Sabine Bachmayer, Artur Lugmayr, and Gabriele Kotsis. Scenarios for collaborative architectures for monetizing broadcast archive clips. In Artur Lugmayr, Heljä Franssila, Christian Safran, and Imed Hammouda, editors, Proceedings of the 15th International Academic MindTrek Confernece: Envisioning Future Media Environments, Tampere, Finland, 2011. MindTrek Ry, Tampere Univ. of Technology (TUT).

Scenarios for Collaborative Architectures for Monetizing Broadcast Archive Clips

Sabine Bachmayer
Dept. of Telecooperation
Johannes Kepler Univ. Linz
Altenberger Str. 69, Linz, Austria
+43 (0) 732-2468-9264
sabine.bachmayer@jku.at

Artur Lugmayr
EMMi Lab.
Tampere Univ. of Technology
POB. 553, Tampere, Finland
+358 40 821 0558
lartur@acm.org

Gabriele Kotsis
Dept. of Telecooperation
Johannes Kepler Univ. Linz
Altenberger Str. 69, Linz, Austria
+43 (0) 732-2468-9238
gabriele.kotsis@jku.at

ABSTRACT
Broadcasters own huge assets in form of audio-visual archives or licensing rights for content from 3rd parties. A few public broadcasters grant free access to their consumer of their own produced content. Another trend is social media networks, where consumers are exchanging selected clips as form of digital goods on the Internet. Within the scope of this paper we especially focus on the investigation of this scenario, and research the business opportunities as well as the underlying potential digital platform for exchanging that can be utilized for exchanging digital clips and monetizing these as digital goods. However, the main focus will be on the presentation of the scenarios and the architecture to support the exchange of digital goods in a social media setting.

Categories and Subject Descriptors
D.2.4 **[Computer-Communication Networks]**: Distributed systems – *client/server, distributed applications*. H.3.5 **[On-line Information Services]**: *commercial services, web-based services*. J.4 **[Social and Behavioral Sciences]**: *economics, sociology*.

General Terms
Management, Economics, Experimentation, Human Factors.

Keywords
Broadcasting Multimedia, CSCW, Interactive Television, Multimedia Archives, Broadcasting Content

1. INTRODUCTION
Within the scope of this paper, we present a theoretical solution for architectures suited for monetizing broadcast archiving content. Nowadays, broadcast archives are going digital, and the content simply remains in broadcasting archives, rather than turned to business. Another trend is the emergence of social media as principle platform for exchange of content, digital goods, and gifts. We developed scenarios for bridging the gap between broadcasting archives, consumers, and social networks.

The developed scenarios describe various stages of the life-cycle of digital goods. The developed scenarios relate to activities around the broadcasters' clip archive during live-broadcasts, and not directly related to live broadcasts. Activities for the monetize archive clips as digital goods relate to the promotion/marketing of the possibilities in social networks, distribution of these digital clips during live-broadcast content, analysis of the audience to allow targeted advertising of clips, and audience measurements to provide insights for gaining knowledge for the target reach.

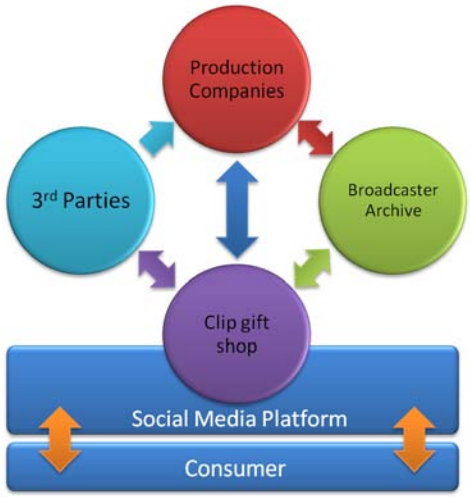

Figure 1. Collaborative platform for exchanging digital goods

Figure 1 gives an overview of the scenario. The main component of the scenario builds social media platforms that act as main exchange for digital clips. 3rd parties are responsible to access and distribute clips coming from broadcast archives to the consumer. 3rd parties have access to the broadcasters' archive or to the production companies for creating content for the gift shop.

