

Building a Business Case for 4K Video Surveillance

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In the business world, video surveillance has often been considered a necessary cost of doing business. Initial investment in any new system comes out of a company's capital expenditure and 'returns' can be difficult to calculate mainly if it simply works to deter crime, or prevent loss in the retail sector for example. Managers have had the difficult challenge of justifying an investment without having a hard target for Return On a new system's Investment (ROI).

But increased quality and resolution of these systems increases the value of that investment and the potential return it can provide. An investment in a CIF resolution video system may only guarantee a deterrent effect. However, if you are a victim of a crime you run the risk of not being able to identify the perpetrator with this type of system. By contrast, an HD system makes positive identification much more likely.

With the advent of 4K, offering four times higher the resolution and pixels on target than HD, you can expect to increase the value of your system's investment further still. More pixels on target, combined with content analytics, offers the potential for genuine calculation of ROI in terms of:

- Increased effectiveness of loss prevention programs
- Increased security with higher chance of identifying perpetrators post-incident
- Increased operational efficiencies and security guard productivity
- A host of other application-specific benefits— such as preventing the need to pay out on fraudulent 'slip and fall' or 'accident at work' claims against your company

Just as 250 pixels per metre is becoming the standard for facial recognition in the UK and the rest of EMEA; in the United States the Security Industry Association recommends 80 pixels per foot for a host of video systems tasks. Automatic Number Plate Recognition (ANPR) and facial recognition have long been associated with higher image resolution requirements. However, a number of other video content analytics-based applications demand higher specification systems to deliver to their full potential.

Once a video task has been identified, the additional resolution provided by 4k cameras can help reduce the number of cameras needed and ensure the fastest possible payback of initial outlay. For example, in an airport immigration queuing area that is 64 feet long, or about 20 metres, where facial recognition is required at 80 pixels per foot, the pixels across required to cover the area is 5,120. So in order to cover that area with HD cameras (1920 x 1080 pixels), you would need three cameras ($5120/1920 = 2.7$ cameras).

However, if you instead specified use of Ultra HD 4k cameras (3840 x 2160), you would be able to cover the whole area with just two cameras ($5120/3840 = 1.33$). This reduction in the number of cameras can be replicated across all applications in which the demanding task of 'recognition' is required if 4k cameras are used instead of a larger number of lower quality cameras.

Another way to look at it is shown in the images below. With an Ultra HD 4k camera it's easier to get the required 250 pixels per metre than with an HD camera. In this case with a 9mm lens on an HD camera positioned 15 metres away, you can only get 189 pixels per metre (see image on the right); while with an Ultra HD 4k camera together with the same lens from the same 15m distance you can get nearly twice as much detail - 302 pixels/metre (see image on the left).

Verizon
5:17 PM

Theia Lens Calculator

Camera: Ultra HD 1/1.7"

Lens: SL940 9mm

Focal Length: 9mm to 40mm

Object Distance: 15 m

Res: 302 pix/m FOV: 12.7 m

Verizon
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Theia Lens Calculator

Camera: 1080 HD 1/2.7"

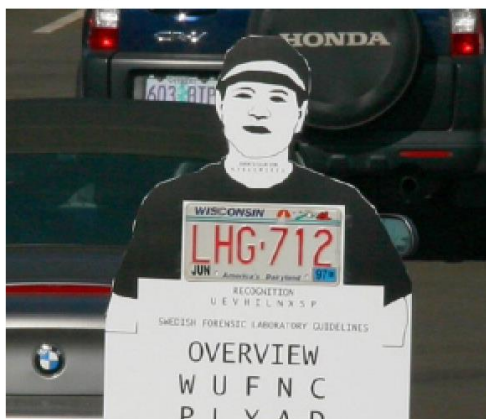
Lens: SL940 9mm

Focal Length: 9mm to 40mm

Object Distance: 15 m

Res: 189 pix/m FOV: 10.2 m

Image resolution simulation



Digital Zoom 1 X

JPEG Quality

1

Field of view simulation

Image resolution simulation



Digital Zoom 1 X

JPEG Quality

1

Field of view simulation

4K resolution-based installations can also unlock cost reductions in direct security operations, further supporting ROI. For example, one US Fortune 500 company was able to deliver a 33% reduction in its video systems' running costs. They calculated cost of use in terms of man-hours required to retrieve and review event footage. With a higher resolution video system, not only were they able to reduce the man-hours required for this activity, but also cut the cost per hour of running the system.

