Sheffield Goes Digital

Underlining the digital revolution taking place across Britain's town and city centre CCTV schemes, the recently opened Sheffield Wide Imaging and Switching System (SWISS), reveals how one major city is embracing the latest advances in surveillance technology to help it combat crime and disorder.

Officially launched in February 2003 by John Denham MP, Minister of State for Crime Reduction, SWISS is overseen by a CCTV Steering Group who's published strategy statement reflects Sheffield's Crime Reduction Strategy 2002-5, where CCTV is regarded as an important tool in delivering the objectives of the Sheffield First for Safety (SFFS) partnership.

Organization and Funding

The umbrella organization responsible for the city's crime reduction strategy, Sheffield First for Safety, operates on a partnership basis. Comprising members from the Local Authority, South Yorkshire Police and Police Authority, Health agencies, S Y Fire Authority, Crown Prosecution Service, Probation Service and others, its key strategy is one of a number of other strategies operating within the city addressing crime and regeneration including the Annual Policing Plan and Social Inclusion Strategy.

In excess of £3 million has been spent on the upgrade scheme, with most of the funding for this work having been made available from the Home Office. However, Area Panels, community groups, commercial organizations and the local authority have all contributed.

CCTV Strategy

The objective of Sheffield First for Safety to help provide a safer and more pleasant environment for people living in, or visiting the city of Sheffield, is being proactively supported by the new network of CCTV surveillance equipment and Help Points. The system's doctrine is to reduce crime and the fear of crime by installing, maintaining and recording high quality images, and by responding swiftly to requests for assistance from the public.

In the last two years significant progress has been made with the CCTV system within Sheffield. The upgrade, which includes a new control room, installation of new infrastructure, re-location of existing equipment and a fibre-optic network, is now, in the words of Bob Kerslake, Sheffield City Council's Chief Executive, " One of the most technologically advanced systems in Europe. "

Coverage

To facilitate the expansion of the system beyond the city center itself, to outlying districts where the incidence of crime has been identified as high, an extensive network of fibre optic cabling has been installed. Now covering the areas of Burngreave, Darnall and Tinsley, the system has been extended to include surveillance of the stations on the Supertram route along the Don Valley corridor. The route terminates at the external area of the Meadowhall Shopping Centre, whose car extensive parks are also covered by the system. Coverage has been extended this year under the Street Crime Initiative allowing additional cameras to be installed at key locations where robbery and thefts are a particular concern.

At strategic locations, the installation of over 40 audio Help Points, with some doubling-up to provide travel information, is a further feature of the new system. This gives members of the public the opportunity to contact the CCTV control room in the event of an emergency and at any time of day.

On the outskirts of the city center, the University of Sheffield operates a parallel system within its own grounds. Linked to SWISS, this sub-system allows the monitoring of an extra 20 cameras and further five Help Points in public areas to the west of the city.

Effective Control

Underlining the company's reputation as the UK's leading manufacturer of advanced CCTV matrix switching, control and recording equipment, Sheffield chose UK manufacturer Synectics, as its main technology supplier.

Controlling the system's 100-camera surveillance coverage, SWISS utilises 12 individual control terminals, five in the main control room and seven others spread across four police stations, South Yorkshire Passenger Transport Executive (SYPTE) and Meadowhall Shopping Centre. At each control terminal, Synectics' Security Industry Award winning SynergyPro™ touch-screen user interface is used to furnish operators with a simple, fast and intuitive route to all common system functions.

To achieve this, SynergyPro's unique user centric design considers the operational and systems environment as a whole, tackling the SWISS system's complexity of a large numbers of cameras, consolidation of operator workstations, different user groups and the regulatory environment, to provide a simple, yet powerful interface. Whilst providing SWISS system operators and managers with a practical control and administration solution, Synectics' many years' experience within major CCTV systems has provided a system that dramatically simplifies the human interface to video monitors, Navigator™ joystick, computer monitor, keyboard, mouse and other disparate systems such as; telephone, ANPR and audio Help Points. Allied to this, at all times, supervisors have the ability to monitor system usage and override its operation if necessary.

