# Introducing XIMPEL – The eXtensible Interactive Media Player for Entertainment and Learning

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## Abstract

The use of online video has increased rapidly during the past years. People are actively creating and sharing their videos. These videos are mainly presented in a linear way, while interactivity could be a valuable addition.

In this paper we argue that, based on the increased amount of broadband available, the large number of online videos (e.g. on YouTube and archive.org) and the promising combination of Adobe Flex and XML, it is time to rethink and explore the possible role and form of interactive video in both education and entertainment.

Therefore, we introduce XIMPEL[1], a framework for interactive video, and offer an application that can be used online. The resulting application, developed at VU University, uses existing video material with which users can create interactive storylines, and may be combined with gameplay. This prototype has been used in a serious gaming context for the Clima Futura climate project, and has been tested in various (educational) settings.

In this paper, we will discuss the basic concepts of XIMPEL, its relations with Clima Futura and the technical basics. Furthermore, we present the experiences of using XIMPEL in an educational setting. Our approach to interactive video results in new challenges in narratives and rhetoric, which are also hinted at in the paper. We conclude by indicating possible future applications, and by suggesting further research in the field of interactive media.

## Introduction

These days, many people use the internet to actively watch and share videos online. Websites like youtube.com offer the possibility to share these videos with a huge audience. Social networking sites extend these possibilities, by offering easy opportunities to share videos with friends. At the same time, the availability of video material is increasing. Digital video cameras have become affordable, and are even integrated in (cheap) cell phones. Repositories like archive.org also offer a wealth of (pre-recorded) video material, even in the public domain.

Still, the popularity of video on the web does not (yet) result in new methods to represent videos on the web, although the possibilities of (Flash-based) online video editing systems are expanding. For example, with JumpCut[2] users can edit and remix videos, and use each other's material. Despite these developments, it is not yet possible to add real interaction; videos are mainly presented in a linear way. To add more interactivity to videos on the web, we have created the XIMPEL framework.

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[1] ximpel.net
[2] jumpcut.com

The open XIMPEL Interactive Video Format allows people to create their own interactive media applications, and to share these online. These applications contain interactive elements and can be extended with (serious) gaming elements and scoring mechanisms. XIMPEL is based on Adobe Flex, combined with an XML-based annotation scheme. XIMPEL's component based structure allows for the expansion of the framework with additional elements, such as mini-games and questionnaires.

XIMPEL has received a positive response: various organisations have showed interest in using and possibly extending the XIMPEL platform.

**Structure**

In this paper, we start by discussing the basics of XIMPEL, including its video description format. Then we look at current applications of XIMPEL in a serious gaming context and in education at VU University Amsterdam. We continue by describing story graphs and narratives. Subsequently we show some rhetoric issues. Finally, we will discuss the conclusions and future work.

# XIMPEL basics

**An introduction to interactive video**

Interactive video is an important element of the XIMPEL framework. A basic property of regular (linear) video is that the sequence of events is already defined. In an interactive video (or *hypervideo*), the user makes choices that influence the presented material. So the storyline of interactive video is determined by the viewer. By making decisions, discovering additional storylines and answering questions, players will make their way through the material.

To define interactive video more precisely, we can use a definition:

> A video application is interactive if the user affects the flow of the video and that influence, in turn, affects the user's future choices. (Stenzler & Eckert, 1996).

So true interactive video should provide something more than standard navigation or information retrieval; it should adapt itself to the choices of the user. However, the dynamic structure of interactive video also creates some issues regarding narratives and rhetoric structure; these will be discussed in a later section of this paper.

**XIMPEL technology and features**

XIMPEL is based on the open-source Adobe Flex[3] framework. Applications made using Flex can be played on all computers with a web browser and the Adobe Flash plug-in. Interactive applications made in XIMPEL can be viewed locally as well as on the Internet.

In short, XIMPEL offers the following features:
- Customizable, clickable overlays and visuals, which can be used to:
  - Access different branches of the storyline
  - Link to both internal and external information sources
- Customizable questions (during the videos)
- A scoring mechanism to weight the choices made and the answers given
- Modularity, as XIMPEL can incorporate the user's own (Flash) mini-games[4], questionnaires, etc.

