

# Biometric versus Smart Card – Observations by M H Systems

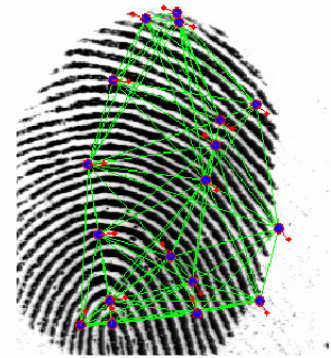
This can be a very confusing issue for many schools. Over the last 18 months, M H Systems has spoken to schools that have used smart card system very successfully, others who have tried to use card system and have failed because the cards have been lost or damaged to much and the school wishes to move to biometrics, and those schools who have tried biometrics but have found them too unreliable and have moved back to card schemes that have then been very successful.

So, what are the issues?

## Definitions:

### **1 Biometric Systems**

Biometrics is currently the subject of many myths and misrepresentations. Some schools and parents still believe it is like taking a photograph, fax or photocopy of a child's fingerprint, however, this is completely incorrect as no actual graphical or visual image is retained. The record is stored as an encrypted algorithm and merely specifies the location of a number of key physiological points on the image and the spatial relationship between each point (see right). The dictionary definition of an algorithm is "a key to secure communications and achieve the goals of confidentiality, integrity and authentication", in other words a digital file that cannot be fraudulently re-created.



In layman's terms, if you take a digital photograph on a camera it is stored on a memory card as a binary number but can be read by any other digital camera using the same card format and the image re-created. If stored as an encrypted algorithm then the print is also stored as a digital number but you would need the very same camera to re-create the image. This means that as soon as the data is taken outside of the cashless catering system it becomes completely useless and impossible for anyone to use it. The school could sell the entire database of biometric records to a toy manufacturer and, unless they also had a copy of the catering software and the school's main pupil database, it would be completely useless

It may also be useful to remember two things; 1) the Pentagon use biometric identification readers and 2) it is far more scary and dangerous for parents to give a child's passport to a hotel to be photocopied during their stay on holiday than it is to have a secure encrypted biometric record stored at their school.

### **2 Smart Cards**

There are two common types of smart card; the MiFare card and the HID iClass.

**MiFare:** This is already very widely used in schools and the UK Government approves and supports its use. In essence, it is a relatively simple technology where the card comes with a 1K or 4K chip. Each chip supports identification in two ways; there is a unique serial number within each chip that can be read by any software vendor to identify the card which is then cross-referenced against a card holder list. A more secure technique is where a sector of the chip is encoded by a software vendor, again, with a unique number but, in this case, so no one else can read it. This is the method used by our Chips system

**iClass:** This is a more secure but much more expensive technology developed by a company called HID where they guarantee that each and every card in the world is unique and the code cannot be broken. This card is more commonly used for sensitive access control areas. It is more expensive because HID

charge a minimum of £1 licence fee per card for any end user (Mifare is free) and the readers are also more expensive. In cases where the card is being used to store data such as personal information or an e-purse, the iClass solution is more suitable. In the case of a school where the card is being used simply as an identifier and no other data is being stored, it is, in most cases, an unnecessarily expensive option.

### **Tills using Biometrics**

Biometrics was developed by the security industry to be a form of secondary ID verification and not a primary identifier. This is for three reasons, firstly, until recently, biometrics have been too inaccurate in to be the sole form of identification in a "one to many" lookup process (seeking a single record out of many on the strength of a fingerprint read), secondly, they have been too slow (a read time of a second) and thirdly they are more susceptible to external physical factors such as small fingers, wet fingers, pressing too hard so the imprint is flattened and, in the case of access control, it is almost impossible for biometrics to be used to open an outside door as there is too much light (less of a problem within the school premises). The end result is that schools have had to introduce EPOS systems that work with fingerprints but that also require some form of manual look up for when the print read fails. In most systems, one in six or seven reads will fail but the effect on performance is minimised as the till operator simply asks the name of the pupil and then looks them up on a list so the problem goes un-reported. It should be noted that the CHIPS system achieves a much higher rate of success, perhaps, only one in thirty failures due to its intelligent learning capability where it continually improves its knowledge of every child's print by storing up to ten records per pupil.

The primary and most obvious benefit of biometrics is that any administrative overhead regarding the initial and ongoing production of ID cards is removed.

