



**AudioSoft**

## White Paper

# Solutions to PACE-compliant digital interview recording

Ten benefits of upgrading to a digital system

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## Executive Summary

Over the last fifteen years there has been a gradual move to digital recording solutions to reduce costs and improve functionality.

Digital recording allows for:

- ▶ Replay whilst still recording
- ▶ Live monitoring from outside the room
- ▶ Central storage for quick access
- ▶ Reduced maintenance costs
- ▶ Reduced media costs
- ▶ No loss of quality and easy distribution
- ▶ Centralised management of recorders
- ▶ Single system for synchronised audio and video
- ▶ Quicker transcription time
- ▶ Secure integrated workflow management

There is now an urgent need to move away from analogue tape recording due to the unavailability of the tapes themselves and spare parts for the recorders.

Digital recording is now a mature technology for:

- ▶ Interview recording (in accordance with PACE [1])
- ▶ Emergency Services recording
- ▶ Surveillance recording
- ▶ Court recording

This white paper explains the benefits of upgrading to a digital solution for PACE-compliant interview recording and the costs savings that it can bring.

## Audience

This white paper is relevant to:

- ▶ Those responsible for the operation of the interview recording system (and any associated network)
- ▶ Those responsible for budgeting for the recording system
- ▶ Those responsible for setting the requirements for logistic management
- ▶ Transcriptionists
- ▶ Those responsible for transcriptions

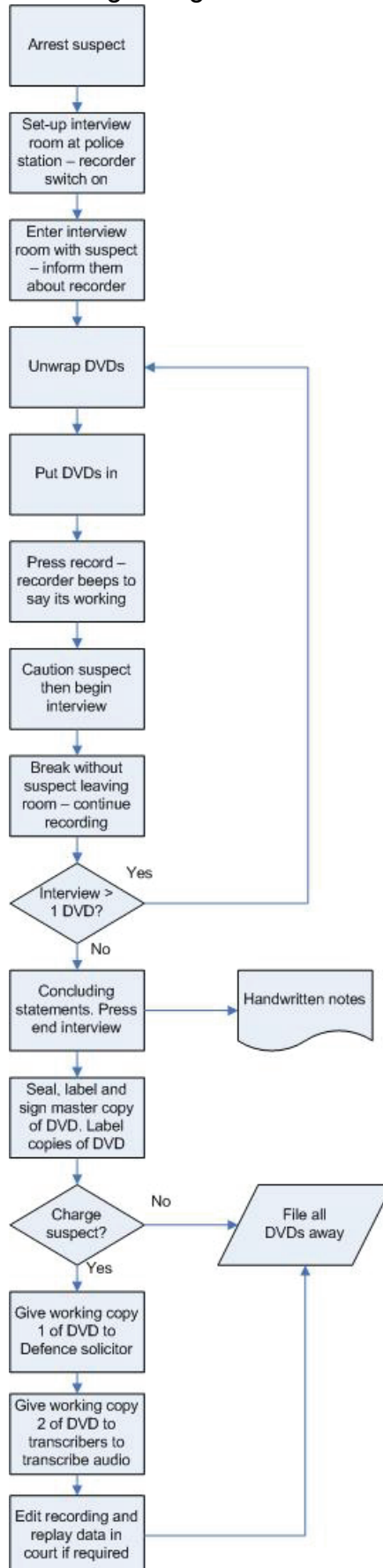
## Section 1: Key points for general PACE interview recording

This section summarises the key points for PACE compliant interview recording. To ensure all your organisation's requirements we recommend you further consult PACE [1] legislation.