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[3] http://www.adobe.com/products/flex/
[4] Short and simple games that focus on a certain subject and usually take no longer than a couple of minutes to play
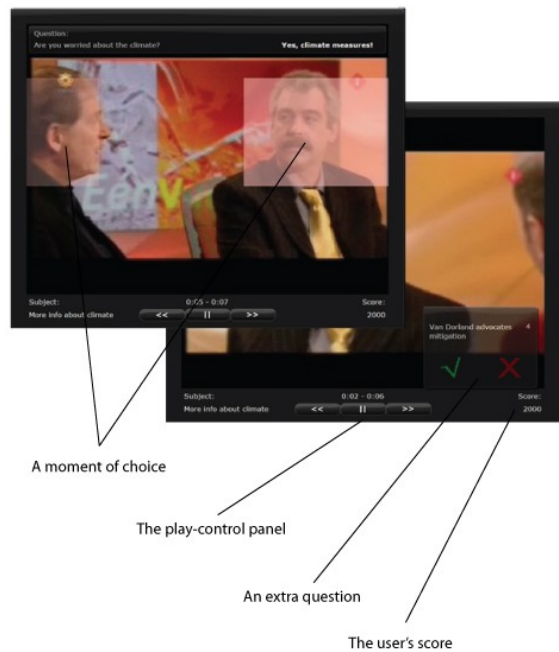
*Figure 1: A visual overview of XIMPEL's features*

All of the variables, such as the clips to be shown, the branches, overlays, questions and score points, are modifiable through an XML configuration file, which is read by the XIMPEL Player.

**Video Description Format (XML)**

To clarify the XML-based structure of XIMPEL, an excerpt of an XML-file is given below (available in an online tutorial[5]).

```
<subject name="ExpertDebate">
      <longname>Discussion between Van Dorland and Kroonenberg</longname>
      <score>2</score>
      <videos>
            <video file="debate-01"></video>
            <video file="debate-02"></video>
            <video file="debate-03">
                  <question>Van Dorland is against mitigation</question>
                  <rightanswer>false</rightanswer>
            </video>
      </videos>
</subject>
```

The video configuration file above consists of a playlist. A playlist can contain a number of subjects (which incorporate related videos). These subjects can be linked to each other and provide choices to the user. Video overlays can be used to visualize these moments (clickable areas in the video).

In the basic example there is one subject. It has, besides an internal name, a 'longname'. This is a meaningful name to the subject, which is shown in the XIMPEL player. A 'score' is defined, to assign points to the choice of certain subjects by the user. The video files in the subject are played in sequence. The third video contains a 'question', which is shown during the video. This is usually a statement about the current clip, and it can either be right or wrong (answering correctly results in bonus points).

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[5] www.cs.vu.nl/~eliens/im/local/intro-iv.pdf

As described in Eliens et al. (2008), the XIMPEL Interactive Video Format supports the following basic elements:

- subject(s) – with video fragments
- video(s) – to present the material
- question(s) – transitory or modal branching
- overlay(s) – to indicate choice point(s) for branching
- score(s) – assigning points

Several additional options are available for defining the visual overlays on a video (for example by using semi-transparent images).

**Availability**

Since October 2008, a basic version of XIMPEL can be downloaded from the official website[6], free of charge. With this basic version, it is possible to create your own interactive video application, by editing the XML configuration file. Furthermore, it is possible to configure different settings, like the displayed information texts and images. Basic tutorials to ease the creation of interactive video applications are available.

At a later stage, a more advanced version of XIMPEL will be made available, which allows for the addition of extra components and advanced visual design of the player.

# XIMPEL applications

**Clima Futura**

The first usage of XIMPEL was as a pilot for the Clima Futura[7] project, which involved the creation of a (serious) game about climate change (see Eliens et al. 2007). Clima Futura is a turn-based game, in which the player is confronted with a climate change and its related problems. The player's decisions are reflected in the game result parameters (people, planet and profit). Other important elements of Clima Futura are mini-games and interactive video.

The Clima Futura interactive video pilot offered an introduction to the subject of climate change. A player can make decisions, discover (hidden) storylines and answer questions. The experiences with this Clima Futura pilot served as a basis for the further development of the platform.

**XIMPEL in educational settings**

XIMPEL has also been applied in educational settings. The first tryout was during the '*Bètadag*'. The Bètadag is a one-day program for high school students and serves as an introduction to science at the university. They were assigned to create a simple interactive video by following a tutorial and modifying a playlist.

