Graphic Watermarking, Security Feature in Cadastral Content Management

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Abstract—The paper shows the necessity to increase the security level for paper management in the cadastral field by using specific graphical watermarks. Using the graphical watermarking will increase the security in the cadastral content management; furthermore any altered document will be validated afterwards of its originality by checking the graphic watermark. If, by any reasons the document is changed for counterfeiting, it is invalidated and found that is an illegal copy due to the graphic check of the watermarking, check made at pixel level

Keywords—cadastral system, database security, security standards, content management, identity management, watermarking.

I. INTRODUCTION

CONTENT Management knows a fast development in the enterprise and worldwide activities for more and more companies. In order to secure the huge data stores, which contain critical documents, security solutions are required on each level of storage, from hardware level, database level, infrastructure-application server level, with its web server level, to end user-browser level. The necessity to increase the security on each level is required due to the new standards of security over ISO 27001 standard, for example PCI DSS[7].

II. WATERMARKING PROCESS FOR TRANSPARENCY

Starting from the point of creating the watermarking templates, cadastral documents, all will have the version 1.0, for example, the form which is presented in the following Fig 1. Cadastral document with graphical watermarking [1]. The position of the watermarking can be set randomly by the end user, as well the resolution of it. From the performance point of view, the resolution of the watermarking is recommended lower than 128X128 pixels, and the graphic encoding to TIFF.

The template references some characteristics of the watermarking, like: alignment in the document, color, size etc. Also the template can be extended with custom attributes like: the text or the picture used for watermarking, last timeframe when the watermarking was altered. Having graphical watermarking, extra metadata are used, for example luminosity, RGB, resolution, extension, mandatory for graphic encoding. In order to make it much complex, the graphical process for anti counterfeit of cadastral documents, the watermarking is the subject to the transparency process. From normal eye scanning, any pixel altering, which can appear to counterfeit process, can't be recognized, but scanning programmatically, the altered pixels can be found easily [3][4][5]. It's a prerequisite to set the transparency to a specific value, in order to make it harder the counterfeit process for all cadastral documents.

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The document with the transparent graphic watermark is presented below in the Fig. 2 Transparent watermark for the cadastral document.
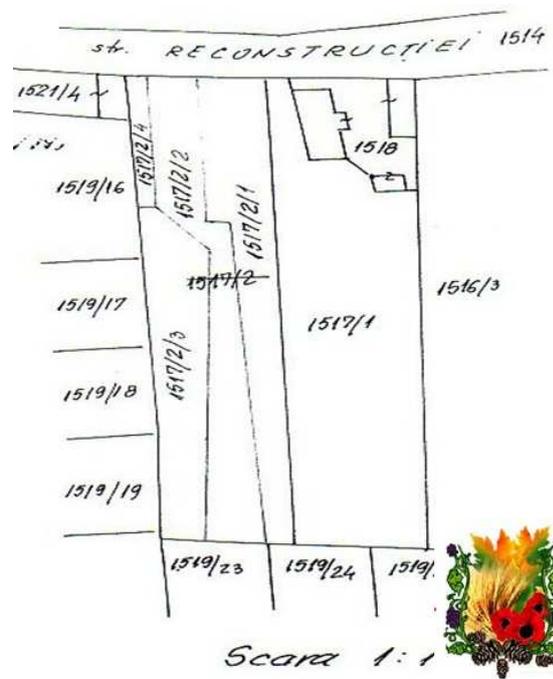

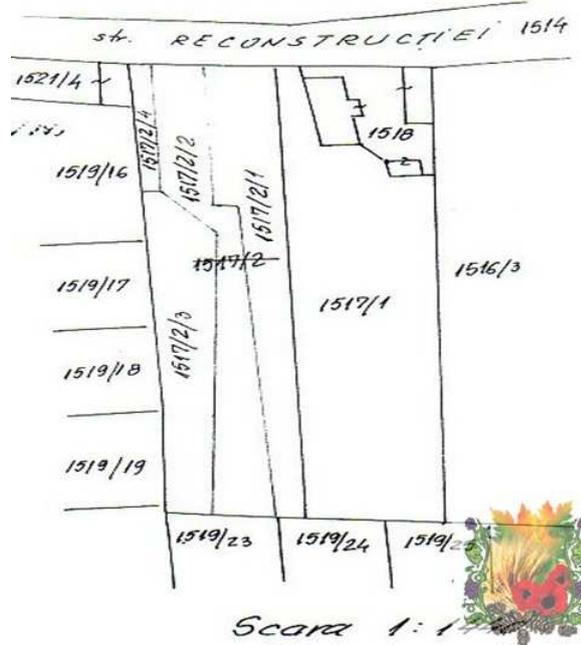Fig. 1 Cadastral Document with graphical watermarking

Fig. 2 Transparent watermark for the cadastral document

In the end phase of the transparency process, the cadastral document can be stored in the content management system and can be used as support to all workflow of the cadastral informatics system.

III. TRANSPARENCY PROCESS

The position for watermarking can remain the same in the transparency process, or can be changed accordingly to the end user preferences in the cadastral informatics system. The validations are made to the cadastral document, and it's independent of the document type: word, photo, that's why the watermarking must not cross over the dimension of the cadastral document. During the transparency process, the watermarking is altered by its intensity, especially by its opacity.

