

MEDIAMIXER, FP7 PROJECT

VIDEOLECTURESMASHUP (JSI USE CASE)

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CONTENTS

BACKGROUND.....	3
USE CASE DESCRIPTION.....	5
ACTORS AND ACTIVITIES.....	6
USER WORKFLOW.....	7
CONTENT MANAGER (CM) WORKFLOW.....	9
SYSTEM FUNCTIONALITIES.....	11
CONTRIBUTION OF USE CASE TO STATE OF THE ART.....	13

TABLE OF FIGURES

FIGURE 1. VideoLectures.NET portal (source: VideoLectures.NET).....	3
FIGURE 2. VideoLectures.NET workflow basic (Authors: Fabjan, A., Zdolšek, T.).....	6
FIGURE 3. VideoLectures.NET user workflow current (Authors: Fabjan, A., Zdolšek, T.).....	7
FIGURE 4. VideoLectures.NET user workflow NEW! (Authors: Fabjan, A., Zdolšek, T.).....	8
FIGURE 5. VideoLectures.NET CM workflow current (Authors: Fabjan, A., Zdolšek, T.).....	9
FIGURE 6. VideoLectures.NET CM workflow NEW! (Authors: Fabjan, A., Zdolšek, T.).....	10



BACKGROUND

Currently VideoLectures.NET hosts more than 16.000 video lectures from prominent universities and conferences mainly from natural and technical sciences. Most lectures are 1 to 1.5h long linked with slides and enriched with metadata and additional textual contents. Videolectures.NET is being visited by more than 15.000 unique visitors from all over the world daily, which provides a very efficient distribution and dissemination channel. Further to that, Videolectures.NET is tightly integrated in the three world scale communities of higher education institutions that are providing open access to free educational contents. The three communities OpenCourseWare Consortium (OCWC), Opencast and Knowledge4All combine altogether more than 600 HigherEd (mainly Universities) around the world including the first ten highest ranked Universities. This provides on one side a huge market and on the other the unique dissemination channel to reach world scale impact.

Welcome Tanja | Edit | Admin | Trac (my) | 

videolectures.net exchange ideas & share knowledge  

828 events, 10770 authors, 14250 lectures, 16448 videos

HOME • BROWSE LECTURES • PEOPLE • CONFERENCES • ACADEMIC ORGANISATIONS • EU SUPPORTED • ABOUT US • BLOG

Invited Talk [syn] 127 views, 11:46:52 Knowledge for from People for from Computers **Michael Witbrock**

Invited Talk [syn] 226 views, 1:02:19 Patterns in Complex Networks via Spectral Analysis **Ernesto Estrada**

Lecture 16: Electromagnetic Induction, Faraday's Law, Lenz Law, Complete Breakdown ... [syn] 975 views, 51:21 **Walter H. G. Lewin**

Od trepenjenja do uresničitve inovativne ideje [syn] 548 views, 17:55 **Andrej Detela**

Novel HIV Inhibitors [syn] 179 views, 21:25 **Vladimir V. Poroikov**

Invited Talk [syn] 105 views, 49:31 Strategies for Prediction under Imperfect Monitoring **Gabor Lugosi**

CATEGORIES

- Architecture (96)
- Arts (178)
- Astronomy (71)
- Biology (298)
- Business (948)
- Chemistry (161)
- Computers (299)
- Computer Science (6875)
- Earth sciences (18)
- Environment (147)
- Events (404)
- Health Sciences (25)
- Humanities (220)
- Journalism (43)
- Life Sciences (30)
- Mathematics (453)
- Medicine (189)
- Military (17)
- Philosophy (81)
- Physics (236)
- Regional (11)
- Science (477)
- Sports (36)
- Technology (509)

NEWS

The crew is off to Paris to collect the UNESCO award Feb. 21, 2013

Next week the VideoLectures.Net crew is traveling to the UNESCO Headquarter, Paris, France to pick up the 2013 WSA award of the decade in the "e- Science & Technology" category. Looking forward to the gala event!