The second application of XIMPEL was in the undergraduate course *project interactive multimedia*. This course was given at the Faculty of Science of VU University and followed by students Computer Science and Information Sciences. The general assignment for this course was:

> To design and develop a moderately complex multimedia application, with both educational and game elements, as part of a communication strategy for some particular goal or issue of societal relevance. (Eliens et al. 2008)

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[6] www.ximpel.net
[7] www.climafutura.nl

Students had to create a (short) viral video and an interactive version, using XIMPEL. The XIMPEL platform was still in development at that time, so the major question was if students could express themselves sufficiently using XIMPEL. Furthermore, the technical stability of XIMPEL as a platform still needed to be proven.

**Results**

The results of the course positively surprised us. The students created very diverse applications, and showed us new ideas. The applications can roughly be divided in applications that represented information, provided classifications and even resembled games. A selection of our favourite applications is available via our website. The viral videos can be viewed via the *vumedia* channel on YouTube[8].

The first category of the resulting applications mainly consisted of tours through the VU University. In these applications, users could for example choose a direction or subject to view at branch points. Some applications showed (graphical) selection menus, and users could return to these menus via cycles in the graph structure.
Other applications provided basic classifications, giving feedback to the user, for example by indicating what kind of student the player is or which study to choose (based on the player's choices).
Thirdly, there are the applications that resemble games. One group made an application using a real-life version of the Mario character. The player can take decisions in order to advance through the VU-building. By using the music and typical assets of the Mario game, this was a major step towards gameplay. What it still missed, though, was a clear goal and scoring mechanism.

**Feedback**

Student feedback after the project was generally positive. While reluctant at first to create interactive videos themselves, afterwards they said that it was simpler than they thought (quoting a student: 'XIMPEL is simple'). Of course, there were also requests by students about additional functionality, for example about a higher number of possible overlays. Many of these requests were implemented later on.

Students also asked if they could add new functionality themselves. To this end, a custom version of XIMPEL was made available. In this version, students could add extensions, provide new functionality, and alter the visual design of the application. Various refinements made by students have already been incorporated into the XIMPEL platform.

## Story graphs and narratives

The student's assignments in the *Project interactive multimedia* course involved several phases: *concept*, *scenario*, *story graph*, *acquiring assets* and *final production*. The story graphs provided the opportunity to review the complexity of the scenario and how to realize it, so they were an important aspect of the process. Story graphs can be defined as:

> Directed graphs in which each node represents a linear, scripted scene, followed by a decision point. Arcs between nodes represent decisions a user can make. (Riedl & Young, 2006).

The students were free in their exact representation of the graphs. As figure 2a, 2b and 2c show, their results differed vastly, and students showed much creativity in visualizing the graph, using icons and plain text.

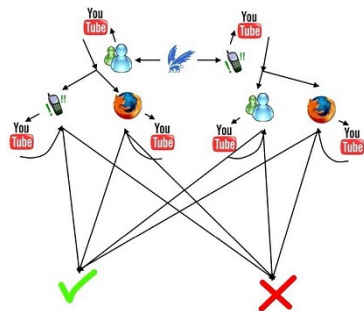---

[8] youtube.com/vumedia

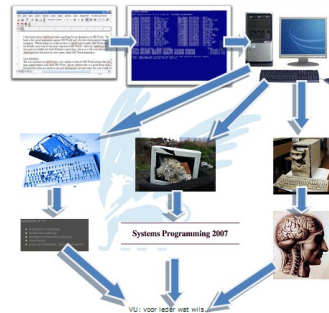*Figure 2a: SMS/MSN (205);*      *Figure 2b: Course(s) (301);*      *Figure 2c: Exchange (213)*

Students also used different conceptual elements in their graph structure: branching and converging storylines, redundant video material and cycles. These elements influence the narratives in interactive video.

