ARML - An Augmented Reality Standard

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ABSTRACT

This position paper was designed for the Mobile Augmented Reality Summit in Barcelona, held on February 17, 2010.

The paper covers an Augmented Reality standard, called ARML (Augmented Reality Markup Language), proposed by Mobilizy, the creators of the Wikitude World Browser. In the first section, the paper explains why – in Mobilizy's point of view – the AR field requires a standard. The second section gives some insight and technical overview of the proposed standard. Finally, the third section covers the expected acceptance of ARML in the future.

1. INTRODUCTION

Marker-less Augmented Reality (AR) has become a very trendy part of mobile application development recently. Being researched for more than 50 years [1], it took surprisingly long to get an application mass-market-ready. Early researchers faced what one could call the *AR hardware barrier* – hardware spread over a number of different devices, like a seperate GPS antenna, a computer to perform the calculation, a screen to display the output etc. Some of the AR pioneers even carried their computers on their back and a screen in front of their face to be able to augment their reality on the computer screen.

With the launch of Google's mobile operating system, Android, and the first Android-based handset (HTC Dream) in late 2008, all components necessary for location-based AR (GPS, compass, accelerometer and a development platform to easily access the components) finally found their way into one single, easy-to-use and handy mobile phone, allowing AR developers and applications to reach millions of mobile phone users at once. The AR hardware barrier finally was broken, and *Wikitude* [2], the first AR application available to end consumers, was published in October 2008.

During the following months, more and more AR applications rushed to market. Some of them were fulfilling a limited number of use cases, like finding those YouTube videos which have been produced around the current location of the user [3]. Others established themselves as true *AR Browsers*, aiming for the ability to display any location-based information in the browser. This led to what one could call the *AR data standard barrier* – the lack of data available in an AR-optimized way. This paper will deal with the Augmented Reality Markup Language (ARML), one approach to overcome the AR data standard barrier.

2. A NEW STANDARD - WHY?

One might argue that the need of a standard for data displayed in AR is not justifiable. Standards for location-based content are already available and well established, like Google's KML[1] standard, used in *Google Earth*. KML already provides developers with the ability to store or access latitude, longitude and altitude of Points of interest (POIs), their name, some description etc. in a standardized way. Why would one need an additional standard for AR?

The answer to this question is rather straight forward: The information available via KML is simply not sufficient to tap the full potential of AR applications. Think of one typical use case for AR applications: a user just arrived in a foreign city and looks for a nice and quiet place to sleep. What he or she might do using the AR Browser on the mobile phone, is search for the closest hotels. The AR Browser will show the results in the cam view. Everything up to here would be possible with KML-based data as well. However, one real power and strength of mobile AR is the immediate interaction with the place the user just found. After reviewing the results, the user might for instance want to call some hotels, view some nice pictures, be guided to the hotel address, even view their webpage etc.

The KML standard does not provide any special tags for a phone number, the address of the POI etc. It was simply not designed for AR use. Using pure KML in AR applications does not permit the developer to access this data in a standardized way and thus the user to use the essential features stated above. That's when ARML is entering the field.

3. ARML

ARML is proposed by Mobilizy, the company behind the *Wikitude World Browser*, in the course of the release of *Wikitude 4* in January 2010. Hence, Wikitude 4 is the first AR browser with full support of ARML. ARML is currently reviewed by *W3C*.

ARML is based on KML, mainly because KML is a very wide-spread standard and already provides the fundamental tags for location-based applications. The main differences between ARML and KML are:

1. KML is a very rich standard. Most of the tags provided are not needed for AR applications. ARML reduces the KML standard to the bare minimum.

[1] Keyhole Markup Language

2. As described above, ARML adds some additional features to the KML standard, see section 3.1.3 for details.

3.1 ARML structure

An ARML file consists of two sections. One section provides information about the Content Providers, which are the provider of sets of POIs (e.g. Wikipedia). The second section defines the POIs itself.

3.1.1 An empty ARML Document

A minimal ARML document comprises the following tags:

```
<?xml version="1.0" encoding="UTF-8"?>
<kml xmlns="http://www.opengis.net/kml/2.2"
  xmlns:ar="http://www.openarml.org/arml/ext/2.2"
  xmlns:wikitude=
    "http://www.openarml.org/arml/ext/2.2">
    <Document>
    </Document>
</kml>
```

The namespaces represent the "acceptance-status" of the tags in the namespace.