United Nations and UNESCO to award VideoLectures.Net best educational product of the decade Feb. 18, 2013

We are happy to announce that VideoLectures.NET was recognized by UN and UNESCO as one of the most outstanding examples of creative and innovative e-Content in the world in the last decade. Check our [blog article](#) for more details.

New MIT OCW courses Feb. 11, 2013

Make sure to check the courses 6.01SC Introduction to Electrical Engineering and Computer Science, Spring 2011 and 6.262 Discrete Stochastic Processes, Spring 2011 as these are dealing with topics that affect and include many applications in engineering, physics, biology, operations research and finance.

NIPS 2012: Posner Lectures, Invited talks, Workshops, all published! Jan. 16, 2013

Make sure to check the lectures from the prominent 26th Annual NIPS Conference filmed @ Lake Tahoe 2012. Also make sure to check the NIPS 2012 Workshops, Oral sessions and Spotlight sessions which were collected for the Video Journal of Machine Learning

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RECENT EVENTS

27th European Congress of Arachnology (ECA), Ljubljana 2012 disabled

27th European Congress of Arachnology (ECA), Ljubljana 2012

7.01SC Fundamentals of Biology disabled

7.01SC Fundamentals of Biology

Fundamentals of Biology focuses on the basic principles of biochemistry, molecular biology, genetics, and recombinant DNA. These principles are necessary ...

6.172 Performance Engineering disabled

6.172 Performance Engineering of Software

FIGURE 1. VideoLectures.NET portal (source: VideoLectures.NET)



As use case partner, JSI will integrate the MediaMixer technology into Videolectures.NET and hence demonstrate the value of the technology while also itself benefitting from improved search and retrieval of fragments of its video assets.



USE CASE DESCRIPTION

Visitors to VideoLectures.NET are looking to consume learning materials on specific topics of interest. However, visitors typically have limited time to find and watch the materials they want and the topics they search for may be orthogonal to the materials themselves (be the subject of different parts of multiple learning resources rather than the subject of a specific complete learning resource). Visitors would benefit from easier and quicker access to those different parts in the form of a single, integrated presentation of learning materials, which in turn could drive more repeated access and win new users, including in new contexts. E.g. dynamic provision of such learning resource “mash ups” would be particularly useful in mobile consumption contexts (where the user typically has more limited time and a restricted browsing interface). These mash-ups could subsequently form a new distribution channel for VideoLectures.NET contents (e.g. video streams / TV channels on selected topics) and be integrated into other learning channel offers (mobile like iTunesU, IPTV specialist channels).

Hence we propose a use case for the **VideoLecturesMashup** which will be a dedicated channel on the VideoLectures.NET portal which is capable of accepting a specific learning topic as input and will produce as a result a mash up of fragments of learning materials from the site addressing that topic, ordered in a meaningful way. The mash up will be specifically addressable and hence bookmarkable/saveable for subsequent reference and viewing.

ACTORS AND ACTIVITIES

In this use case, the principle actors are the **users** (scientific community generating the learning materials with the support of their universities, and the learners who seek to access those materials in a suitable and appropriate fashion), aided by the **content manager** at VideoLectures.NET who is in charge of preparing the materials on the portal.

The below diagram introduces the current principle actors in VideoLectures.NET with their activities in using the portal.

