Two Norwegian vendors have managed to roll out Learning Management Systems (LMS) throughout universities and secondary schools, and soon in primary schools to an extent that we believe is unprecedented in our part of the world. As the introduction of ICT in learning and teaching very much have been mediated through LMS adoption projects these systems have defined e-learning to many Norwegian teachers and learners. They do not always like what they see. Now the Ministry has commissioned a report on what should be expected from the next generation learning platforms, being afraid that the first generation LMS may put some serious limitations on how we learn with the help of ICT.

Again we are challenged by filtering in what should be the essence of learning and teaching in the new “specification”. And we need to filter out some of the models that clearly were imposed on the solutions from interests that are more peripheral to learning activities themselves.

As research for the report the eStandards Project has done some studies of the UK practice, especially the work with architectures and eFrameworks within BECTA and JISC². Our point has been that learning platforms should be dismantled as monolithic systems and refactored as different services within a service oriented architecture. The JISC E-Learning Framework groups the services in three categories, Sample User Agents, Learning Domain Services and Common Services. The BECTA National Digital Infrastructure for Education, aka “The Frog” (see figure³ below), talks about Data Services and Learning Services on top of Institutional Infrastructure – all surrounded by Connectivity.



The e-learning framework is more generic than “the BECTA Frog”, Learning Platforms (VLE/LMS) being part of the User Agent box and the different services located shared with other domains as Common Services, and with other learning systems as Learning Domain Services (see figure⁴ below).



Building these models what happened to the pedagogical values that most teachers cherish, e.g. learner centeredness? We have not concluded our studies yet, but we have some thoughts about what BECTA is struggling with at the moment. To us it seems that there are problems *surrounding* the learner that are addressed first: Schools Management Information Systems that

² See <http://www.becta.org.uk/corporate/display.cfm?section=15&id=4705#02> <http://www.e-framework.org/http://elframework.org/>

³ http://www.becta.org.uk/page_documents/corporate/projects/industry/developing_ict_architecture.ppt

⁴ <http://elframework.org/>

not give Value for Money⁵, parents that should have access to online surveillance of their children's activities at school, statutory reports, web site filtering etc. At the moment the frog is blinking her right eye as the Learner Services still has to be specified in detail. However there is a danger as we see it, that the value of learner-centred teaching will be translated into just a question of building learner preferences into the systems so that the learners get different versions of content and activities prepared for them to suit their needs as guaranteed in some government policy.

Could learner-centred pedagogy be supported by other means than user preferences? Interestingly enough the higher-ed counterpart to BECTA, JISC is coming from quite a different angle. They are as part of the e-Framework for Education and Research exploring the Personal Learning Environment theme.

“An alternative approach would be to locate a large amount of VLE functionality with the learner either as a desktop application or an independently hosted portal. Institutions would still provide content via repositories, undertake assessment and so on, but learners would interact with these using their personal systems, comprising their preferred tools and ways of working. This new sharing of technical facilities requires careful elaboration, but offers the promise of providing more control for the learner in their lifelong learning journey, and reduces the requirement for institutions to be total system providers, from data to user interface” (Liber & Hollins)⁶.

CETIS (the JISC funded Centre for Educational Technology Interoperability Standards) will develop a Personal Learning Environment reference model to present an alternative approach to traditional VLE/LMS.

4. Discussion

The Norwegian eStandards Project is set up to deal with interoperability issues. The three examples from our recent practice shows that interoperability does not only have to do with three or four letter acronyms for technical specifications. If you let Google filter your definition of interoperability you will be struck by the number of times the term “work together” shows up. Interoperability has semantic, technical and political (or organisational if political is too dangerous) aspects. And you need all three to have systems working together.

Members of the Standards Community of Practice often find that authorities want to restrict the scope of their work to technical interoperability. We have shown that this is short-sighted and may lead to development of technology that does not serve the needs of the learners. It is a challenge though to bring different stakeholders into this work, so that the policies underpinning

⁵ BECTA published August 2005 the report “School Management Information Systems and value for money” (http://www.becta.org.uk/corporate/press_out.cfm?id=4928) that estimated that £ 180 million was expended annually on MIS systems, some £, 55 million expended on the provision of support in the use of those systems. One vendor having 85 % of the market, only an “architecture approach” could change the vendor lock-in.

⁶ See <http://www.e-framework.org/events/conference/programme/ple>

the technical work are grounded in broader national strategies. Our concept model filtering might help to facilitate this discussion, making it legitimate to put questions to phenomena that presents themselves as “black boxes” – objective things that “just work”.

When you start to filter out the models that are inscribed into the three cases we discussed above, we will see that there are some common themes revolving around control, trust, development strategies, quality and other high level concepts.