In the event of a major incident, SynergyPro provides the very useful feature of secondary monitoring via an on-screen 'follow me' button. This function allows operators to relay camera selections to a remote terminal, as the incident is being tracked, allowing South Yorkshire Police to follow an incident as it unfolds - helping to speed up the response times to incidents.

Overseeing the correct deployment of the system and enabling assessment of the system's usage, the SynergyPro™ software creates powerful reports for managers, providing them with a single audit trail, along with associated visual evidence. Steve Godber, CCTV & Security Manager at SWISS confirmed, " The SynergyPro user interface delivers the flexibility of operation that Sheffield's complex system requires, to create an optimum workstation environment that delivers the level of control we need."

MPEG2 Recording

To meet the requirements of SWISS for a system capable of digitally recording each camera, in real-time, for 14 days, Synectics supplied their tried and tested Modular Digital Recording System (MDRS), already used in other well-publicised installations such as at NCP Manchester.

Describing the system's digital recording requirements, Steve Godber explained, " Because we wanted high-resolution real-time pictures, which meant that our digital storage requirements would be extremely large, we demanded a recording system that would prove to be very reliable and robust. Synectics' approach has been to integrate with 'best of breed' third party equipment for the storage element of their MDRS, something we think to be an important factor when considering that the large amounts of storage here represent one of the most significant IT investments a local authority will ever make. The Synectics solution takes into account the importance we place on data, future expansion, speed of retrieval and major incident support, whilst supplying us with a cost-effective storage solution."

Not wishing to reinvent the wheel and simply supply a home-grown digital storage product, for this important aspect of the recording equation, Synectics forged a business partnership with IBM to bring their immense experience and world-leading product set to the CCTV industry. The result, MDRS, is the combination of 'best of breed' elements that create a truly flexible and scalable unified solution for major systems' recording needs, including the ability to supply CCTV camera images of a quality admissible in court, as evidence. Designed specifically for town and city center CCTV systems, where picture quality, security of images and evidential value are key factors, MDRS's composition also allows it to match robustness with cost effectiveness over its operational life cycle.

Ideal for spot monitors, high-risk cameras and for the recording of accompanying audio, Synectics use exceptionally high quality MPEG2 to provide highly detailed recordings. Synectics' unique 'Agile Encoder' also enables MPEG2 to be deployed more widely, by allowing cameras to record MPEG2 based on time, or events.

Initial recordings are made to Primary Storage Nodes (PSN's). As images are recorded, a MD5 hash is produced that gives each file a unique Originality Code, generated to ensure the evidential quality of all images. These PSN's are then automatically archived on an hourly basis to Secondary Storage, which is as "deep" as the client requires. Typically, storage is around 10 to 100 Terabytes, although the system is scaleable well beyond this, Sheffield's current capacity is 90 Terabytes.

The security of Swiss's images is ensured by creating an environment with robust storage, strong rights management and audit trails. Synectics' partnership with IBM provides a world class CCTV IT storage platform for essential data, a desirable property when considering this data potentially contains invaluable evidential information.

The 'value point' of this evidential data is about proving the originality of the images, the MDRS achieves this by calculating a unique code for each minute the images are produced. Any change to the coded file can be identified down to individual pixel level. Synectics do this by recalculating the unique code and comparing it to the original, hence proving originality. The original MD5 hash, 128bit code can be kept securely in many ways, such as within the Synectics 'Evidence Locker'. This approach is very different to those offered by other generic "off the shelf" solutions available, and is aimed at major end-users who require a flexible, scalable and secure digital recording system.

Retrieval and Storage

The retrieval of images is simplicity itself. Using the Synectics 'Review Client', authorised users can login and review images based on time, data or camera number. When any selected video footage 'clips' are required to be archived or supplied as evidence, controlled copies are sent to the Synectics 'Evidence Locker'.

A robust server configured to handle and storage of evidence, the Evidence Locker provides a useful resource for the demands for evidence from the system, acting as a central point for evidence management. Visual data from the Evidence Locker can be archived automatically (onto LTO Tape which has a guaranteed shelf-life of 100 years), or if required for evidential purposes, downloaded to CD or videotape. If the footage is supplied on CD, to ensure the evidence can be readily reviewed off-site, the evidence is supplied including a self-contained media player, ensuring it can be played back on any P.C.