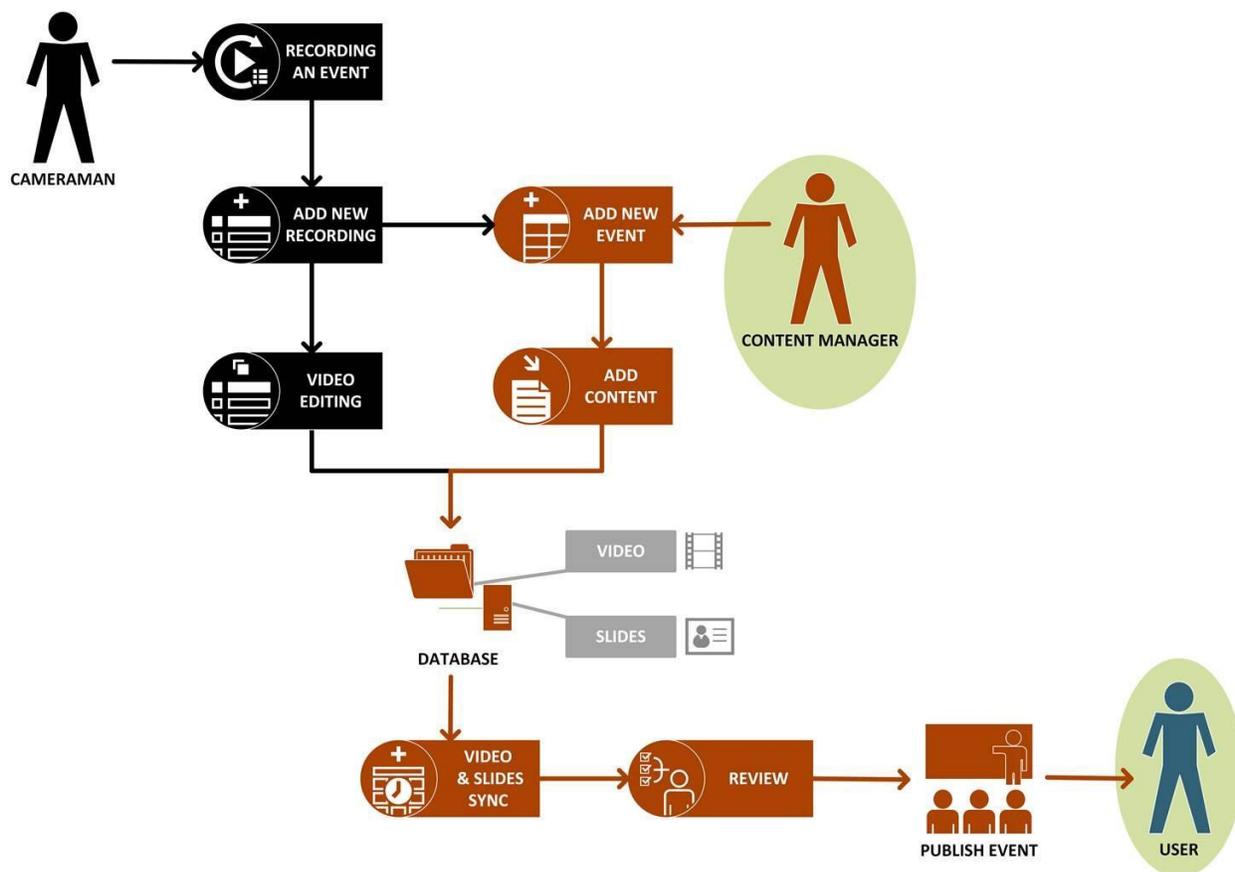


FIGURE 2. VideoLectures.NET workflow basic (authors: Fabjan, A., Zdošek, T.)

In terms of benefiting these user types, we note that **VideoLecturesMashup** can help distribute more widely the materials available on the learning materials portal by reaching learners who may not have otherwise found that material at all (since its primary subject is not the topic the learner may have searched for), promoting cross-disciplinary learning and promoting further the content of the universities (NB. this requires that the mash up can still associate the selected fragments in the mash up with the content provider) and the work of the presenters (since presentation of their work to new communities may seed new applications or co-operations).

1. USER WORKFLOW

The below diagrams are explaining the current and new **user** activity / workflow in VideoLectures.NET.