2. RELATED WORK
There is sufficient literature around the topic digital interactive TV, however, we would like to refer to [12] as one of the basic works describing advanced application scenarios and their realization. On standardization level, we refer to DVB [3, 4], ETSI [5], SMPTE [14], and MPEG [8, 9, 13] as they laid the basics for interactive platforms with their wide sets of standards. The World Economic Forum released a report in 2011 how collaborative and personal data ecosystems [15] will evolve in the future and has impact on business eco-systems. The Department of Business Innovation & Skills published an interesting report to

the role of the empowered consumer and the business opportunities that are emerging. [2] More specific, the impact of social influence in E-Commerce decision making was researched by Kim et al. [10] Kim et al. pointed out that customers often make use of previous customers' opinions, especially if they don't know the product. These findings especially apply to video clips, as Zhou et al. [16] and Davidson [1] confirmed with their studies about the YouTube recommendation system [11]. They conclude a high correlation between views and view rates. Fleder et al. went one step further with their study, showing the impact of recommender systems on the sales diversity. [6] Based on these findings, we see social media platforms as a reliable platform for distributing and selling video clips from broadcasters clip archives.

3. SOCIAL MEDIA PLATFORMS FOR EXCHANGING BROADCAST CLIPS

The exchange of digital goods became rather popular through the emergence of social media. Consumer exchange clips and other digital content on their favorite social media platforms. One of the main concerns is the development of an eco-system consisting of broadcasters, production companies, and 3rd parties that enable the monetization of digital content in form of digital gifts. The main questions are:

- Which platforms enable the automated exchange of digital clips between broadcaster, production companies, and third parties?
- Which business models exist to turn broadcast archives into a business, complying with legal, royalty, and regulatory frameworks?
- Which new types of consumer services might emerge on the basis of such a platform?

4. SCENARIOS FOR EXCHANGING BROADCAST CLIPS VIA SOCIAL MEDIA

In the following we present four example scenarios to give an idea how broadcast clips or clips from the clip gift shop can be exchanged collaboratively. The general setup for these scenarios is any broadcast receiving platform connected to the Internet. This could be a social media platform providing television functionality (like Tape.tv on Facebook[1]), a TV set connected to the Internet providing social activity (e.g., via an integrated chat or similar) [7] or any WebTV platform providing social activity as well (like Watchitoo[2]). It is important to mention that the scenarios exist only theoretically, they are not yet technically realized.

4.1 Promotion and Propagation of Clips via Social Media Platforms and Digital Gift Shops

4.1.1 Scenario Description

Clips of broadcasts shall be distributed via clip gift shops to the consumer from broadcast archives or from 3rd party provider. Consumers can buy these clips and re-distribute these via social media platforms in a collaborative way. Rights of these clips need to be cleared.

[1] http://de-de.facebook.com/tape.tv

[2] http://watchitoo.com/

4.1.2 Architectural Components

The core of this scenario is the clip gift shop which is included into any social media platform as shown in Figure 1. The shop acts as a link between the broadcaster's and 3rd parties' archives and the social media platform to distribute the clips collaboratively. In a first step, the clip gift shop can be a conventional web shop integrated into any social media platforms (as for example Facebook[3]). In a second step, the offer of the clip shop can adapt and vary depending on the activity and collaboration that is going on at the social media platform, as described with the scenarios 4.2 – 4.4.

4.2 (Live-) Content Pushes Collaboration

4.2.1 Scenario Description

The consumer shall be motivated to buy clips from the digital gift shop through triggers embedded into (live) content. For example, a clip of the broadcaster's in-house produced soap opera shows a preview to the next episode. Or an in-house produced live talk show provides backstage clips to their guests. The consumer's attention to these clips is firstly drawn by the moderator of the talk show (which is trigger via the content) and secondly by embedding triggers into the medium (which mostly will be MPEG) when two guests are discussing.

