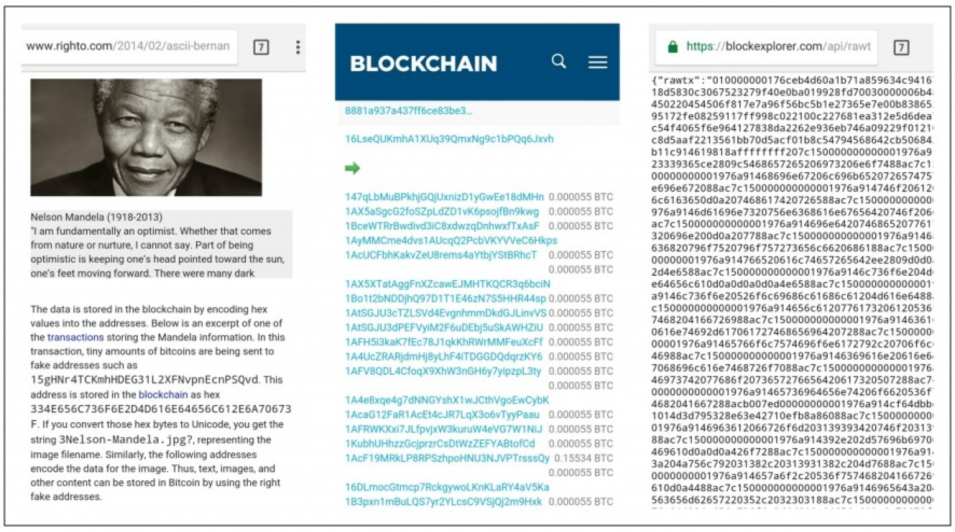
Steganography in Bitcoin's Blockchain

bebee.com/producer/@roberto-a-foglietta/steganography-in-bitcoin-s-blockchain



www.righto.com/2014/02/ascii-bernan

Nelson Mandela (1918-2013)
"I am fundamentally an optimist. Whether that comes from nature or nurture, I cannot say. Part of being optimistic is keeping one's head pointed toward the sun, one's feet moving forward. There were many dark

The data is stored in the blockchain by encoding hex values into the addresses. Below is an excerpt of one of the transactions storing the Mandela information. In this transaction, tiny amounts of bitcoins are being sent to fake addresses such as `15gHNr4TCKmhHDEG31L2XFNvpnEcnPSQvd`. This address is stored in the blockchain as hex `334E656C736F6E2D4D616E64656C612E6A70673F`. If you convert those hex bytes to Unicode, you get the string `3Nelson-Mandela.jpg?`, representing the image filename. Similarly, the following addresses encode the data for the image. Thus, text, images, and other content can be stored in Bitcoin by using the right fake addresses.