The phases of opacity are set accordingly to the following rules [2]:
- end user preferences;
- the position on the cadastral document stored in the multimedia database;
- color palette which describe that specific graphic watermark.

The watermarking transparency is in direct correlation with the clarity of the reported cadastral information. Changing the transparency it's made programmatically, it is an automatic process and propagated to the database, using the oriented programming language Java. The parameter which plays an imported role in this process it's presented below in the code source. The graphic transparency process starts from the (0,0) coordination of the picture, the one that is used as graphic watermark.

```
Graphics2D g2d = (Graphics2D)
bufferedImage.getGraphics();
g2d.drawImage(icon.getImage(), 0, 0, null);
AlphaComposite alpha =
AlphaComposite.getInstance(AlphaComposite.SRC_
OVER, 1f);
g2d.setComposite(alpha);
```

After setting the transparency, the process continues with the drawing of the changed pixel to the cadastral document, stored in the multimedia database, line to line, column to column, starting from the same coordination (0,0), as it is presented in the following code source sample.

```
for (int i = 0; i < iconw.getIconWidth(); i++)
{
    for (int j = 0; j < iconw.getIconHeight(); j++) {
        int color = bufferedImagew.getRGB(i, j);
        int red = (color >> 16) & 0xff;
        int green = (color >> 8) & 0xff;
        int blue = (color) & 0xff;
        graphicObj.setColor(new
Color(red,green,blue));
        g2d.fillRect(icon.getIconWidth()-
iconw.getIconWidth()+i,icon.getIconHeight()-
iconw.getIconHeight()+ j, 1, 1);
        }
            }
```

The object iconw represent the graphic object used in order to manipulate the information from graphic watermark. The way this object was created, is created below in the following code source section:

```
ImageIcon iconw = new ImageIcon(filew.getPath());
BufferedImage bufferedImagew =
new BufferedImage(iconw.getIconWidth(),
iconw.getIconHeight(),BufferedImage.TYPE_INT_RG
B);
```

From programmatic point of view, same steps are made for the graphic object represented by the topographic sketch, which is by document type, a picture. This sketch is the multimedia support for the graphic watermark drawing.

In order to increase the security in the cadastral informatics system, the content management factor will play an important role by using this graphical protection at document level, accomplished by the graphic watermark over all cadastral documents. More the transparent the graphic watermark is, is much more difficult to make copies and counterfeiting the cadastral documents.

Altering of any subsection from the graphical watermark, using the multimedia component of the informatics cadastral system, makes that change to be hardly tracked by human eye, furthermore any unauthorized change of graphic watermark, outside the system, make the cadastral document on which that watermark is applied, a fake, not recommended to be used in the cadastral workflows.

IV. CONCLUSION

Graphic watermark is a new feature that was used in creation of a new a modern security system for the cadastral system, as well to be compliance with the security standards, and with the requirements of the CADASTRAL STANDARD 2014. Using content management in combination also with other technologies like the multimedia storage, this will give a much more modern approach for cadastral informatics systems. Checking the requirements in the Cadastral Standard 2014, content management helps in storage also the juridical information related to a land parcel. Furthermore, in the versioning process, all the changes in the content templates will go in parallel with the changes in the juridical cadastral support [1].

Using these modern secure methods for cadastral documents, make it possible the extension to all economic fields, which use big content management systems, from the financial, to legal, furthermore from public sector to private one. Each institution or economic subject can use specific graphic watermarks, for example the branding symbols, which will be applied to all documents. Implementing the transparency process will increase the security level and will be a new method to avoid counterfeiting and illegal copies of documents.

Graphic Cadastral Processing is it possible by using the multimedia component, all the altering are made from R-G-B point of view; due to its facility the graphic watermarking process can be applied to all types of documents used in the daily cadastral activity, from the topographic sketch, to all word documents. Furthermore, following the CADASTRAL STANDARD 2014, the parcel object can be extended by adding the metadata from the graphic watermarking object to its description.

As it is a distributed activity, the cadastral system can use specific graphic watermarks to specific counties, towns, cities, and make it possible to make some differentials to documents from land owners point of view, they will know exactly and much easily where is located that specific parcel.

Watermarking approach helps to secure the documents, using image watermarking, beside the alphanumerical ones, this will increase the security with a higher grade. Having a document secured with a image watermarking, this cannot be altered or modified, because of the watermarking presence. Changing a color pixel, unavoidable in the altering process, will make the document a fake, that's way, even if the watermarking looks the same at glance, reading it, checking all the pixels, the fake can be proven, but this will be covered in another paper, special for the image watermarking secure process[1] [8].

Graphic watermarking process can be used as well in all types of document systems, from e-learning management systems, to interactive multimedia systems, from medical, to economic fields, in fact it can be extended to all informatics systems which has an digital archive component [6].

Graphic watermarking process using transparency is recommended to be used for all content management systems, as a new and modern approach in order to secure all types of documents, furthermore main key in the watermarking document protection is the multimedia database, considered to be the core in this process, that's why a database with multimedia features is more than a prerequisite in building the software architecture for future informatics systems.

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