These concepts resonate with cultural traits that might vary quite a lot from country to country, explaining why one particular learning technology may be used and interpreted very differently in e.g. USA, UK and Norway.

Metadata has to do with classification. Classification has to do with what is right or wrong. Right or wrong has to do with quality. And we all want high quality in our educational institutions, don't we? Therefore there is a point to be made that the classification of learning resources should be controlled by someone that knows right from wrong. The classification model to educational metadata calls for control (as in controlled vocabularies), but who is to play God?

The social tagging model to educational metadata leaves the control in the hands of the learners. But should they be trusted in a world with young people not believing the Holocaust took place because they filtered in on some nasty websites⁷? May be they should not be trusted if learning is defined as an isolated activity taking place between the individual learner and the computer screen. But that is not the model of learning that is harnessed in Nordic education. Learners are part of a Community of Learners. All quality assurance does not have to be built into the learning resources – we need to trust that the right is filtered out from the wrong in the social and cultural process of learning under guidance of qualified teachers. The same holds to some degree for tagging of learning resources. We could leave some part of the classification to the learners, using information technology to mould the data to fit the different needs for searching for resources, spotting local use within the Community of Learns etc.

The classification model and the tagging model do not mutually exclude each other. Both approaches should be used. By engaging in model filtering discussions we have demonstrated that there is room for both – it is more a question of dosage and what stakeholder to benefit. Some communities are looking for the truth; others are looking for the ingredients to construct the truth from. When advising policy makers we should be careful to explore more than just one model. Learning and teaching are very complex activities. If we are not very careful to build our specifications on the right use cases, we might end up with repositories of learning resources that are not used, just to mention one example. They might be perfectly searchable by quality-controlled key words, but they might not serve the actual use patterns of the community of learners they were build for.

⁷ Neo-Nazi translation confusing youth: A growing number of young Norwegians doubt the truth of the Holocaust after a website has begun translating neo-Nazi propaganda (Aftenposten)
<http://www.aftenposten.no/english/local/article1146139.ece>

All technologies have a built in model of trust. In Norway we want to build a Culture for Sharing (which is the title of a white paper from the Ministry of Education⁸). You will not be willing to share your learning resources with anyone, if you do not trust your fellow students and colleagues to use your intellectual property fairly. DRM technologies try to build *no trust* into the hardware, with damaging consequences for learning and teaching. With the current patents casting shadows over all technologies that want to do DRM, we should not expect much to happen in this field to serve the interests of education. So why not filter in another model with radical trust in the very essence of education itself? As said above, the special cultural, economic and historical situation of our country could make such a model viable in Norway. If we do right model filtering!

In building the next generation learning environment we have to filter in on the needs of the learner and to make some brave choices about development strategies. Up till now we have based our design on management interests to control and supervise learning activities. This has led to monolithic systems, which are not very flexible from the learners' point of view. If we refrain from some control, put more trust into our design, build the system more bottom-up and allow for a more loosely coupled architecture of mix and match services we might end up with what we could call a Social Learning Environment. This environment would not be able to do tracking of all activities and personalisation in the "we know what is best for you" way. However, it would allow for a wider choice of pedagogies.

Again, it is not a question of not using the applications which design is informed by other models. It is a question of bringing more heterogeneity into to domain of learning technologies.

5. Conclusion

The backdrop of this paper is the issues under debate at the Norwegian e-learning scene. The Ministry of Education has funded The eStandards Project to raise awareness about interoperability standards. We could have chosen to interpret our remit just to cover technical issues, leaving the pedagogical issues to the teachers. We have not done so, because our understanding of specifications is that they are not value free; interests and values are inscribed into the specifications through a process of translations (Latour, 1996, 1999; Hanseth, & Monteiro, 1998). By reflecting upon the practice of this three year project we have come up with the concept of *model filtering* inspired by the theme of the Middlesex University Filterproject Symposium of November 30th 2005. We have used model filtering to allow for a discussion of the different models that inform the design of learning technologies, e.g. interoperability specifications. These models might use the same data, e.g. technology parts, specifications etc. However, the final design might look very differently depending on what model that is filtered out and what model that is filtered in.

Could this discussion lead to some advice for best practice? We would definitively advice national agencies supervising the development of learning technologies to encourage a professional discourse that supersedes just technical issues, making it possible to see what the "black boxes" contain. How we should work to engage different communities of practice in such

⁸ See http://odin.dep.no/ufd/norsk/dok/andre_dok/rapporter/045071-220020/dok-bn.html

a discourse and how this discourse should be further facilitated could be the subject of another paper – and further research.

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