BLOCKCHAIN

```
8881a937a437ff6ce83be3...

16LseQUKmhA1XUq39QmxNg9c1bPQq6Jxvh

➡

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1BceWTRrBwdivd3iC8xdwzqDnhwxfTxAsF  0.000055 BTC
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1AcUCFbhKakvZeU8rems4aYtbjYStBRhcT  0.000055 BTC
                                    0.000055 BTC
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1Bo1t2bNDDjhQ97D1T1E46zN7S5HHR44sp  0.000055 BTC
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1AtSGJU3dPEFVyiM2F6uDEbj5uSkAWHZiU  0.000055 BTC
1AFH5i3kaK7fEc78J1qkKhRWrMMFeuXcFf  0.000055 BTC
1A4UcZRARjdmHj8yLhF4iTDGGDQdqrzKY6  0.000055 BTC
1AFV8QDL4CfoqX9XhW3nGH6y7yipzpL3ty  0.000055 BTC
                                    0.000055 BTC
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1AcF19MRkLP8RPSzhpoHNU3NJVPTrsssQy  0.15534 BTC
                                    0.000055 BTC
16DLmocGtmcp7RckgywoLKnKLaRY4aV5Ka
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```

https://blockexplorer.com/api/rawt

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976a9146d61696e7320756e6368616e67656420746f206
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563656d62657220352c2032303188ac7c150000000000

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Introduction

Recently the news reported that some people discovered into Bitcoin's Blockchain **the existence of a couple of thousands of secret messages**.

In particular some of them are containing links to illicit information, links that could be broken removing the pointed source *ab origine* and leaving the broken and thus useless links in the Blockchain.

Among this stuff, the news reported that it were concealed an image, such kind of image that it would illigal to keep in any civil and developed country.

For this reason someone argues that because the Blockchain could not amended by this information, the whole Bitcoin Blockchain should consider illegal and thus destroyed.

Did you had a loud laugh? It is ok and you would not have any need to read this article. Otherwise, keep reading.

Steganography

Steganography is the practice of concealing a secret message into another one in such a way those look at the public message cannot see the secret one nor suspect it exists at all.

For example, the hidden message may be written with an invisible ink – like lemon juice – between the visible lines of a private letter – like in the **The Name of the Rose**.

The word steganography combines the Greek words*steganos* (**στεγανός**), meaning "covered, concealed, or protected," and *graphein* (**γράφειν**) meaning "writing".

The first recorded use of the term was in 1499 by **Johannes Trithemius** in his **Steganographia**, a treatise on cryptography and steganography, disguised as a book on magic.

Some implementations of steganography that lack a shared secret are forms of **security through obscurity**, and key-dependent steganographic schemes adhere to **Kerckhoffs's principle**.

Blockchain and Bitcoin

A **blockchain** is a continuously growing list of records, called *blocks*, which are linked and secured using **cryptography**.

By design, a blockchain is inherently resistant to modification of the data.

It works as an open, **distributed ledger** that can record transactions between two parties efficiently and in a verifiable and permanent way by a.

Once recorded, the data in any given block cannot be altered retroactively without the alteration of all subsequent blocks, which requires collusion of the ledger's network majority.

Blockchains are **secure by design** and exemplify a distributed computing system with high **Byzantine fault tolerance**. **Decentralized** consensus has therefore been achieved with a blockchain.

Blockchain was invented by **Satoshi Nakamoto** in 2008 for use in the **cryptocurrency** **bitcoin**, as its public transactions ledger.

The invention of the blockchain for bitcoin made it the first digital currency to solve the **double spending** problem without the need of a trusted authority or central server.

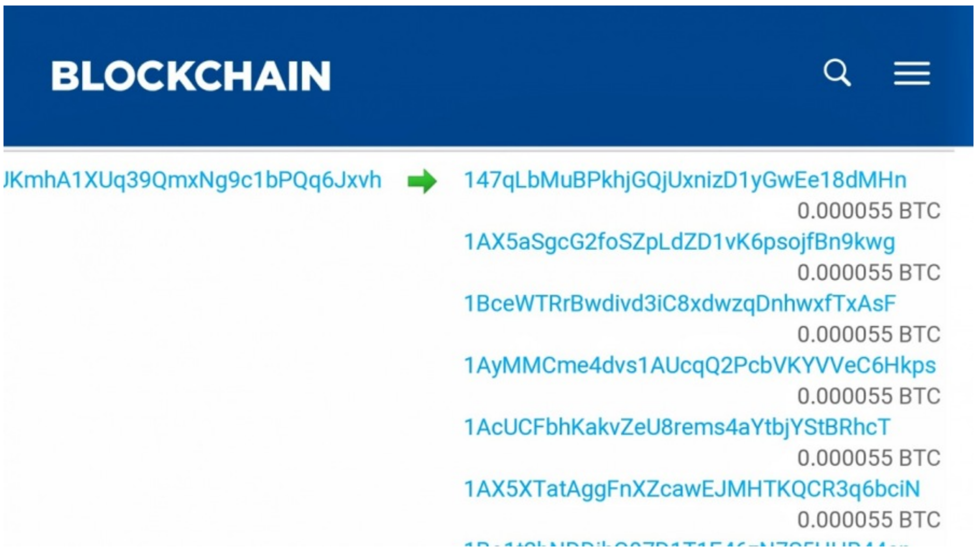
Here we are!

Stenography in bitcoin's blockchain is not an issue because stenography happens in any format data is stored, inevitably.

Amazingly, someone might be surprised that bitcoin's blockchain could contain arbitrary information, piece by piece, in a sequence of transactions like a Mandela's Tribute which is publicly available and engraved in, forever.

It is not an issue

However, it became clear that this is not an issue in the moment we check how the Mandela's Tribute is stored into bitcoin's blockchain:



```
JKmhA1XUq39QmxNg9c1bPQq6Jxvh  ➡  147qLbMuBPkhjGQjUxnizD1yGwEe18dMHn
                                                      0.000055 BTC
                                 1AX5aSgcG2foSZpLdZD1vK6psojfBn9kwg
                                                      0.000055 BTC
                                 1BceWTRrBwdivd3iC8xdwzqDnhwxfTxAsF
                                                      0.000055 BTC
                                 1AyMMCme4dvs1AUcqQ2PcbVKYVVeC6Hkps
                                                      0.000055 BTC
                                 1AcUCFbhKakvZeU8rems4aYtbjYStBRhcT
                                                      0.000055 BTC
                                 1AX5XTatAggFnXZcawEJMHTKQCR3q6bciN
                                                      0.000055 BTC
```

Did you see anything else than letters and numbers? Nope? Me neither.

That's the main point of the steganography. In order to collect back the hidden message we need some information:

there is a hidden message

where is the hidden message

how to extract the hidden m.

how to decode the hidden m.

If we do not know just one of these information, it may impossible or near impossible for us to retrieve the information. Moreover, if we ignore the first point, we do not even know the information exists at all.

It is a matter of will, only

Imagine we know that accessing a steganographed image into the bitcoin blockchain is a violation of the law.

Imagine, we have all the information above about this conceiled image and we have the bitcoin's blockchain.

Thus, we have all we need to access at that data at every time we would like.

The will to break the law it is our own personal choice, only. There is not any way to break the way above our will.

Those will break the law, they will do with or without bitcoin or blockchain.

It is the blockchain not the bitcoin

Any issue of this kind is not related in any way with bitcoin but with blockchain. Obviously, bitcoin need blockchain to exist and to work but the blockchain technology may be used in many others ways that have nothing to do with bitcoin.

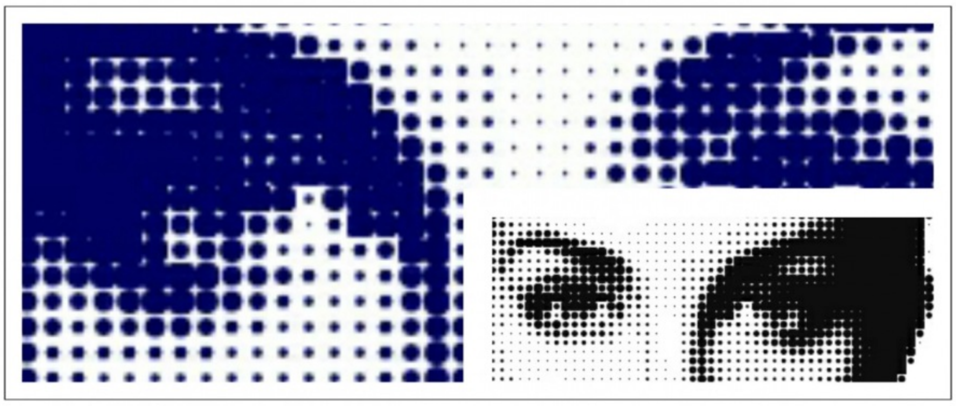
Thus, every blockchain open ledger may suffer such kind of conceiled injection and nobody could prevent from it in any way.

Every public write-only ledger would suffer the same issue. Moreover, every public write-once not editable block of information could be used for the same aim. Let me explain this.

Bits and dots

Mandela's tribute has been encoded in sequence of bitcoin's transactions.

Such collection of numbers and letters could be converted into a image file which would be a specific encoding of an image which is nothing else thab a way to convert bits into dots.