Providing a full managerial audit trail, all usage is logged onto a database, and for future authentication purposes, a unique 128-bit MD5 hash code is watermarked onto every minute of evidential video footage. If a police officer wishes to take a copy of the video footage away, the system saves the corresponding evidence's hash code in the form of a 'Digital Evidence Certificate'. The policeman wishing to take away the evidence will need to sign copies of the certificate, leaving one on-site and taking the other away with the footage to prove its legitimacy.

The investment made in this technologically advanced CCTV system is providing an important element of the regeneration of Sheffield. The upgrade and expansion of the scheme has been a priority for Sheffield First for Safety and is seen as offering a further means of retaining and enhancing Sheffield's status as a safe city.

A Brief history of CCTV in Sheffield

CCTV was first installed in Sheffield city center in 1995 and was operated by Sheffield City Council (SCC). In 1999 a bid for Home Office funding was drawn up by officers from the South Yorkshire Police Force (SYP) and SCC. This was successful and in 2002, a new control room was completed, the existing cameras were digitalized and additional cameras were added to the system in areas of the city where the incidence of crime was at its highest, namely Burngreave, Darnall and Tinsley. At the same time, the system was extended along the Supertram route along the Don Valley corridor, terminating in the external areas of Meadowhall shopping centre. Partnerships with South Yorkshire Passenger Transport Executive (SYPTE), the Meadowhall Shopping Centre and SYP were established to maintain and support the system.

Purpose of CCTV

Sheffield City Council is committed to the operation of CCTV and wherever possible, to its expansion as part of its objective for Sheffield to remain a 'safe city'.

At the official launch of the CCTV system in Sheffield, speakers were quoted as saying:

"CCTV will play a vital role in making the town safer, helping to provide evidence when a crime has been committed and reducing the fear of crime". – **John Denham, Minister for Crime Reduction**

"The extension of the system into neighborhoods is a particularly valuable approach which further communities will benefit from in the near future". – **Jan Wilson, Leader of Sheffield City Council.**

As the much publicized debate continues as to the effectiveness of CCTV, what is clear, is that the Sheffield public are generally enthusiastic to see its use extended.

Purpose of the system:

- To reduce crime
- To reduce the fear of crime
- To assist in the detection of crime and the apprehension of offenders
- To provide images which are admissible in the court of law for evidential purposes
- To provide a facility where a person can easily gain assistance in an emergency
- To reduce environmental damage
- To integrate with other prevention and community projects, both within the public and private sectors, to enhance their effectiveness
- To increase the safety of the public in all circumstances
- To better utilise the resources of all the partners thereby achieving synergy in pursuit of a cost effective service
- To support and safeguard all members of the community, increasing their confidence and enhancing the image of the city as a whole
- To aid with traffic management, safeguarding the structural integrity of Tinsley viaduct and liasing with the appropriate agency on problems on the highways
- To assist in the regeneration of parts of the city where there are perceived problems of crime and disorder
- To use, wherever possible, local labor and to create job opportunities

Partners

Meadowhall Shopping Centre and The South Yorkshire Passenger Transport Executive (SYPTE) are key partners. Their access to the system extends only to those cameras collecting images from their land and property interests. The key partners entered into Collaboration Agreements with Sheffield City Council to support and maintain the CCTV system. All partners subscribe to The Code of Practice for The Operation of CCTV in Sheffield.

Community groups, Area Panels and other organizations have interests in specific locations for which they have responsibility. These groups may influence their part of the system but do not necessarily have access to any images collected from it.

About Synectic Systems, Inc.

Synectic Systems Inc. (Synectics), a wholly owned subsidiary of UK-based Quadnetics Group Plc, is an engineering, integration and manufacturing company with expertise in IT and networked systems, CCTV control systems, enterprise storage and command control software applications. Quadnetics is listed on the Alternative Investment Market (AIM) of the London Stock Exchange.

Synectics' unparalleled ability to deploy custom, enterprise-class DVR solutions that integrate with existing legacy systems and future technologies has established them as a market leader in the Middle East, the UK, Europe and in North America. For more information about Synectics, go to: **www.synecticsusa.com**