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POTENTIAL ROLE OF SMIL IN DIGITALIZATION OF NATIONAL HERITAGE

Abstract. XML technologies provide that digitalization of national heritage relies on widely accepted standards. Beside the XML standardized way of text and picture digitalization, there is a similar way for multimedia digitalization. Special XML language, called SMIL (Synchronized Multimedia Integration Language) is used for the multimedia digitalization. This language is very convenient for the digitalization of national heritage like the custom, national dresses, popular national music etc. The SMIL capabilities in digitalization (its good and bad sides) are described shortly in this paper. Several specific examples demonstrating SMIL characteristics and possible using in digitalization of multimedia heritage are presented.

1. Introduction

SMIL is a language for synchronized multimedia integration – it serves for the describing of multimedia. Like XHTML, SVG etc, SMIL is created according to the XML rules. The languages like SMIL are often called XML applications (see [8] and [9]). SMIL is made by W3C and the work on its specification started in 1998. Until now the versions SMIL 1.0, SMIL 2.1 and WD-SMIL 3 are created (see [3] and [4]). All SMIL versions are fully based on XML. Version SMIL 1.0 provides all classical video and audio elements (like TV and something more). The version SMIL 2.1 is compatible with SMIL 1.0, but it has additional capabilities: it provides modularity and extends some functionality. So SMIL 2.1 is a superset of previous version. WD-SMIL 3 is proposed in December 2006 and it is draft version. This version is superset related to SMIL 2.1.

What are benefits of the using SMIL instead of classical audio and video documents? The multimedia contents expressed by SMIL can be easily manipulated with, easily presented on the Web, easily recorded etc. W3C recommendations are world widely accepted and it is really to expect that SMIL becomes official world standard for multimedia in the future. One can conclude that, in this moment, SMIL is the best language for the digitalization of multimedia documents in national heritage. This practically means that SMIL is especially convenient whenever pictures and sounds are combined. For instance, SMIL is convenient for representation of folk dance, for registering some special events (weddings), national customs, etc.

2. Characteristics of SMIL

SMIL is a language used for the creation of multimedia presentations. Those presentations define what will be show, where will be show, when will be show and how long it will last. In the other words, SMIL presentations have defined timescale. One of the biggest SMIL presentation advantages is the fact that those presentations can easily be found on Internet.

As we already said, SMIL file is a XML document, which begins with tag `<smil>` and end with closing tag `</smil>`. Similar to plain HTML, there are child tags `<head>` and `<body>` (and their closing counterparts) within `<smil>` tag. The role of these tags is similar to the corresponding tags in HTML. The main differences in corresponding to HTML are:

the SMIL tags have to be written in lower case (SMIL is case-sensitive).

SMIL is XML-based. Tags have to be ended.

Some characteristics of SMIL and some examples are described in [1], [2], [6] and [7]. The complete description of different SMIL-versions could be found on the sites [3], [4] and [5].

The skeleton of a correct SMIL document can be described in the following way:

```
<smil>
<head>
<meta name="Faculty of Mathematics" content="Teaching" />
<layout>
<!-- positioning tags -->
</layout>
</head>
<body>
<!-- content tags, time tags, synchronization tags -->
</body>
</smil>
```

As the other Web-technologies, SMIL has some weaknesses. Major SMIL weaknesses are pointed out in [1]:

- confusion in terminology and
- lack of business and art support.

Today, there are a large number of software products supporting multimedia. Each software vendor forces its terminology, and that area is not stabilized yet. This weakness will be probably less important when the Web-technology becomes stable. If SMIL would become generally accepted standard for multimedia documents, it would have better support in literature.

SMIL also has a weakness common to whole XML – it is complexity. XML applications are truly powerful when they are combined and when they relied on each other. However, that combining requires many efforts and (in the case when XML technology isn't intensively used) this approach can be unjustified.

Sometimes “technical problems” arise because exist different SMIL versions and some SMIL player vendors don't support SMIL 2.0 and WD-SMIL 3 . However, in close future this “technical problems” will probably be overridden.

3. What can we do with SMIL?

At the original site of W3C related to SMIL (see [4]), we find the short description: “SMIL is typically used for "rich media"/multimedia presentations which integrate streaming audio and video with images, text or any other media type”.