4.2.2 Scenario Components

The motivation should not happen only via conventional commercials in the content but also via triggers that are embedded into the medium of (live) content.

(1) Embedding a software trigger into the broadcasted MPEG medium during the production phase or live broadcast.

The medium is analyzed by the consumer's player and notifies them about a temporary available clip.

(2) Animate the audience via the content

For instance, the TV host informs the audience about a temporary available clip.

(3) Combine (1) and (2).

For instance a clip to a guest in a talk show is temporary available in the clip gift shop. The audience takes notice of this clip firstly by a notification which pops up at their TV platforms providing a direct access to the clip in the clip shop. And secondly by the TV host or the talk guest itself.

4.2.3 Scenario Implementation

For the scenario of (Live-) Content Push Collaboration, two parts namely the producer and the consumer part need to be implemented.

4.2.3.1 Producer

The producer part refers to embedding triggers into the medium. Therefore it is necessary to provide access to the medium to (1) design and create the trigger, (2) embed it into the medium (whether the content is live broadcasted or not) and (3) link it to the desired clip. How to embed the triggers into the medium depends on which media standard is used. MPEG-4 for instance allows fine grained access to i.a. objects and scenes, whereas MPEG-2 allows high level access to frames, packets and maybe timestamps. In the following we proceed from MPEG-2 since it is standard of DVB in Europe.

[3] www.facebook.com

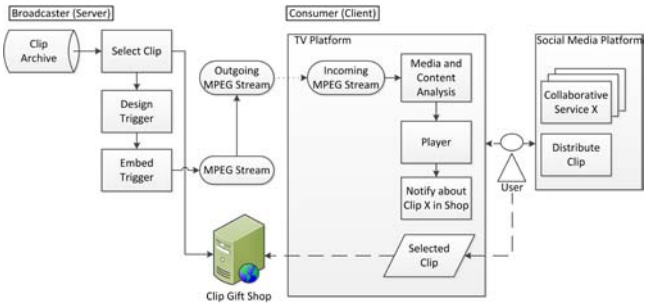

Figure 2. Process of (live-) content pushes collaboration

(1) Design Trigger

The trigger in its simplest form exists of XML metadata with a predefined DTD. The DTD defines the structure of the trigger including mandatory fields (e.g., unique identifier, its position in the medium like frame number or timestamp, id of the clip to it refers, etc) and optional fields (e.g., additional information to the clip). Mandatory fields are required by the player to detect and process the trigger.

(2) Embed Trigger to the Medium

The producer must be able to embed the trigger to the medium easily. Therefore provide a tool which allows attaching the trigger in case of MPEG-2 to a certain frame, timestamp, or the DVB event mechanism into the medium. [8,9] In case of live-content, the attachment of the trigger should be possible via an editing tool that allows embedding trigger into live-content in form of events, application related triggers, or other mechanisms provided by DVB.

(3) Link to desired Clip

The linkage is done very easily by providing XML fields to define the required clip and a web link to the shop that is executed by the player.

4.2.3.2 Consumer

The consumer part refers to the TV player which (1) analyses the incoming content for embedded triggers and (2) provides access to the gift shop as well as to social media platforms via web browsers on the digital TV player.

(1) The TV platform receives the DVB stream, encodes it into an MPEG-TS stream which is turn decoded or redirected directly to the player for displaying the content. [4] After decoding, the player is analyzing the MPEG-2 media's elements (frames, timestamps, etc) for embedded metadata.

(2) A special graphical user interface of the gift shop is integrated to the TV platform and is displaying when a trigger occurs in case the consumer wants to.