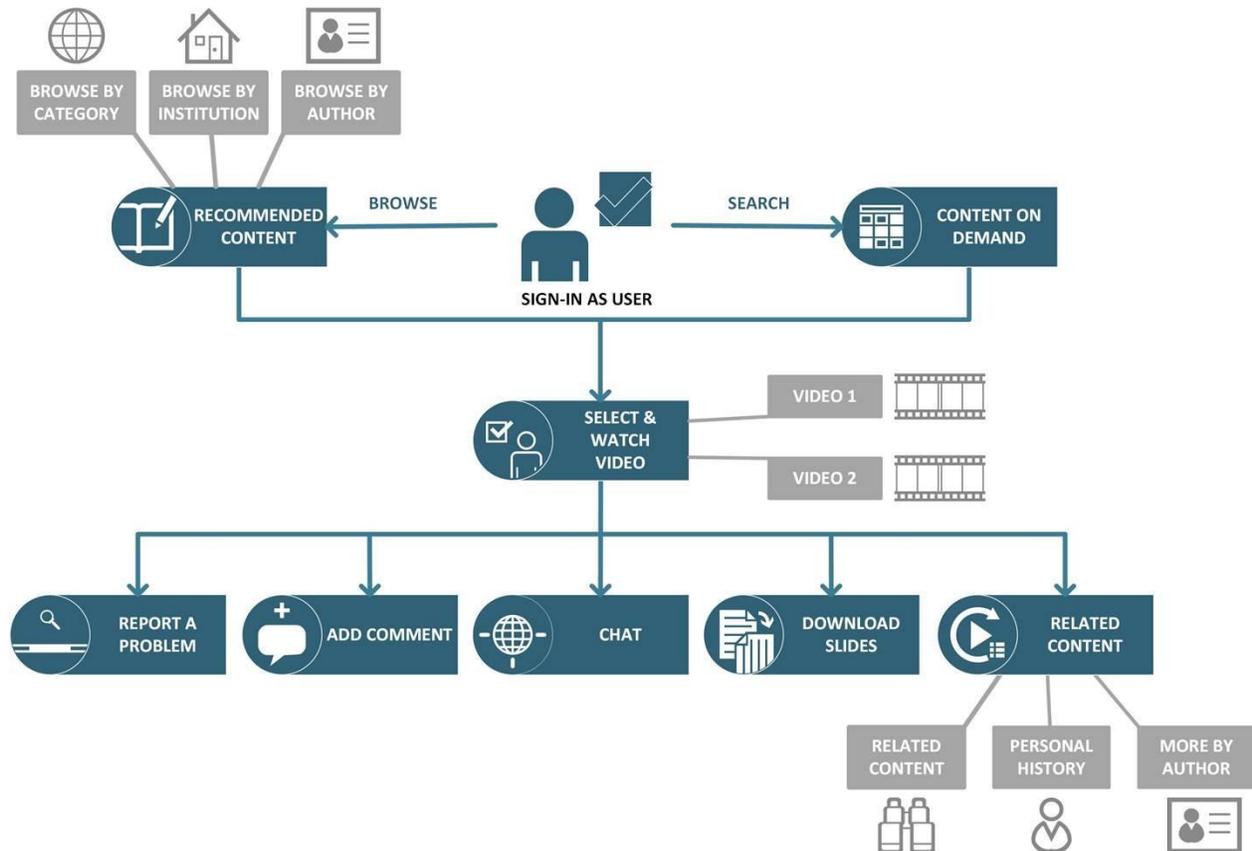


FIGURE 3. VideoLectures.NET user workflow current (authors: Fabjan, A., Zdošek, T.)

Another workflow should be noted where the learner is not just looking at VideoLectures.NET but is interested in any learning offer regardless of its source (the single requirement would be trustworthiness):

request for video content → compare the content on MOOCs (competitors: Coursera, EDx, Udacity, Khan Academy, AcademicEarth, iTunesU) → seek to receive most demanded content → search keywords, topics interested in → receive list of results → choose the appropriate video lecture → watch & download specific video lectures → **receive knowledge**

Here, VideoLectures.NET competes with other learning material offers and the perceived value of its offer will be based on the relevance and appropriateness of what learning material it presents with respect to the other sources. **The key access point in every workflow is the step “search keywords, topics interested in” which results in a list of results which are unordered, complete learning resources.**