According to [6], by using SMIL, we can:

- position media elements wherever we want on the screen,
- synchronize those elements,
- display media following user-preferences, language, bit-rate, etc

The positions of media elements can be relative or absolute. To insert the media within a presentation we have to specify the region (the right place into main window) where it will be displayed. One media element can be positioned over the other by adding z-index attribute to <region>. Also, each media element may be adapted to its container by using the "fit" attribute. If the media element is bigger than its region, the area can be scrolled by setting the fit attribute to "scroll". Working with timeline provides synchronization of media elements by using <par> and <seq> tags.

4. Using of SMIL

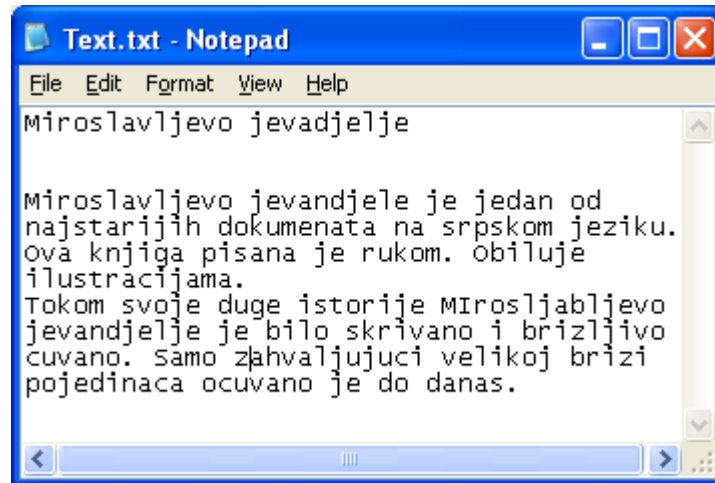
SMIL document is in a text format, saved within file with extension SMIL. So, to write a SMIL-application, we can use a usual text-editor like Notepad from Windows. Moreover, there are special editors (for example, VM) adapting to the SMIL-syntax and very convenient for writing SMIL-documents.

The adequate software tool (also known as player or multimedia browser) is required to “show” a specific SMIL document. There are many players on the market (see [1], [5] and [6]). One of the most popular for Windows systems is RealOne Player (produced by RealNetworks).

To demonstrate how to use SMIL, we will consider a simple example. Suppose that the following SMIL-document is in the file **Prvi.smil**:

```
<smil>
<head>
<layout>
<root-layout width="600" height="600" background-color="green" />
</layout>
</head>
<body>
<text src="text.txt" />
</body>
</smil>
```

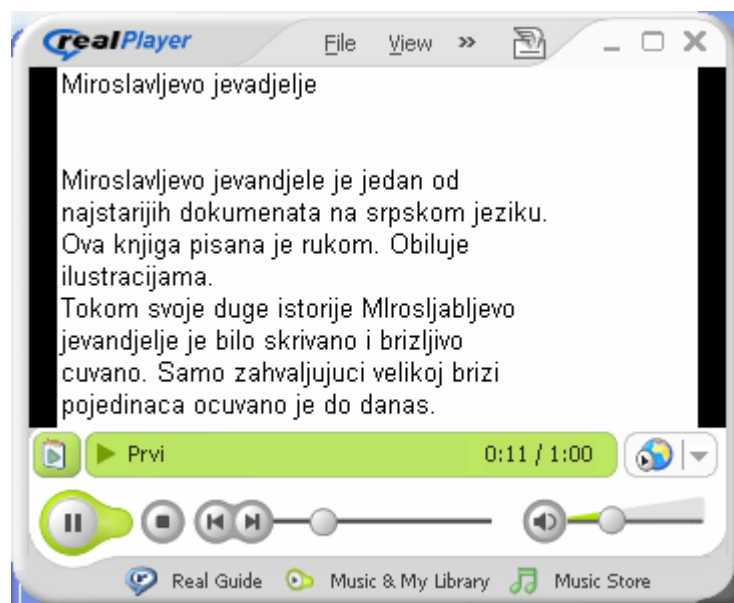
One can notice that within SMIL document exists reference to file **text.txt** (in <text> tag). File **text.txt** has the following structure:



Browsing folder containing the file **Prvi.smil** will show icon representation of that SMIL file. That icon looks like:



The activation of this icon (by click or double-click, depending on Windows settings) will activate RealPlayer application, and show SMIL document:



5. Examples related to digitalization of cultural heritage

The following examples demonstrate only small subset of SMIL capabilities. The detail presentation of SMIL constructions requires much more space. Several interesting examples for using SMIL can be found in [1] and [7].