4.3 Automated Provision of Clips through Audience Analysis of Non-Live Content

4.3.1 Scenario Description

Based on the analysis of the collaborative activity of the consumers, additional clips coming from 3rd parties or the broadcast provider shall be provided to the digital gift shop. For example the collaborative activity of a community to a TV series is observed and analyzed during its broadcast. Depending on the outcome of this analysis, the offer of the clip shop varies. For instance clips are added / removed to the clip gift shop, prices may change, special offers can be made, clips are selected automatically and broadcasted in the social media platforms, etc.

4.3.2 Scenario Components

To provide this implicit and collaborative influence to the assortment of the clip gift shop, it is necessary to (1) measure, (2) analyze and (3) quantify the collaboration (or collaborative activity) within the social media platform.

(1) Measure the collaboration

As a first step it is necessary to detect whether collaboration is going on (e.g., any activity going on), in which formation (e.g., one big group, several parallel groups, subgroups, etc), which form (e.g., discussion, file exchange, games, etc) and which intensity (e.g., number of group members, of collaborating users, etc).

(2) Analyze the collaboration

If any collaboration was detected, analyze the ongoing collaboration concerning to its topic, content and goal. For example is there a prevailing topic in an ongoing discussion? Is there a common goal the collaborators try to reach in a mini game?

(3) Quantify the collaboration

To process the outcome of the collaboration, it is necessary to somehow quantify or simplify it to make it able to be processed within the broadcaster archive and the gift shop. For example reduce the analysis of a discussion within a social media platform to one term or code which can be processed within the broadcasters archive.

4.3.2.1 Scenario Implementation

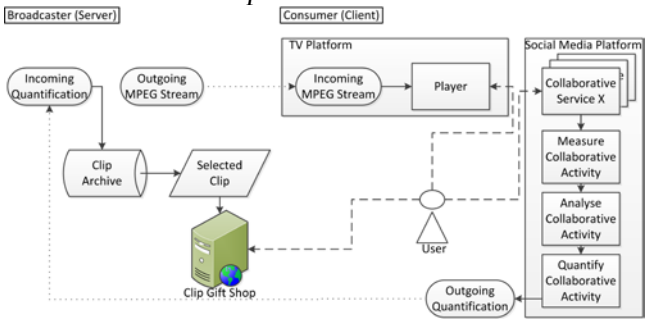

Figure 3. Process of automated provision of clips through audience analysis of live content

This service is split into the broadcaster and consumer part.

4.3.2.2 Broadcaster

To know what the collaboration is about, a collaboration observation framework needs to be provided. Of course the users must agree to this observation.

(1) To get any chance of analyzing the collaboration, it is necessary to provide a common context between TV and social media platform which in most cases will be TV programs or in general current broadcasted TV content. For example a TV show XY provides a community, group or room in one or several social media platform/s. Within this predefined frame, the collaborative activity is measured in a first step. This is realized by using the social media platform's SDK if provided. Detecting collaboration might be easy since it is enough to detect the number of active users

and their activity within the provided collaborative services (chats, games, blogs, etc).

(2) For analyzing the collaborative activity, each provided collaborative service must be analyzed separately by for example catching the outcome or scores of collaborative mini games provided in the community or using text analysis tools to recognize the topic or keywords of an ongoing discussion.

(3) Simplify and quantify the outcome of step 2 to use it as further input to the archive and gift shop. For example use the analyzed keywords of a discussion as a search phrase in the database of the clip archive to automatically select a video clip that is provided in the gift shop and / or played on the social media platform.

4.3.2.3 Consumer

For consumers a common context (like the community of a certain TV show) is most important to direct and canalize their collaborative activity. Otherwise it will be almost impossible to get any useful outcome of the collaboration. Secondly, reliable collaborative services must be provided to them. Thirdly get the agreement of each single user for the analysis.