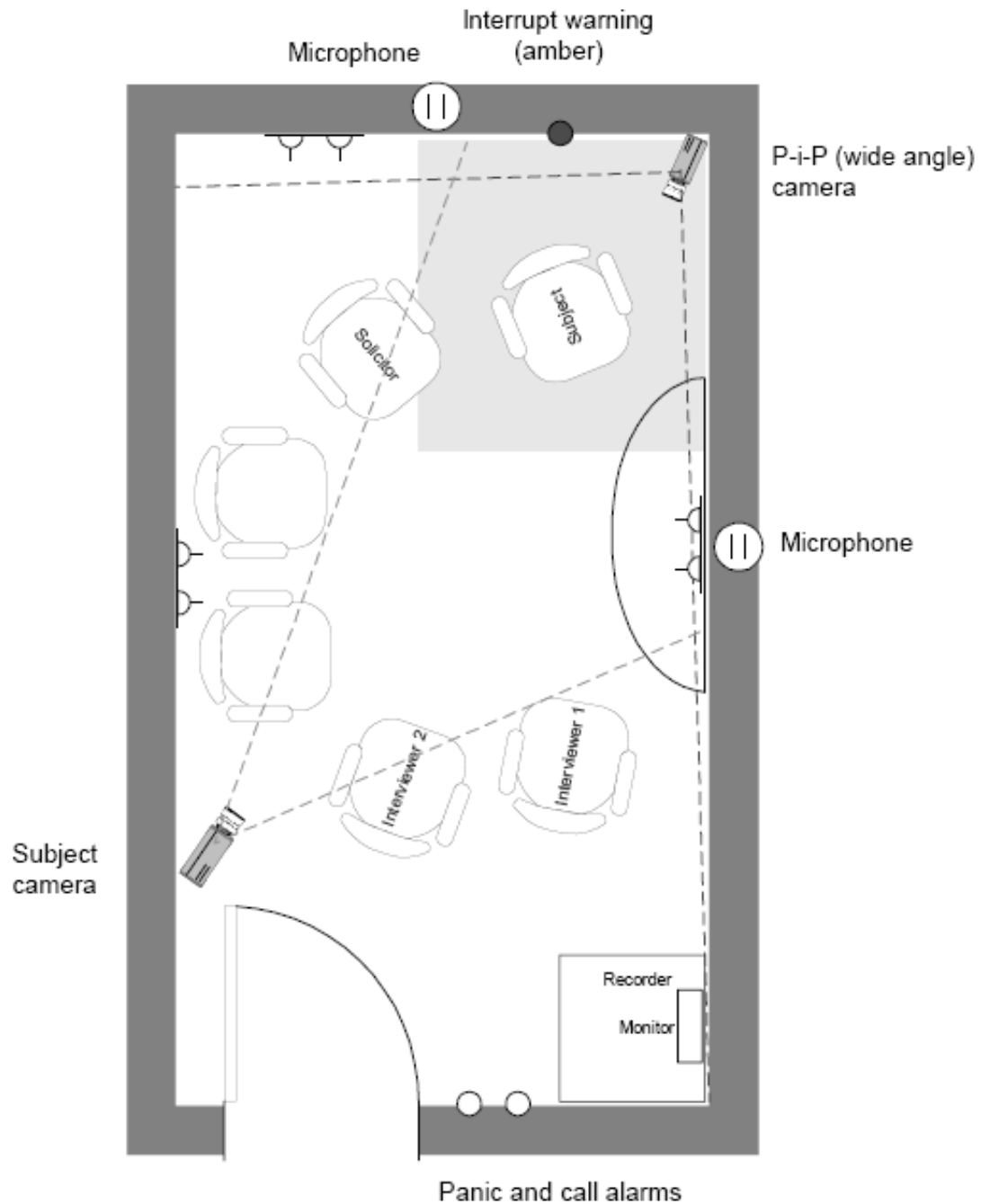
- ▶ The whole of each interview should be audio recorded, including the taking and reading back of any statement [1] [4]
- ▶ "Recording of interviews shall be carried out openly to instil confidence in its reliability as an impartial and accurate record of the interview" [1]) so the recorder should be in the room (a small, desktop box is ideal) but with the power button not easily accessible to suspect i.e. not on the front of the box
- ▶ The audio should be recorded using a minimum of 2 audio channels [2], with the signal to noise ratio > 50 dB; frequency response > 100 Hz to 8 kHz [5]
- ▶ In many cases video recording is preferable, with two cameras giving the recommended picture-in-picture view [2] Horizontal resolution in colour > 240 lines [5]. Time and date should be stamped on the picture [2]
- ▶ The initialization period shall be no longer than 30 seconds [5]
- ▶ At the end of the recording, the recording equipment shall have a maximum finalisation time of 4 minutes [5]
- ▶ The recorder should allow a minimum of 2 hours continuous recording [5] alerting the user to when the media are nearly full [1], for which 5 minutes is recommended [5]
- ▶ Multiple media drives should be recorded to, a minimum of 2: ("One recording, the master recording, will be sealed in the suspect's presence. A second recording will be used as a working copy" [1]) but 3 are recommended. As PACE currently stands [1], the interviewee still needs to be offered a copy of the recording, ideally on a media such as DVD for ease of replay, and a master copy still needs to be sealed and signed. See Appendix A.
- ▶ Eject buttons on media should be locked to prevent accidental ejection while recording/finalisation is in progress [5]
- ▶ Illuminated on/off switch with light or Liquid Crystal Display (LCD) to show live monitoring and sound levels should be present [5]