The `kml` namespace is the native KML namespace. The `ar` namespace should include all tags which have been found to be relevant for all (or most of) AR browsers. The `wikitude`-namespace defines the proposed tags which Wikitude uses and Mobilizy believes will be relevant to all AR browsers. Other AR browsers might propose additional namespaces, tags within these namespaces should constantly be reviewed and, if found in various browsers, should then be merged into one tag in the `ar` namespace. Finally, one could imagine to move the `ar`-namespace back to the KML standard to have the KML standard enriched with AR data in the future.

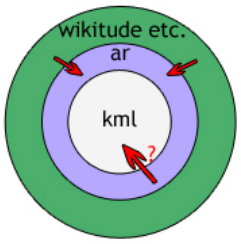

Figure 1: ARML Namespace structure

3.1.2 The Content Provider Section

The content provider section holds all information about a single Content Provider, like the name, a description, a logo, the web page of the provider, etc. The provider shares this information with all the POIs which it delivers:

```
<ar:provider id="myCpId">
  <ar:name>The name of the CP</ar:name>
  <ar:description>
    Any description of the CP
  </ar:description>
  <wikitude:providerUrl>
    http://myUrl.com/
  </wikitude:providerUrl>
  <wikitude:tags>
    any tags for the CP
  </wikitude:tags>
  <wikitude:logo>http://logoUrl.com</wikitude:logo>
  <wikitude:icon>http://iconUrl.com</wikitude:icon>
</ar:provider>
```

3.1.3 The POIs Section

Every POI needs to be linked to one (and only one) Content Provider stated above. It comprises the essential AR-data (location, name, description, phone number, email etc.) for each POI.

```
<Placemark id="123456">
  <ar:provider>myCpId</ar:provider>
  <name>Title of my POI</name>
  <description>My POI description</description>
  <wikitude:info>
    <wikitude:thumbnail>
      http://thumbnailUrl.com
    </wikitude:thumbnail>
    <wikitude:phone>123-456-789</wikitude:phone>
    <wikitude:url>http://poiUrl.com</wikitude:url>
    <wikitude:email>inf@myPoi.com</wikitude:email>
    <wikitude:address>
      My POI Street 5, 5020 POI, Austria
    </wikitude:address>
    <wikitude:attachment>
      http://myAttachmentLink.com
    </wikitude:attachment>
  </wikitude:info>
  <Point>
    <coordinates>
      13.048056,47.797222,432.0
    </coordinates>
  </Point>
</Placemark>
```

The coordinates of the POI need to be provided as longitude, latitude and altitude. Altitude is optional.

4. ARML IN THE FUTURE

We see an analogy between AR today and the Internet 20 years ago. Before Tim Berners-Lee proposed the first version of the HTML standard for the Internet, numerous ways existed to define the visibility and structure of content, but none of them had a broad acceptance through the various Internet browsers available. Tim Berners-Lee then started with a small set of pre-defined tags what would later become the first HTML standard. Twenty years later, HTML (of course in a very extended version) is still used as the main language for building webpages.

Taking into consideration the situation 20 years ago on the Internet and the major step Tim Berners-Lee took, we can see that AR is moving in the same direction now. There are some ways to define content on AR browsers, but still there is a need to define a true AR standard to make AR grow exponentially as the Internet did. That's why Mobilizy is now proposing ARML to be the first version of what should later become the standard for AR browsers and AR applications, allowing users to create their own AR content. In Mobilizy's opinion, ARML will be supported by every AR browser within the next few years, pushing AR in general to an even higher level. An indication of the acceptance

of ARML might be the fact that W3C started reviewing ARML right after the first version of ARML was published.

However, to make sure ARML is successful, the AR development community has to work together to add additional tags to ARML to be able to satisfy more and more use cases.

5. MORE INFORMATION

More information on ARML can be found on the ARML webpage at http://www.openarml.org.

6. REFERENCES

[1] Wikipedia free encyclopedia, http://en.wikipedia.org/wiki/Augmented_reality#History

[2] http://www.wikitude.org

[3] http://www.mobilizy.com/wikitude-api-c2youtube