The reduction in man-hours was achieved because the higher resolution system enabled the use of more video content analytics software to automate the review of the system footage. Put simply, analytics algorithms find higher quality images easier to process. They become more accurate and reliable in spotting anomalies as a result. The cost per hour reduction was achieved by reducing guard headcount since, as routine monitoring tasks were being automated, fewer staff were needed to follow up on only pre-qualified abnormal behaviours and events.

In manufacturing operations, high resolution video surveillance systems are being deployed to serve multiple department heads responsible for areas as diverse as security, health and safety monitoring, quality control and operations. Such systems can be used to provide video evidence to resolve conflicts in a worker's compensation claim; monitor staff behaviour to a level where managers can intervene early enough to prevent accidents and manufacturing errors; as well as verifying workers' hours – most of which require (or would be greatly facilitated by) higher resolution 80 pixels per foot systems. In one US manufacturing plant, supervisors documented a 20% increase in productivity from better supervisory monitoring of the shop floor, warehouse and delivery areas, using a new high resolution video system.

Traditional loss prevention applications such as Point Of Sale and cash till monitoring, remain strong applications for high resolution systems such as 4k, with camera count reduction being an obvious win in terms of cost of acquisition and system maintenance. In one major UK retailer, clever deployment of high resolution cameras, video management software and analytics nearly halved its shrinkage from 0.81% to just 0.44% within the first two years – which translated into hundreds of thousands of pounds of savings. In so doing, the number of employees caught in the act increased five-fold.

But high resolution video surveillance systems are also being used increasingly to aid in corporate cost and risk avoidance as 'ambulance chasing' law firms continue to step up their efforts to build accident and negligence claim-linked revenues on both sides of the Atlantic.

On one law firm's website potential clients are alerted to the weaknesses of shopping mall owners, with article titles like "If a Florida mall's carelessness caused my shoulder surgery, is that a good case?", providing a list of 86 factors that might affect their claim.

AllLaw.com advises that if you slip and fall or are otherwise injured in a store, you may have a valid legal claim against that business because *Businesses that welcome the public onto their premises have a legal duty to keep them 'reasonably' safe*. As indicated in a white paper by one camera company we work closely with, cases of judges dismissing cases in which video surveillance was the primary evidence due to insufficient image detail are becoming more common. They also assert that if an organisation has cameras installed and evident, they have provided 'intent' to protect.

The public then has an expectation of protection and if this intent exists, there is liability associated with it. With at least one claim paying out \$15 million to a Colorado 'slip and fall' claimant, the stakes are high. While a 4k video system will not allow owners to escape responsibility for legitimate claims, it



can provide peace of mind and valid evidence where claims are fraudulent or spurious. Reduced legal payout bills can be included in ROI calculations.

Finally, by bringing together 4k, analytics, cloud storage and 'big data', it becomes possible to deliver concrete and accelerated ROI in a more consistent manner. 4K video data, combined with these technologies will enable data from various sources to form a powerful source of business intelligence.

A 4k video system can be used to monitor a shop's aisles for loss prevention and the same video data can be mined to help understand consumer behaviour via 'heat mapping' analysis of traffic patterns, people counting, etc. The resulting intelligence can be used to develop tools to increase sales such as targeted sales promotions, queue management, improved store layouts, etc.

Justifying an investment in 4k video becomes easier when you include traditional loss prevention, operational cost reductions and efficiencies, and potentially now - top-line revenue increases from better merchandising and store management. Of course the cost of implementing these new systems also increases.

So to make a strong business case, managers will still need to funnel investment towards the areas where they see the highest risk of losses. To this end, securing areas where there is significant risk to human life or high value assets are two clear areas where we anticipate early adoption of 4K: power plants, chemical plants, airports, stadiums, casinos and banks for example. In addition, managers across any large organisation can share the system to realise benefits in multiple departments and build an ROI story much quicker as a result.