## Section 2: Typical Scenario

Below is a typical scenario using a digital recorder for a PACE-compliant interview:



The recommended room layout for a PACE-compliant video and audio interview is below. Diagram courtesy of “Visual recording of evidence within the Criminal Justice System (CJS) – Equipment specification” [5]



### Section 3: Understand your specific requirements

Whilst PACE Code E [1] “deals with the tape recording of interviews with suspects in the police station”, Code F “deals with the visual recording with sound of interviews with suspects. There is no statutory requirement on police officers to visually record interviews. However, the contents of this code should be considered if an interviewing officer decides to make a visual recording with sound of an interview with a suspect”.

There are other situations in which interview recording requirements should be considered and that are various options available:

*Suspects – audio only:* Standard PACE recording for which either tape-based recording or digital recording can be used. The advantages of digital recording are discussed further in Section 4.

*Suspects – audio and video:* Recording both video and audio gives greater information, allowing better analysis of the interview and easier presentation in court. It gives greater protection to the officers interviewing the suspect as it can then be proven that there was no physical intimidation in the room when the suspect was being interviewed. A picture-in-picture format that shows both the wider room and a close-up of the suspect’s face is ideal and recommended in [5]. Integrating this with audio for lip-synced replay is most easily achieved using a digital solution.



*Child/Vulnerable witnesses:* In this case recording both audio and video may allow the interview to be replayed in court in place of testimony. The interview is likely to take place in an environment other than a custody suite, perhaps in a hospital or in a friendly, controlled, off-site environment for children or rape victims. In these cases, a small, lightweight, portable recorder is required that can be quickly and easily set-up for recording both audio and video.

*Murder / serious crime investigations:* A murder (or similar) investigation, may require multiple interviews to be conducted simultaneously with the interviewer being prompted by what is said in the other interview. This may warrant the audio (and video) being streamed from several interviews either to outside the room at the same site or to a central location at another site over a secure network. In this latter case only a digital recording solution fulfils the requirement.

## Section 4: Business Drivers of a digital solution

There are many advantages to upgrading to a PACE-compliant digital interview recording solution:

### Advantage 1: Replay whilst still recording

Digital recorders allow replay of the interview from outside the room whilst the interview is still in progress without affecting the recording. For example, if a suspect offers some information that cannot be easily heard on first listening, it can be replayed easily, thus improving operational response. Advanced digital recorders allow functionality such as variable playback speed, loop and bookmarking to ensure vital information is not missed.

### Advantage 2: Live monitoring from outside the room

Recordings can be live monitored either at the recorder or across the network, increasing operational capability. In cases of high importance this allows officers to monitor multiple interviews at once from one central location, feeding back information to the interviewers. Streaming video and audio over the network is only possible with a digital system.