Example 1. Create a SMIL presentation that simultaneously shows both picture and text. Picture is in the file **Miroslav.jpg**, and text is in the file **Text.txt**.

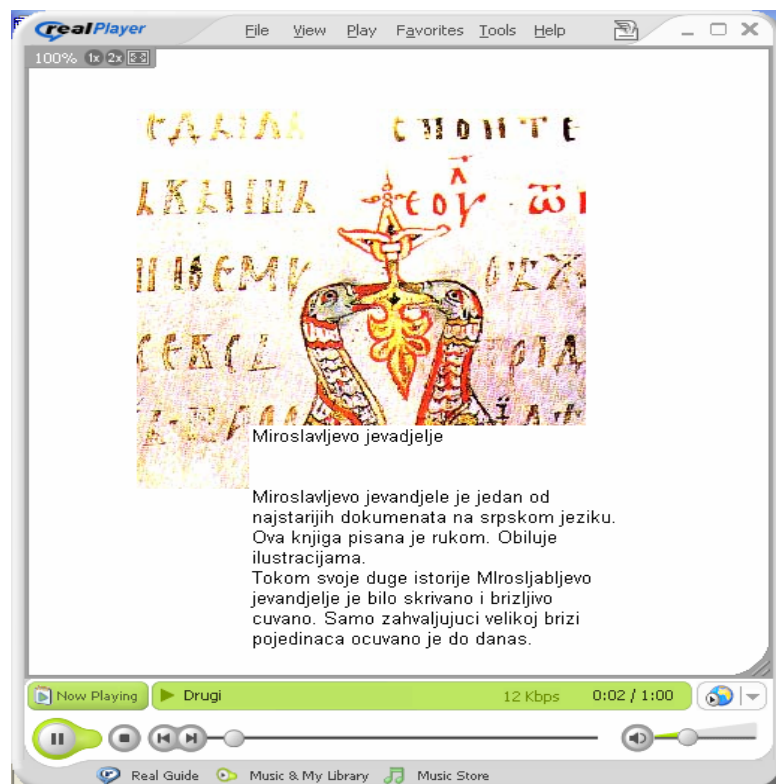
```

<smil>
<head>
<layout>
<root-layout width="500" height="500" background-color="white" />
<region id="Reg1" left="75" top="50" width="300" height="300" />
<region id="Reg2" left="150" top="300" width="300" height="180" />
</layout>
</head>
<body>
<par>

<text src="Text.txt" region="Reg2" />
</par>
</body>
</smil>

```

In previous example, the files with picture and text are within <body> tag. The duration of picture showing is 20 seconds. The tag <head> contains size of presentation window, size and position of window that contains text and size and position of picture window. All presentation settings are within <layout> tag, that is inside <head> tag. On the beginning of the presented contains is follow:

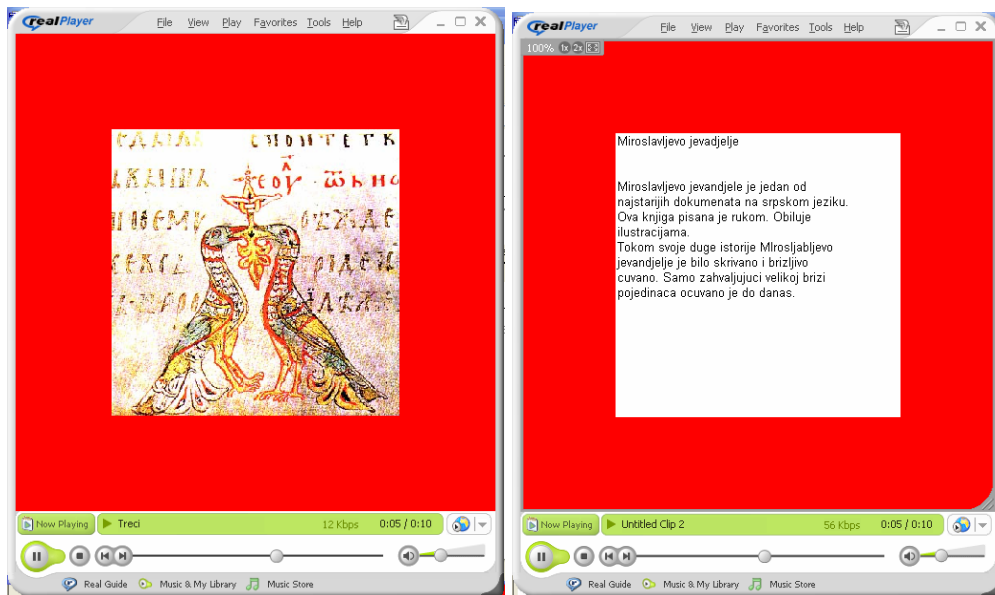


After 20 seconds the picture will disappear and only text will stay.

Example 2. Modify previous example presenting the picture and text sequentially. First the picture should be shown for 10 seconds and after that the text should be shown for 15 seconds.

```
<smil>
<head>
<layout>
<root-layout width="500" height="500" background-color="red" />
<region id="Reg1" left=100 top=100 width="300" height="300" fit="fill" />
</layout>
</head>
<body>
<seq>

<text src="Text.txt" region="Reg1" dur="10s" />
</seq>
</body>
</smil>
```



The background color in this example is red. Region for text and picture showing is positioned almost in the centre of main window. The fit attribute is used and both, picture and text are fitted into region.

Example 3. Create SMIL presentation that firstly shows a short movie about Belgrade. After 10 seconds in the same region should be shown textual explanation and that explanation should last for 5 seconds. In the background of movie and text, one should listen to soft music represented by the file Greetings.wma.

```
<smil>
<head>
<layout>
```

```

<root-layout width="500" height="500" background-color="yellow" />
<region id="Reg1" width="600" height="500" fit="fill" />
</layout>
</head>
<body>
<seq>
<par>
<audio src="Greetings.wma"/>

</par>
<par>
<audio src="Greetings.wma"/>
<text src="Text1.txt" region="Reg1" dur="5s"/>
</par>
</seq>
</body>
</smil>

```

We can not show here the screen with movie, neither listen to music. Therefore, we will omit realPlayer presentation of this SMIL document.

6. Conclusion

Previous examples show that SMIL can be used easily. SMIL is similar to HTML, so SMIL constructions can be easily understood by HTML proficient reader. Of course, in order to create more complex document, the authors have to know syntax and effects of various SMIL tags. The main advantage of SMIL (comparing to the other multimedia techniques) is standardized XML-like document format. Therefore, browsing and working with SMIL documents on Internet is very easy. W3C has large influence on Internet and we can expect that SMIL will be accepted as universal XML application and standard multimedia document format.

References

- [1] A. F. Arciniegas, *A Realist's SMIL Manifesto*, <http://www.xml.com/pub/a/2002/05/29/smil.html>, 2002.
- [2] L. Bouthillier, *Synchronized Multimedia On The Web – A New W3C Format Is All Smiles*, <http://www.webtechniques.com/archives/1998/09/bouthillier>, 1998.
- [3] <http://www.w3.org/TR/SMIL2/>, 2005.
- [4] <http://www.w3.org/TR/2006/WD-SMIL3-20061220/>
- [5] http://en.wikipedia.org/wiki/Synchronized_Multimedia_Integration_Language
- [6] <http://www.helio.org/products/smil/tutorial>, 1999.
- [7] J. Zeldman, *SMIL When You Play That*, <http://www.aliestapart.com/articles/smil/>, 1999.
- [8] D. Tošić, *XML-tehnologije i digitalizacija*, Pregled NCD 3 (2003), 1–12.
- [9] D. Tošić, V. Filipović and J. Kratica, *Using SVG–XML for representation of historical graphical data*, Review of NCD 9 (2006), 39–45.