IDENTIFICATION STANDARD

• What is the purpose of an Identity standard
• How are Identity levels established
• The primary differences between Analog and IP images for Evidence standards
• Design cost effective solutions that work to a predicted result of identification ... every time
• Prove results with professional tools
Analog Standards for CCTV

- Analog “Best Practices” for Identification have been defined for 25 years
- Analog ID standards are based upon Video images with 285 to 325 horizontal lines of resolution
- Analog ID standards will not work with IP or Digital based images

Identity standards insure that every image is defined to the point of the application’s needs or requirements.
Identity does not infer that the object of recognition is always a human but rather that the object of concern is identifiable onto itself after the fact.

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ANALOG STANDARDS OF ID

• Analog standards of ID were recognized and established in the late 1990s as video gained importance in the prosecution of crime.
• Four levels were established as based upon the average resolution of video playback
  – Detect – 10% of the overall frame size
  – Observe – 20% of the overall frame size
  – Recognize – 50% of the overall frame size
  – Identify – 100% of the overall frame size
Analog Standards for CCTV

- 10% Detect
- 25% Observe
- 50% Recognise
- 100% Identify

VISUAL EVIDENCE

- Visual evidence is broken into three categories.
  - Personal Identification
  - Action
  - Scene
- Each category of evidence is established at the point of design of the system and application.
Evidence: Three Forms of Visual ID

• **Personal**
  • Relates to the visual information pertaining to the personal identification of the main criteria of the scene
    • May be a person
    • May be a very small object
    • May be a fixed object

Personal ID

Based upon the International Association of Chiefs of Police (IACP), the object of Personal Identification should take up at least 1/10 of the overall scene!
Evidence: Three Forms of Visual ID

• **Action**
  • Relates to the visual information pertaining to the action of a crime or incident.
    • It is important to have the complete action of an incident.
    • Without the action, the personal Identification may leave you with circumstantial evidence.

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Action ID

Based upon the International Association of Chiefs of Police (IACP), the object of *Action Identification* should take up at least 1/20 of the overall scene!
Evidence: Three Forms of Visual ID

- **Scene**
  - Relates to the visual information pertaining to the overall individuality of the scene.
  - Providing proof of a crime or incident may prove to be inadequate if you cannot properly document the location of the incident.
  - All visual scenes within the confines of a single camera system must be able to stand out on their own from an area identification perspective.

Scene ID

- Each individual scene within a camera system must stand out on its own from a perspective of visual recognition!
Detect

Observe
Recognise

DEFINING RESOLUTION
What determines detail in an image

Analog and Digital
Analog Resolution

- Analog is determined by number of Pixel Points as created by the intersection of horizontal and vertical lines of resolution
- Only as good as the weakest link in the system
  - Analog switching equipment
  - Analog recording equipment
  - Signal loss over long distance cable runs

Analog Resolution

- Analog resolution is measured by the number of horizontal scan lines in the image
- The more lines, the better the resolution
- TV = 325 HL
- CCTV Ave. = 350 HL
- CCTV Low = 250 -
- CCTV High = 425 +
Digital Resolution

- Digital resolution is determined by the number of Pixel Points as created by the grid pattern of the Charged Coupled Device (CCD).
- Only as good as the weakest link
  - Compression Schemes
  - Pixel resolution at the point of objective surveillance area
  - Storage capacity and storage compression scheme
  - Quality of resolution of the viewing screen

Digital Resolution

- Digital resolution is determined by the number of Pixels creating a grid pattern.
- The more pixels, the better the detail of the image, the better the resolution
  - 640 X 480
  - 1280 X 960
Resolution

Resolution becomes most important when expanding or enlarging the image:

1. Analog pixels and the spacing between Pixels enlarge or expand at the same ratio allowing for extensive enlargements prior to picture deterioration.
2. Digital pixels are fixed squares of color and only expand to a fixed degree before overlapping each other and causing Pixilation of the image.

Analog and Digital Resolution

- Analog Video is based upon a sensor and screen ratio of 4:3.
- The larger you expand an Analog image, the further away from the image you must stand to dissemble what is being seen.
- High Definition (HD) Digital Video is based upon a Mpix sensor and screen ratio of 16:9
- Most modern Mega-pixel and some IP based cameras will offer both 4:3 or 16:9 ratios.
- With Digital images, once you go beyond the ability of the viewing pixels to expand without overlapping, it makes no difference how far away from the image you stand … it will be out of focus or beyond distinction.
1st of 3 Ways of Referencing Digital Resolution

The most Common Digital Resolution Reference is the grid size ...

4 CIF = 704 x 480

Note: it is very important that the camera and viewing screen specification sheets refer to “Active” or “Effective” pixels or provides a percentage number representing the amount or number of inactive pixels in the CCD (Imager).

2nd of 3 Ways of Referencing Digital Resolution

The Second most Common Digital Resolution Reference is the total Pixel Count ...

