J9 Hidden Data: A Barcode Primer With Casework Examples

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After attending this presentation, attendees will be able to understand the history, use, and examination of 1D and 2D barcodes, and will have a foundation upon which to develop their competency in assessing and deciphering barcodes.

This presentation will impact the forensic science community by providing a broader, updated understanding of the current usage of barcodes in which examiners may encounter.

Upon initial consideration, the barcode (in its various forms) is a printed element used for automatic identification and data capture (AIDC). It would be perfectly natural for a Questioned Document Examiner (QDE) to shy away from all but a perfunctory comparison of size and format. Unfortunately, there is no technical profession that specializes in deciphering barcodes. That the task will fall to the QDE is evident in the incorporation of barcode reading software in the newest versions of equipment marketed to forensic labs. A certain level of competence regarding barcodes will be necessary for an examiner to properly assess, document, and present the physical features and data of a barcode. That competence must include an understanding of the history of barcodes, the types of barcodes and their various applications, technical limitations in their assessment, and an understanding of the types of data that may be revealed.

The history of the barcode is a long one. The first documented consideration was in the late 1940s. Their first use was in tracking train cars (clearly a limited application). However, it was not until the mid-1970s that the grocery industry began to see the possible cost savings of scanning products and put out a request for proposals to a variety of technology companies. As late as 1980, the implementation of "UPC" barcodes for food stores was seen as a failure. Albeit at a crawl, the technology moved into more and more stores, and then eventually spread to other industries. The military began to require that all purchases contain a barcode ("Code 39"). The U.S. passport application system generates a barcode that summarizes the form data, as do some medical records. The creation of the tech-savvy Japanese marketplace, the "QR code" is now seen on coupons and products throughout the U.S.

Today, there is a great variety of barcodes. The simple "1D" barcodes hold a small amount of data in a simple to read format; for experienced users, some can be deciphered at a glance. These barcodes may be used to impart only a small amount of information, or they can be used to access information in a centralized system. The more advanced "2D" barcodes can hold far, far more information. The most common of these, the PDF-417, is based on an international standard and a correctly encoded PDF-417 can be read by any standard reader (or by a scan/software solution). Efforts to encrypt the PDF-417 for identification documents have had limited success because this solution requires that all verifiers obtain equipment for decryption.

The QDE may encounter barcodes on a variety of documents: state driver licenses, state insurance documents, applications (the information is summarized in a barcode), passports, commercial and industrial products, and countless others. Both the simple and more advanced barcodes typically hold data. While some barcodes serve as pointers to information in a central system, the majority hold the actual data. In the case of travel and identity documents, and certainly medical records and other forms, comparing the data in the barcode to the text on the document immediately reveals if there is a difference.

The first limitation a QDE may encounter with a barcode is access to equipment to decipher the entire barcode. The "readers" used for point of sale (POS) acceptance of documents and by some law enforcement entities extracts the "important data" and presents it in a summary form. More data is often present and may be revealed (and made useful) given the use of a decoding system. The assessment of barcodes is also limited by the lack of information regarding methods for incorporating non-encryption based enhancements and/or security elements. This limitation must be addressed on a case-by-case basis through contact with the issuing authorities for the genuine documents. Unfortunately, there is often a very small group of individuals who have this information and they are difficult to find.

At the FDL, it was determined that counterfeiters are making readable barcodes and including them on counterfeit documents. This is unfortunate because at POS locations, clerks often rely on the scan to verify the document, and never actually look for any of the security features. The barcodes produced by the counterfeiters include the name/address/date of birth in readable form. Fortunately, they also contain data that can help lead investigators to their source. To date, there have been a limited number of cases at the FDL in which barcodes played a significant role. A summary of those cases will be presented.

Although barcodes are not new, their role in the examination of documents is. Given the potential for identifying altered or wholly fabricated information on a document, passing them off as a "data element" and hoping that another technically-trained individual will handle them is no longer appropriate.

Currently, most questioned document examiners are not assessing barcodes when they are present on suspect documents. Both the physical features and the deciphered data of a barcode must be considered in order to provide a full

assessment of a document. By developing competence regarding barcodes, QDEs will be better able to identify evidence of alterations, counterfeiting and unauthorized production.

Questioned Documents, Barcodes, Data

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