**Narrative form**

Narrative, in film theory, is defined as 'a chain of events in cause-effect relationship occurring in time - and space' (Bordwell & Thompson, 2001). To make sense of a narrative, we identify its events and link them by cause and effect. Of course, film makes use of linear narratives, in which a sequence of events unfolds without user interaction. In interactive video users can make decisions and thus influence the way the story unfolds. Because of this influence, new challenges with respect to narrative occur.
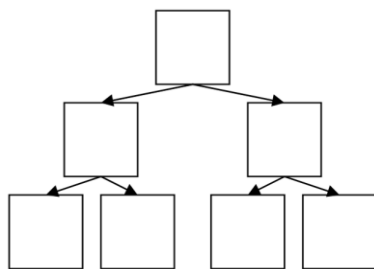


*Figure 3: Branching paths*

A basic property of narrative in interactive video is the branching structure (figure 3). Videos link to other videos, often providing opportunities for the user to choose between multiple options. An inherent problem of the branching structure is that the user does not see every video. This means that a large amount of video material has to be used. Also, the complexity of a branching video structure steadily increases when new branch points are added. This can partially be circumvented by creating sequences of videos without link opportunities.

In narrative, user interaction can also cause some issues. One is the 'conflict of control and coherence' (Riedl & Young, 2006). The higher the degree of control of a user, the more difficult it will be to ensure that the story remains coherent and the user's actions do not interfere with the causal dependencies. To some extent this can be circumvented by using converging paths in the narrative structure (figure 4), in order to ensure that certain videos are always viewed: to provide *closure*. (Eliens et al. 2008). These clips could be vital story elements.
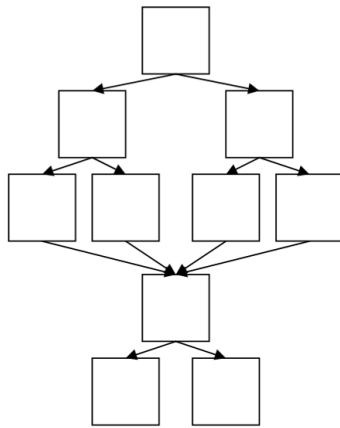
*Figure 4: Converging paths in a branching structure*

## Argument and rhetoric

Interactive video is not only about narratives. In video, often opinions and arguments are expressed. If you want to convey a particular message or reach a certain goal, which we can loosely describe as 'creating climate awareness' in the case of Clima Futura, it is needed to consider the rhetoric form.

Bordwell & Thompson (2001) describe, in the context of documentaries, the four basic attributes of rhetorical form:

- It addresses the audience openly, trying to change its conviction, attitude or to take action
- Often, the subject (..) is not one of scientific truth, but of a matter of opinion
- If the conclusion cannot be proved beyond question, the maker often appeals to our emotions
- Often arguments are not presented as arguments, but as observations or factual conclusions

To persuade the audience, different arguments can be used. These can be *arguments from source*, *subject-centered arguments* and *viewer-centered arguments* (Bordwell & Thompson, 2001). Arguments from source try to convince the viewer that the film is a reliable source of information (for example by using a narrator with an authorative voice). Subject-centered arguments are about the film's subject matter, and often use common beliefs, example and logic. Viewer-centered arguments are arguments that appeal to the viewer's emotions.

Authors of interactive videos can use the argument types in their storyline (depending on the goal of the interactive video application), to influence viewers and their choices.

As Bocconi (2006) states, these argument types can be traced back to Aristotle's categories of persuasion, in his book Rhetoric (1954). Therefore we can distinguish:

- *Ethos*: appeal to the speaker's reputation
- *Logos*: appeal to logic or reason
- *Pathos*: appeal to the emotions of the audience

Rabiger (1998) also discusses different ways a documentary maker can behave. A *propagandist* shows only the evidence supporting predetermined conclusions. A *binary communicator* gives equal coverage to both sides in a controversy. Finally, a *mind-opener* aims at expanding the viewers mind, without manipulating, and presenting a subject in all its complexity.

When authoring an interactive video, it is also possible to behave differently. For example, you can choose to be a mind-opener, expanding the viewer's mind, or be a propagandist. You can decide

whether or not you show different views on a subject. Additional challenges can be added, based on the user's choices, by presenting contradicting and complying evidence.

## Conclusions and future work

In this paper, we presented the XIMPEL interactive video platform. With XIMPEL, interactive storylines can be created, that may be combined with gaming elements. The first release of XIMPEL is available for download at ximpel.net. We are actively developing the platform, and will offer new features in the future.

Further research in the field of interactive media will contain several topics, like more automated forms of video playlist creation, the inclusion of more game elements and new representations of interactive video.

Finally, the reception of the XIMPEL platform at several occasions, like the DIVERSE 2008 conference, showed that there is a lot of interest in it. In the future we hope to be able to use this interest to improve and extend the XIMPEL platform further.

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