4.4 Automated Provision of Clips through Audience Analysis of Live Content

4.4.1 Scenario Description

Based on the analysis of the collaborative activity of the consumer, additional clips coming from 3rd parties or the broadcast provider shall be provided to the digital gift shop. This scenario focuses especially on live content, where consumers are motivated in deployed collaborative services to exchange digital goods. For example, several prominent actors are guest in a talk show. The talk show also founded a group on any social media platform. The activity within this group is observed and analyzed. Depending on the outcome of this analysis, clips are added / removed to the clip gift shop.

4.4.2 Scenario Components

Scenario components and implementation are similar to the previous scenario 4.3.

5. CONCLUSIONS

This paper represents a simple introduction to the potentials of social media regarding monetizing the digital archives of broadcasters. It reviews broadcast typical scenarios and possibilities and gives a first glimpse on their potential implementation. It's understood, that there exist many similar efforts, however, the main issue is the understanding of the problematic and the potential such a system can offer for live and non-live content. It can be seen as attempt from the broadcaster's side to get one additional revenue stream, which seems to be rather attractive. The same is valid for content producers, who gain access to another distribution/revenue channel for their content. Nevertheless, broadcasting is a fascinating environment, and is currently undergoing many changes. In this paper we presented several possibilities for new services.

Within the scope of this paper, we presented some platforms that could allow the automated exchange of digital clips between the involved parties. As the broadcast and Internet world is a rapidly changing these services provide one possibility for newly emerging business models. Royalty, legal, and regulatory frameworks are still to be discussed and opened.

REFERENCES

[1] Davidson J., Liebald B., Liu J., Nandy P., Van Vleet T., Gargi U., Gupta S., He Y., Lambert M., Livingston B., and Sampath D.. The YouTube video recommendation system. In *Proceedings of the 4th ACM conference on recommender systems (*RecSys '10), ACM, 293-296.

[2] Department for Business Innovation & Skills, Cabinet Office, Better choices: Better deals - consumers powering growth, http://www.bis.gov.uk/policies/consumer-issues/consumer-empowerment.

[3] DVB. Digital Video Broadcasting (DVB). http://www.dvb.org.

[4] DVB 1999, Implementation Guidelines for the use of MPEG-2 Systems, Video and Audio in Satellite, Cable and Terrestrial Broadcasting Applications. International Standard.

[5] European Telecommunications Standards Institute (ETSI). http://www.etsi.org/.

[6] Fleder D. and Hosanagar K., Recommender systems and their impact on sales diversity. In *Proceedings of the 8th ACM conference on Electronic commerce* (EC '07). ACM, 192-199.

[7] Hess J., Ley B., Ogonowski C., Wan L., and Wulf V., Jumping between devices and services: towards an integrated concept for social tv. In *Proceedings of the 9th international interactive conference on Interactive television* (EuroITV '11). ACM, 11-20.

[8] ISO / IEC 13818-1 2000. Information Technology – Generic Coding of Moving Pictures and Associated Audio Information: Systems. International Standard.

[9] ISO / IEC 13818-2 1995. Information Technology – Generic Coding of Moving Pictures and Associated Audio Information: Video. International Standard.

[10] Kim Y. and Srivastava J., Impact of social influence in e-commerce decision making. In *Proceedings of the 9th international conference on Electronic commerce* (ICEC '07). ACM, 293-302.

[11] King I., Lyu M., and Ma H., Introduction to social recommendation. In *Proceedings of the 19th international conference on World wide web* (WWW '10). ACM, 1355-1356.

[12] Lugmayr A., Niiranen S., and Kalli S., Digital Interactive TV and Metadata, Springer New York, 2004.

[13] Moving Picture Experts Group (MPEG). http://www.chiariglione.org/mpeg/.

[14] SMPTE. Society for motion picture and television engineers. http://www.smpte.org

[15] World Economic Forum. Personal data: The emergence of a new asset class. http://www.weforum.org/issues/rethinking-personal-data, 2011.

[16] Zhou R., Khemmarat S., and Gao L., The impact of YouTube recommendation system on video views. In *Proceedings of the 10th annual conference on Internet measurement* (IMC '10). ACM, 404-410.