### **Tills using Smart Cards**

This is still the more common means of identifying pupils and, in our opinion if implemented well, often the better solution. The transaction speed is measured in milliseconds (our CHIPS system achieves up to 18 transactions a minute), and is less susceptible to those external factors mentioned above such as the age, size and overall physiology of the pupil. The system can provide anything a biometric solution will offer but will be generally faster and more reliable. There are some potential financial benefits to using cards if the college were to approach a sponsor such as the bank (or MISCO) who may subsidise the cost of the cards in return for their logo being applied. Another benefit of cards over biometrics is that, if a photograph of the pupil is included, cards can provide a means of identification at any point within the school and not just the canteen.

The two problems traditionally associated with smart cards by schools are that pupils lose them and that they place an unacceptable overhead on the office that need to produce cards each year and manage the ongoing task of providing replacement cards. In actual fact, the two issues are obviously linked because the fewer cards that are lost, the fewer need replacing. The majority of this problem is overcome very simply by creating a situation where the pupils place a notional value on their card so they will look after it. This could be through using reward schemes or by making it so inconvenient for the child if they do lose their card that they fear to do so. In some cases, such as London Academy, the cards have been supplied with colour coordinating lanyards with the colours used to denote the year of the pupil. In this academy, the cards have almost become fashion items.

Even if pupils place a high value on keeping their cards, the final part to the solution is to provide a cheaper and faster way to deal with the unavoidable but reduced issue of replacing damaged cards. Firstly, the CHIPS system provides a way to save money by allowing a school to purchase basic white blank un-encoded cards and have them printed, personalised and encoded on site. The process is quick and takes only 40 seconds. Secondly, CHIPS provides a temporary pin number system so any pupil who

has lost their card can be given a five digit number that they present to the canteen operators. This number gives them complete access to their free meals or purse as if the card was present (an on-screen photo will prevent abuse of this facility). The use of pin numbers allows the office to ensure all pupils can access their entitlements whilst “buying themselves time” to print cards at a convenient time. The pin number is only valid for one day but the pupil can come and collect their new card that afternoon or in the morning and is charged £30 for the pleasure.

### **Value Load Terminals**

Value Load Terminals (VLTs) are the most common means of loading value onto an account and, obviously, require the pupil to be identified prior to loading. Although these devices can be supplied with either type of reader it becomes a little more expensive if biometrics are used. The identity of the a card that is used at a VLT (assuming the card is not broken) is irrefutable and no potential mistakes can be made. Each card has one unique number which cannot be misread. However, a biometric scan relies on up to seventeen points of recognition so if it is only partially successful it is not a confirmed scan. At this point, there are two options; one is to refuse to allow the load to continue as the ID is not secure or the second is to present the pupil with what we call an “unresolved scan”. The VLT will present the pupil with the following message, “Your scan has produced a low score match. Please select your account from the following photographs”. At this point the screen shows a series of photographs of all potential record matches and, as the pupil is loading value, it is very unlikely they will select someone else.

This process obviously requires the need of a larger touchscreen display panel on the VLT which increases costs.

### **Integration with other systems**

Biometric is a very recent technology and, even now, it is not guaranteed to become as common as smart cards. Cards are used in all walks of adult life and some schools consider it a more suitable part of a child’s education rather than fingerprints. In addition, it is only cashless catering systems that use biometrics whereas other systems, such as access control, library and registration, still use cards. Therefore, even if a school selects to use biometrics in the canteen, there will be other applications for pupils and, most certainly, staff, where a card is required. It should also be noted that the school will not be able to fingerprint visiting parties so will have to have some alternative form of identification anyway.

The final comment to be made is that both local and central Government are continually looking to implement “citizens cards services” for access to municipal leisure facilities, public transport, library services and, let’s not forget, the famous driving licence and passport. Many are trying to introduce these schemes by using city or town-wide incentive and reward schemes (Suffolk County Council currently operates over 40 different smart card schemes). In the future, there is no doubt that such schemes will be used to attract children to use sports facility to try to improve their health and our chances at the 2012 Olympics. It is important that schools retain as much control over the activities of their pupils as possible and if, in the future, a school wishes to play a central role in any council wide scheme, those using smart cards could be included very easily in that scheme, those using biometrics will simply not be able to participate.