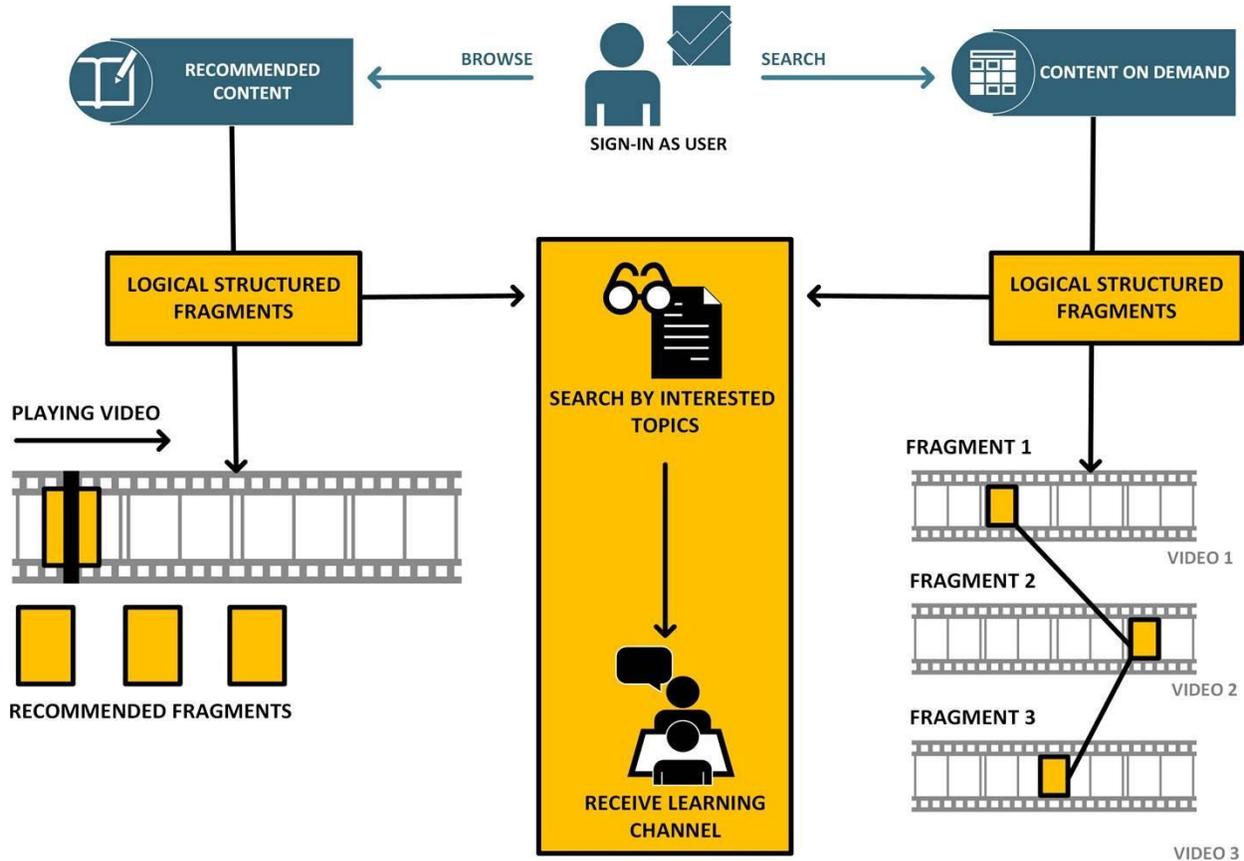


FIGURE 4. VideoLectures.NET user workflow NEW! (authors: Fabjan, A., Zdošek, T.)

VideoLecturesMashup is intended to simplify the user workflow by offering a direct intuitive access to a single learning channel built around the topic searched for, i.e.

search topic interested in → receive learning channel

This workflow may be particularly useful where the user is using a device where browsing is more restricted (TV, mobile) or is seeking to quickly access video which they can begin to consume (time restricted to browse all search results and select which they want). In comparison, there is less direct control over the selected material, which makes the relevance of the selection even more important, and some options may be desirable to offer the user in an interface (e.g. only use recordings made within a certain time period).

2. CONTENT MANAGER (CM) WORKFLOW

The below diagrams are explaining the current and new **content manager** activity / workflow in VideoLectures.NET. The workflow provides information for the manager browsing and accessing learning materials as well as for providing materials for the portal.