### Advantage 3: Central storage for quick access

All recordings can be archived to a central location for easy access of all recordings without having to find, load and rewind the tape. Recordings can be stored efficiently using high-quality codecs and distributed easily over IP networks or e-mailed over the internet in common formats such as '.wav' for audio or standard video formats such as 'mpg4'. Recordings can be stored locally or centrally (or both) without the need for archive media. Whilst PACE still necessitates archiving to removable media, many industries are now moving away from this requirement, thus vastly reducing costs. For more information on how PACE might be amended see Appendix A. AudioSoft can advise on both local and central storage options. Please ask for our white paper, "Network and Mass Storage for Evidential Requirements".

### Advantage 4: Reduced maintenance costs

Digital recorders can benefit from Commercial Off-The-Shelf (COTS) PC technology and the low maintenance costs that this brings. Digital recorders can be configured to have no moving parts so lower probability of failure, which also contributes to the low maintenance costs. With tape parts becoming harder and harder to source, the reduced maintenance costs of a digital solution mean a quick return-on-investment.

### Advantage 5: Reduced media costs

DVDs and digital media such as Blu-ray are the future for recording whereas the costs of tapes are likely to rise as their availability becomes less and less; already some organisations are struggling to source tapes to use in their old analogue

recorders. Furthermore the voice storage per DVD is more than two hours and blu-ray significantly more, which allows for efficient movement of data, e.g. to a transcription house.

### Advantage 6: No loss of quality and easy distribution

Each time a tape is replayed the quality worsens, until eventually the tape will be degraded beyond use. This is of particular importance to transcribers, when a recording may need to be listened to many times to achieve an accurate transcription.

As well as taking longer to copy, any tapes that are made from the original will be of lower quality than the original as the sound is not transmitted perfectly from one tape to another. A copy of a copy is even worse and the speech may be unrecognisable causing significant problems for transcriptionists.

Replay and copying of a digital recording is perfect every time (since there are no physical parts to scratch or damage) meaning that transcription times and costs can be reduced and the accuracy can be increased.

Because of the problem with tape degradation, transcription companies now often charge more for transcribing from a tape than from a digital recording. Another feature that can ensure a high quality recording is an on-line Signal-to-Noise Ratio (SNR) computator; this ensures a good quality voice signal is being received by the recorder making for greater clarity in replay and quicker (and potentially cheaper) transcription.

### Advantage 7: Centralised management of recorders

Advanced digital recorders can be managed from a web-based interface anywhere, anytime with functionality such as:

- ▶ Centralised management
- ▶ Reduced installation time through self discovery
- ▶ Time synchronisation to ensure evidential trail
- ▶ Alarming for quicker reporting of problems
- ▶ Easier maintenance scheduling

This allows managers and administrators peace of mind and reduced workload when looking after the recorders; one person can look after many recorders. Both the recorders and the product can be managed efficiently with timely maintenance and prompt alerts (e.g. through e-mail or SMS) to any potential issues.

### Advantage 8: Single system for synchronised audio and video

Video recording is becoming increasingly important in interviews, both for suspect interviews and vulnerable witnesses, a category that now encapsulates a significant portion of the population. It is essential to choose a recording system that is capable of both audio and video recording. When video recording, it is of high importance that the video is lip-synchronised with the audio in order for the recording to be legally admissible. A picture-in-picture recording can be made with a digital system to show

both the whole interview room and a close-up of the interviewee's face, as recommended in [5].

### Advantage 9: Quicker transcription time

There are modern tools that allow for quicker and easier transcription, reducing transcription costs and the time to court. Digital recordings can be manipulated with a foot pedal and integrated with a word processing toolbar such as Microsoft Word™, allowing the transcriber to manipulate the recording easily, insert time and case information, loop and bookmark, etc.

Automated speech-to-text transcription tools can also be used to reduce the cost of human transcription. Audio analytics can be used to search on key words or phrases to quickly find vital information in lengthy cases.