4 CIF = 704 x 480

Or

337,920 Pixel Array

Note: it is very important that the specification sheet refer to “Active” or “Effective” pixels or provides a percentage number representing the amount or number of inactive pixels in the CCD (Imager).
3rd of 3 Ways of Referencing Digital Resolution

The third most Common Digital Resolution Reference is to reference the imager size:
2 Megapixel or 5 Megapixel

Note: This is the language of the Mega-pixel camera and the personal camera. The larger the number of pixels available to the image, the better the definition.

Again, it is very important that the reference size of the imager is to the “Active” or “Effective” Pixels only.

1.3 Mega-Pixel Camera Grid

1528 Horizontal Pixels

Pixel Point
In-active Pixel
Horizontal Row
Vertical Row

The above is based upon an aspect ratio of 16:9 (1.78 HD)

How to Evaluate What You Need

Obvious
• Choose your areas of coverage
• Verify points of view
• Do not overview an area just because you can
• Learn the language of the equipment that you are reviewing
• HD cameras are the current thing but are often restricted on features
• Mega-pixel are full of features but have many proprietary features that must be tolerated or designed around.

Obscure
• High Density (HD) or 1080p is still mega-pixel but in a 16:9 ratio of view
• High density concentrates on resolution in a defined area
• HD has progressive scanning as opposed to single image production
• Mega-pixel concentrates on area coverage with a defined resolution
• Both technologies can be high resolution by restricting the width of the view
Why HD or Mega-Pixel

Man at 50’ 4 CIF

Man at 50’ 2 Meg-Pixel

Man 150’ 4 CIF

Man 150’ 5 Mega-Pixel
Resolution

CIF = 320 x 240

4 CIF = 640 * 480

4 CIF is the equivalent of making the same image twice as wide and twice as tall but as a single image with 2 times the horizontal and 2 times the vertical resolution. The net result is critical detail in the image for after the fact identification.

Resolution – Mega-Pixel

16 CIF = 1280 * 960
Resolution determines the detail of the image... CIF resolution is great for general images, but not for detail if trying to identify images of small objects/persons at any distance.

CIF Resolution at 10 times expansion for playback

Resolution determines the detail of the image... 4CIF resolution is great for general images, and for detail if trying to identify images of small objects/persons at general distances.

4CIF Resolution at 6 times expansion for playback
Resolution determines the detail of the image... 16CIF (5 Mpix) resolution is great for all images, but eats up storage space at tremendous rates so needs to be used sparingly.

5 Mpix Resolution at 4 times expansion for playback

DIGITAL STANDARDS OF ID

- Digital Standards of recognition are still in flux and are being verified via world wide testing.
- With Digital resolution there are seven levels recognition established as based upon the number of pixels per foot (PPft) available to describe the object of identification.
  - Monitor - 7 PPft at the point of focus
  - Detect – 11 PPft at the point of focus
  - Observe – 18 PPft at the point of focus
  - Recognize – 35 PPft at the point of focus
  - Identify – 46 PPft at the point of focus
  - Facial Identification 88 PPft at the point of focus
  - License Plate Identification 70 PPft at the point of focus

Remember: The associated PPft listed are becoming accepted as a guide. The Standard is in process of development working off the same guidelines, but with the necessary testing required to fix a final PPft standard.
CCTV Evidence
Proving the final product

- Over the past twenty years, two different video verification dummies have been developed and made available to the security industry.
  1. Rotakin
  2. Norman

Operational Requirement
Operational Requirement

NORMAN

CAST
Centre for Applied Science & Technology
(HOSDB)
Facial ID
400% Analog
88 PPft Digital

Testing CCTV Systems

- The Challenge
  - Simple ‘Pass/Fail’ testing
  - Tests that reflect real world application
  - Test that users have confidence in, and understand
  - For small installations as well as large
  - Portability

Target may fill the screen yet still be poorly resolved
Testing CCTV Systems

Set 1: Person Identification
Test designed to allow systems to be tested specifically on their ability to provide useful facial imagery.
Testing CCTV Systems – Solution

• Set 1: Person Identification
  • Coarse detail
    • Hair
    • Face shape
    • Skin colour
    • Visible on lower quality CCTV images
  • Fine detail
    • Eye colour
    • Facial characteristics
    • Can only be differentiated on higher quality CCTV images

Design Rationale

Need to discriminate between good, poor, and inadequate systems
LIGHTING IS ALSO PART OF THE OVERALL IDENTIFICATION PROCESS

Don’t fight the impossible fight ... design around your lighting needs!
Number Plates
Tavcom recommend

- A typical number plate is 520 mm in length
- A typical family saloon is 1.5 metres wide
- With the full width of a vehicle filling the CCTV monitor, the number plate will occupy a third of the screen.

Testing CCTV Systems – Solution

Set 2: Number plate / Text Identification

Test designed to allow systems to be tested specifically on their ability to provide useful images of text/number plates/vehicle livery.

This is not designed to work with ANPR systems.
QUESTIONS?

Thank you for the opportunity to be of Service to you ...

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