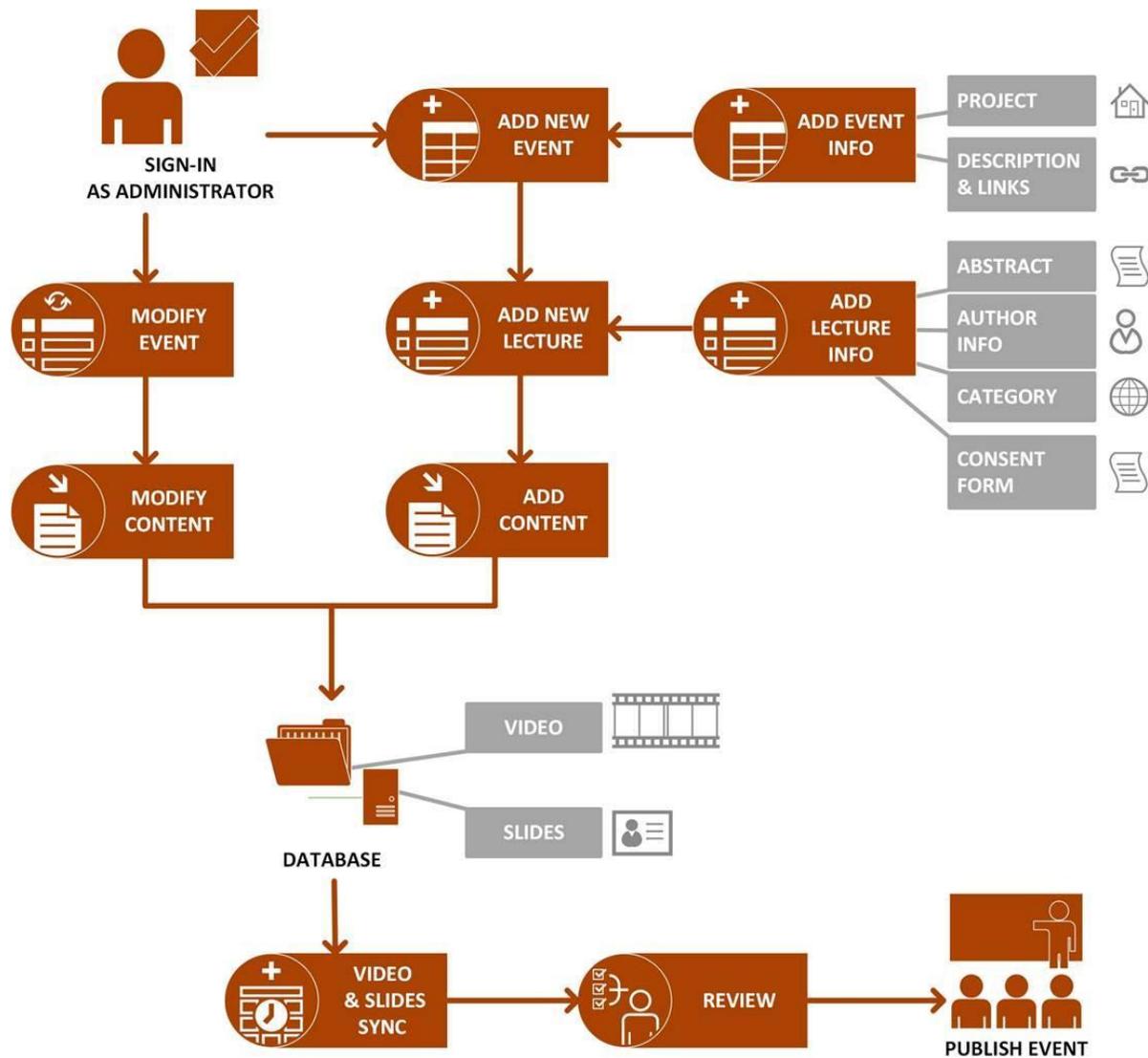


FIGURE 5. VideoLectures.NET CM workflow current (authors: Fabjan, A., Zdošek, T.)