Every software developer could write a piece of code that is able to show an image {a set of dots} starting from a block of alphanumeric characters {an arbitrary text} and s/he could code it in such a way that a specific page of the Holy Bible – the first page of the Genesis, for example – would decoded into such Mandela picture. Any other page would probably show anything else than random dots but that one in particular, baam!

How this could be possible? Because the dots are related with bits by a deconding function. Usually we write encoding and decoding function to convert dots in bits and bits in dots back.

Bits <-- d(_) || e(_) --> Dots

We could always choose to write a deconding function that makes such a magic and if we are smart enough, we could write the inverse of such deconding function to obtain the encoding function.

A couple of foreign spies

If the two of us were spies we may decide before to separate, to choose a specific public writen-only text and later we may exchange between us just functions:

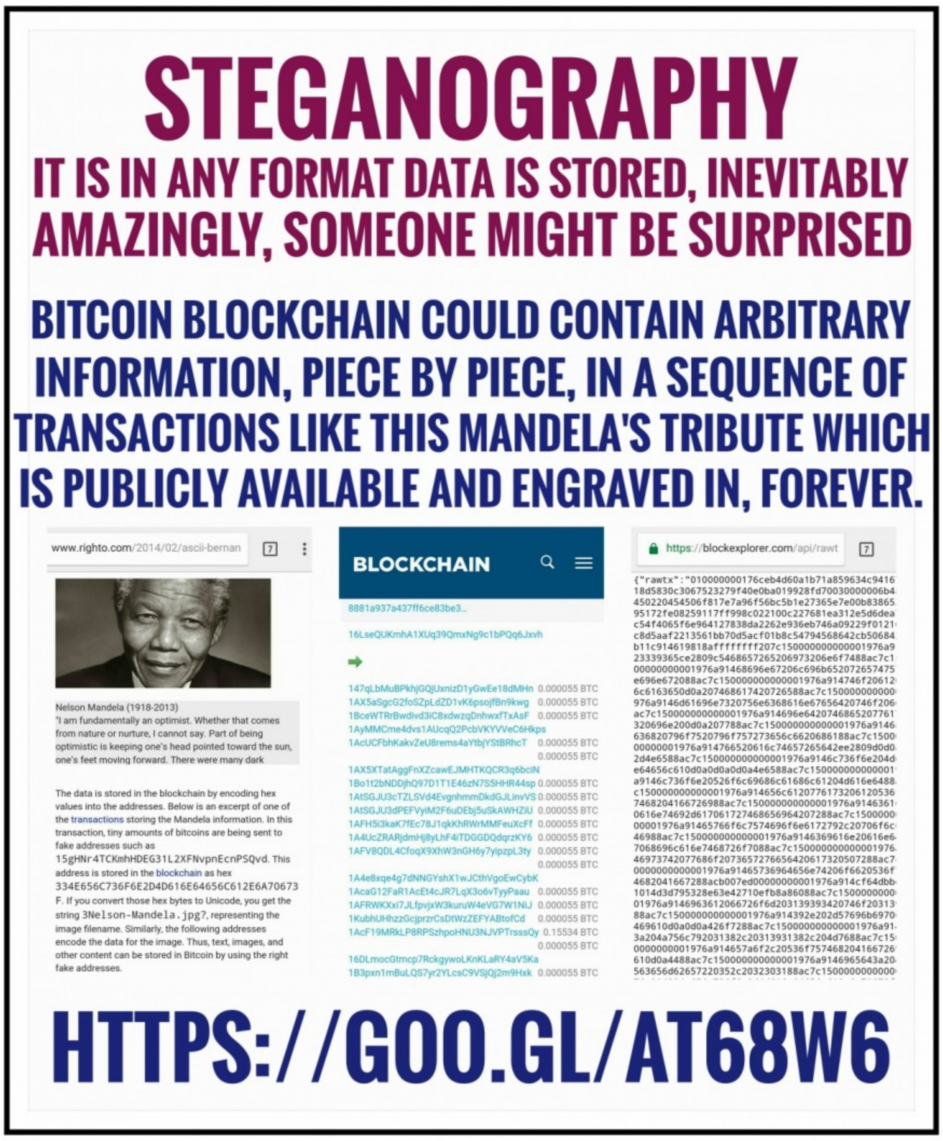
> whisper_1 = function_1(first_amendment);
>
> ...
>
> whisper_N = function_N(first_amendment)

The day we might be caught by CIA whispering secrets each others, we would claim that all those whispering were into first amendment!

Sure, it is true but the will to break the law is in our own will and not in the tools we might use for doing so.

Conclusion

Feel free to download this image and share with your friends for their peace of minds and hearts: good guys knew!



STEGANOGRAPHY

IT IS IN ANY FORMAT DATA IS STORED, INEVITABLY AMAZINGLY, SOMEONE MIGHT BE SURPRISED

BITCOIN BLOCKCHAIN COULD CONTAIN ARBITRARY INFORMATION, PIECE BY PIECE, IN A SEQUENCE OF TRANSACTIONS LIKE THIS MANDELA'S TRIBUTE WHICH IS PUBLICLY AVAILABLE AND ENGRAVED IN, FOREVER.

Nelson Mandela (1918-2013)
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```
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16LseQUKmhA1XUq39QmxNg9c1bPQq6Jxvh

➡

147qLbMuBPkhjGQjUxnizD1yGwEe18dMHn 0.000055 BTC
1AX5aSgcG2foSZpLdZD1vK6psojfBn9kwg  0.000055 BTC
1BceWTRrBwdivd3iC8xdwzqDnhwxfTxAsF  0.000055 BTC
1AyMMCme4dvs1AUcqQ2PcbVKYVVeC6Hkps
1AcUCFbhKakvZeU8rems4aYtbjYStBRhcT  0.000055 BTC
                                    0.000055 BTC
1AX5XTatAggFnXZcawEJMHTKQCR3q6bciN
1Bo1t2bNDDjhQ97D1T1E46zN7S5HHR44sp 0.000055 BTC
1AtSGJU3cTZLSVd4EvgnhmmDkdGJLinvVS 0.000055 BTC
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1AFV8QDL4CfoqX9XhW3nGH6y7yipzpL3ty  0.000055 BTC
                                    0.000055 BTC
1A4e8xqe4g7dNNGYshX1wJCthVgoEwCybK
1AcaG12FaR1AcEt4cJR7LqX3o6vTyyPaau  0.000055 BTC
1AFRWKXxi7JLfpvjxW3kuruW4eVG7W1NiJ  0.000055 BTC
1KubhUHhzzGcjprzrCsDtWzZEFYABtofCd  0.000055 BTC
1AcF19MRkLP8RPSzhpoHNU3NJVPTrsssQy 0.15534 BTC
                                    0.000055 BTC
16DLmocGtmcp7RckgywoLKnKLaRY4aV5Ka
1B3pxn1mBuLQS7yr2YLcsC9VSjQj2m9Hxk  0.000055 BTC
```

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HTTPS://GOO.GL/AT68W6

That's all folks.