### Advantage 10: Secure integrated workflow management

The transcription workflow can be run most efficiently through web management to save time and money. The recordings can be linked in with notes taken during the interview, either inside or outside the interview room depending on the particular scenario, to allow efficient bookmarking of crucial events within the interview.

Both human transcriptionists and automated processes can be allocated by managers, allowing easy monitoring and control of both in-house and external systems. Case numbers and version numbers can be handled carefully to ensure that this system works efficiently for your service's requirements, reducing costs and reducing time to court.

Automatic built in testing and security restrictions (such as only allowing the case officers access to their own recordings) can ensure both reliability and security of recordings.

## Section 5: Example Return on Investment

To assess the return on investment that could be made from changing from analogues tapes, most organisations calculate how much they currently spend on tapes, the maintenance of tape systems and other direct costs that are affected. Below is an example from where upgrading to a digital recording solutions has offered significant financial savings.

### **ROI example – Organisation X**

#### **Background**

Organisation X had 50 interview rooms and had for a long time accepted using tapes as the only option available for recording but had become aware of the benefits of moving to a digital interview recording system.

#### **Business Objectives**

Organisation X needed to satisfy two key business objectives through the introduction of a digital recording system:

- ▶ Ease of movement of recordings
- ▶ Protection against obsolescence of tapes

These business objectives needed to be achieved along with a quick return on investment.

#### **Assumptions**

As in any example, in order to calculate a useful measure of ROI, a number of assumptions must be made:

- ▶ Of the 50 interview rooms, 46 were audio only and 4 were audio and video
- ▶ 2 channels of audio needed recording per interview room
- ▶ In the 4 rooms that needed video recording, this was one channel of video in a picture-in-picture format
- ▶ £0.99 per 2 hour audio tape
- ▶ £0.99 per 2 hour VHS cassette
- ▶ Each interview room is in use for 4 hours per day, 200 days per year; this equates to a total of 146,000 audio hours per annum and 11,680 video

It is assumed that of the three copies of the interview:

- ▶ One would be handed to the suspect immediately – no costs involved
- ▶ One would be couriered to a central location and then to court – two movements – costs cannot be changed
- ▶ One would be couriered to typing pool, then on to transcription company, then back to typing pool, then back to investigative officer or central location – four movements – costs can be eliminated by secure digital transfer

Courier costs had been £300,000 per annum (this is a large figure but equates to just £120 per interview room per week) and could be reduced to £100,000 per annum through the above reductions.

## ROI example – Organisation X (continued)

### Cost Analysis – Investment

Organisation X moved to a digital solution which creates a master and working DVD and also archives to a SAN storage solution with integrated workflow management:

Item	Price	Quantity	Total
Audio only recorder	£4,000	46	£184,000
Audio and video recorder	£8,000	4	£32,000
Installation, training & commissioning	£1,000	50	£50,000
SAN devices	£20,000	-	£20,000
Initial investment:			<b>£286,000</b>

### Total cost savings

Before	(p.a.)	After upgrading	
Audio cassette tapes	£39,600	DVDs	£4,000
VHS cassettes	£3,168	-	-
Manpower in handling tapes	Unknown	No tape handling	-
Tape carousels	£10,000	No tape carousels	-
Courier costs	£300,000	Less courier costs	£100,000
Paper-based workflow management	Unknown	Integrated workflow management	Vastly reduced
Logistic costs, management costs, copying costs	Unknown	Integrated workflow management	Vastly reduced
Annual savings:			<b>£248,768</b>

### Benefits

- ▶ Return on investment in just over a year; then £248,768 saving per annum plus additional indirect cost benefits
- ▶ All recordings could be transferred across the WAN when required, both by an automated archiving process for storage and by operators (with the appropriate access) using a web-based interface from any of the 50 sites for replay
- ▶ Reduced storage costs – at some point (if PACE is amended) Organisation X may choose to move all archiving to fixed storage, which is significantly cheaper than removable storage
- ▶ Archiving software performed a Cyclic Redundancy Check (CRC) to ensure the integrity of the archived recordings
- ▶ All the recordings are stored centrally so search time reduced to a few seconds
- ▶ Reduced couriering of data and so reduced risk of data loss
- ▶ Audio and video could be synchronised and exported to a common format (such as .avi or .mpeg) along with associated notes
- ▶ Automatic SNR check ensures high quality of speech is recorded

When all of this information had been taken into account, it became apparent to the organisation that, in fact the direct cost savings and indirect manpower benefits were sufficient in the first year alone to justify the investment in digital recorders. Moreover the organisation enjoyed many other business benefits from the change in recorders, including quicker and easier transcription and reduced time to court.