New system functionalities (Segmentation, Automatic textual transcription, Concept extraction from slides, Video analysis, Fragments of learning materials, Semantic annotation) would result in less work and less time consumption for the content manager. Another important case is that we now have logical structured fragments, from which the content manager can easily make new structures and publish them as curricula.

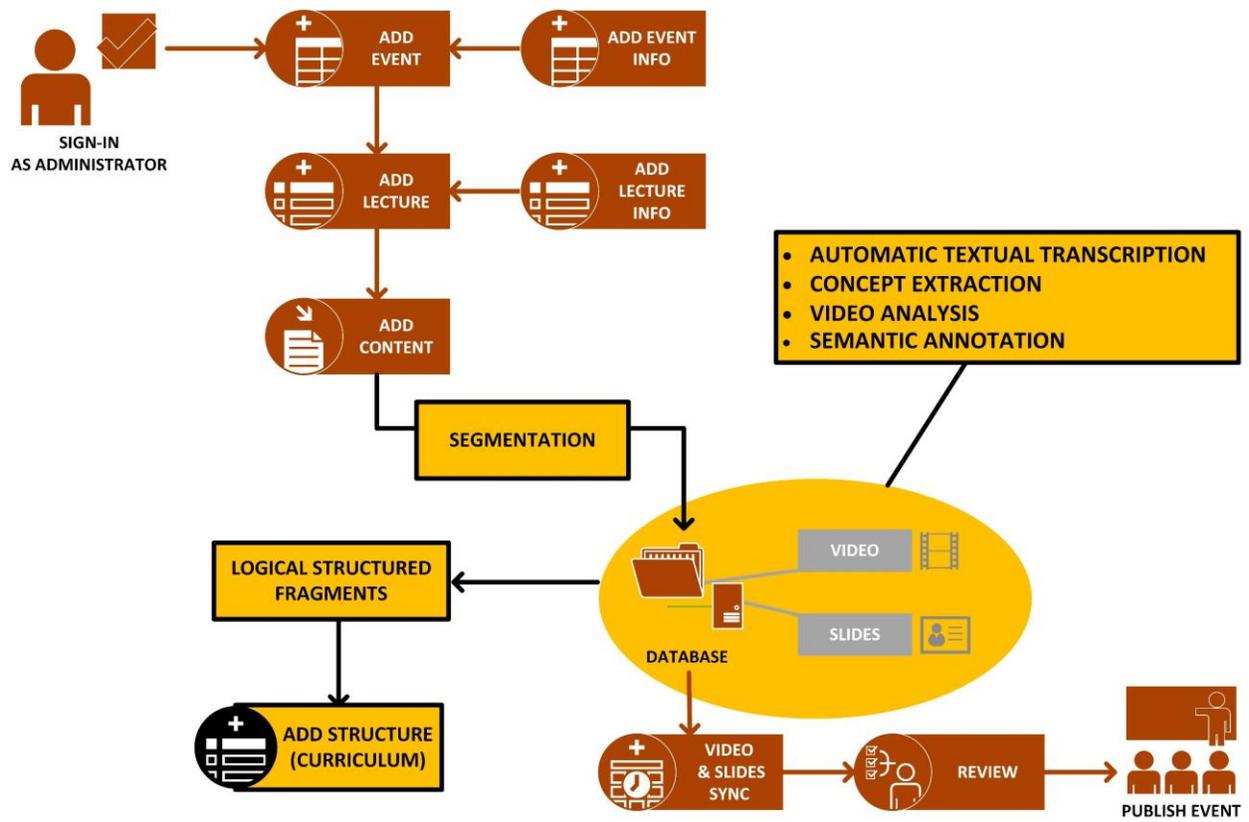


FIGURE 6. VideoLectures.NET CM workflow NEW! (authors: Fabjan, A., Zdošek, T.)

SYSTEM FUNCTIONALITIES

The VideoLectures.NET portal will need access to richer annotations of the learning materials in order to be able to support a search and retrieval mechanism at the level of fragments of the materials themselves. Currently, the search and retrieval works on text matching over complete materials titles and descriptions. Not even the internal descriptions that are currently maintained by VideoLectures.NET (the slide titles) seem to be used in the site search. These internal descriptions (where content of the videos is tied to specific, mainly temporal, fragments) need to be more detailed, and the slide boundaries in the presentation (which can be calculated) linked to the correct temporal boundaries in the video (since a slide may be shown before the speaker starts to reference it, or they reference it before it is shown). This will require additional analysis processes being applied to the learning materials video to generate this annotation. This can usually not be included during recording, even signaling when the speaker refers to the next slide is difficult for a cameraperson probably not knowledgeable about the speaker's subject.

In post-processing of audio, video and the associated slides, VideoLectures.NET needs to incorporate

- automatic textual transcription from speaker audio
- concept extraction from slides (not just titles but textual content)
- video analysis e.g. identification of spatial fragments with the speaker, slides, other objects into its internal metadata generation process, complementing the current manual effort.

This richer annotation will use semantic technology, since associating a spatial or temporal fragment to a semantic concept (rather than, e.g. a simple text label) gives additionally the possibility to link that fragment to that concept's synonyms or related concepts in a semantic search and retrieval system. A metadata schema for the annotations needs to be selected, as well as a choice of vocabularies which contain the relevant concepts and provide (semantic) links to related concepts (e.g. within a taxonomy or classification scheme).

An appropriate repository needs to be provided to store the resulting (semantic) metadata and allow for efficient indexing and retrieval by a search agent. It could be used alongside the current storage solution with the use of shared unique IDs for learning resources to provide a link between data in both stores.

Automatic analysis should be able to handle timing of slide changes in the video, for example, however manual correction may likely still be important for the results of automatic concept detection. It may be that the accuracy of the processes is sufficient to rely on it in user search - however irrelevant results may be less tolerated in a mash up situation. Given the need for specialist understanding of the topic, one option is to incentivize the learning resource creator to correct the annotation of their learning resource. Another is to rely on crowdsourcing, whether Mechanical Turk or the learning resource viewers themselves.)



Assuming the availability of richer annotation of the learning materials, a semantic search and retrieval module needs to be provided for the fragment selection. Given the association of media fragments to semantic concepts, this module is able to match the input topic to concepts in the annotations via the use of appropriate ontologies (logical models of how different concepts relate to one another).

There are three core functions performed by such a module:

- (1) the input topic is internally modelled as a set of semantic concepts;
- (2) the annotated learning resources are internally indexed in terms of the concepts they are associated to, and
- (3) the module is able to calculate a matching value to represent the level of semantic proximity between the concepts in the input topic and the concepts in a learning resource fragments annotation.

An appropriate threshold is set to determine which fragments are to be selected and the form of the semantic proximity (between topic and fragment) may be one of the characteristics used in determining the ordering of the fragments in the mash up. This semantic search module would replace in VideoLecturesMashup the text based search module used by VideoLectures.NET

The results list will contain not complete resources but fragments in terms of spatial or temporal divisions of the learning resources video. Rather than presented as a list to the user they will be played out as a single video stream (while the interface may allow for browsing options, e.g. jump forward or back between fragments). This requires that VideoLectures.NET incorporates on both its media server and its embedded video player the necessary support for the Media Fragments specification.



CONTRIBUTION OF USE CASE TO STATE OF THE ART

There are two main reasons why and how Videlectures.NET profits from semantic multimedia technology enabling fragmented content in comparison with the current approach:

(1) According to the videlectures.NET portal visitor analysis main part of the visitors are looking for very specific information inside the lecture and are not interested to watch the entire lecture. This is why the access to the interconnected video content fragments is important.

(2) Videlectures.NET is tightly integrated in the three main communities of higher education institutions that are committed to provide open access to open lectures at their sites. The main effort in these communities is to find out how to interlink multimodal contents across many multi-lingual sites. The technology to support semantically interlinked multimedia fragmented video content lies in the core of these attempts. Currently there are no feasible solutions to support this aspect.