## Section 6: Summary

Over the last fifteen years there has been a gradual move to digital recording solutions to reduce costs and improve functionality.

There is now an urgent need to move away from analogue tape recording due to the unavailability to the tapes themselves and spare parts for the recorders.

Digital recording is a mature technology for interview recording (in accordance with PACE). The key benefits are:

- ▶ Replay whilst still recording
- ▶ Live monitoring from outside the room
- ▶ Central storage for quick access
- ▶ Reduced maintenance costs
- ▶ Reduced media costs
- ▶ No loss of quality and easy distribution
- ▶ Centralised management of recorders
- ▶ Single system for synchronised audio and video
- ▶ Quicker transcription time
- ▶ Secure integrated workflow management

It is straightforward to construct a business case for upgrading to a digital recording system that gives a quick return-on-investment as well as all the above benefits.

Will PACE be amended to allow networked interview recording? See Appendix A.

## References

- [1] Police and Criminal Evidence Act 1984 (PACE) and accompanying Codes of Practice, Home Office, accessed 21<sup>st</sup> May 2008,  
<http://police.homeoffice.gov.uk/operational-policing/powers-pace-codes/pace-code-intro/>
- [2] “Achieving Best Evidence in Criminal Proceedings: Guidance for Vulnerable or Intimidated Witnesses, including Children”, Home Office, 2002, accessed 21<sup>st</sup> May 2008,  
<http://www.homeoffice.gov.uk/documents/achieving-best-evidence/guidance-witnesses.pdf?view=Binary>
- [3] “Memorandum of Good Practice”, Home Office, 1992
- [4] “Speaking up for Justice”, Home Office, 1998, accessed 21<sup>st</sup> May 2008,  
<http://www.homeoffice.gov.uk/documents/sufj.pdf>
- [5] “Visual recording of evidence within the Criminal Justice System – Equipment Specification”, Private Standard CJS2004, 2004

## Appendix A: A change in PACE?

Section E of the PACE guidelines were changed, with effect from January 31<sup>st</sup> 2008, to allow a trial of networked interview recording at Lancashire Constabulary, Eastern Division.

Lancashire Constabulary are currently running a trial of networked interview recording. The recorder still needs to be in the room but a network connection allows the recording to be stored onto a secure digital network. No tape, CD or DVD is produced at the interview though the recording needs to be made available to the suspect on request (likely to be on CD or DVD but could equally be provided in an alternative manner). The interviewer has to enter digital identifier to commence recording and then provide the appropriate case reference for the interview. For a pause in the interview where the suspect doesn't leave the room, the interviewer needs to stop recording but then continue with the same file. The interviewer must save the recording in the presence of the suspect.

It is the author's opinion that this trial is a precursor to a change in PACE legislation, should the trial be successful of course. Such an amendment that allowed all constabularies to be able to record interviews to a secure network rather than to removable media will bring the following benefits:

- ▶ Vastly reduced storage costs; no more removable media or storage carousels
- ▶ No more archiving problems, such as faulty tapes or DVDs that won't finish
- ▶ Courier costs are removed; £300,000 per annum is one constabulary's costs
- ▶ Reduced risk of data loss, avoid the bad publicity that comes with a missing disk

The trial is of audio only though it is the author's opinion that video will play a greater role in interview recording in the future.

It is by no means certain that PACE will be amended to allow network recording but if it is then the benefits will be significant. Speak to your interview recording provider to discuss what the implications could be for your organisation.