White Paper

Maximizing the value of your IP security system

Leveraging Total Cost of Ownership (TCO) and Return-on-Investment (ROI) for better business decisions

AXIS COMMUNICATIONS

Executive summary

Total Cost of Ownership (TCO) is an established concept in many industries as a tool to estimate costs across a system's lifecycle. Return-on-Investment (ROI) is another recognized model, used to calculate the gains of an investment in a new system.

In this paper, we further explore the TCO model first presented in an Axis paper from 2016. We refine the TCO concept by introducing the cost of risk. We define ways to use the TCO approach to compare different systems, looking at costs for procurement, deployment, operation and risk, across the complete lifecycle of the system. We also introduce the concept of value created by the system. By weighing the expected value of the system against the total cost, it is possible to estimate the ROI of the system during its lifespan.

We look closer at three case studies where the TCO and ROI concepts have been used to analyze real video surveillance installations – ranging from a 40-camera installation up to 1,500 cameras. The studies show great variation in the TCO distribution, highlighting the importance of looking at each project case-by-case. In terms of ROI, the cases presented show a significant return with a break-even occurring very quickly during the system lifecycle.

TCO and ROI are useful tools when calculating projects or assessing tenders. They indicate areas to focus on to reduce costs, they give a foundation to compare tenders from different vendors, and they allow decision makers to better understand the complete costs and value they can expect from an IP security system.

Table of contents

1. Introduction

1.1 The TCO concept for IP security

Total Cost of Ownership (TCO) is a well-established concept in many industries, not the least in IT, as a way for strategic buyers to move beyond looking at the upfront price to understanding all costs associated with procuring, deploying and operating a system.

In an Axis white paper from 2016, we presented a model for Total Cost of Ownership in IP security. We defined TCO in our context as:

Quantify a selection of relevant costs associated with a video surveillance solution throughout its complete lifecycle.

We also presented an overall structure of a TCO where the costs are divided into three main categories: total cost of acquisition, total operating cost and total decommissioning cost. See Figure 1.

We also presented how the TCO model could be applied to an example project. The project was an enterprise 1,500-camera city surveillance deployment. In this theoretical example, acquisition costs represented 67%, operating costs 31% and decommissioning costs 2%.

1.2 How a TCO can help buyers

Over the past year, from working with the TCO approach at Axis, we can see two clear benefits for adopting TCO when buying products:

1. The TCO allows you to look closely at your long-term commitment with the system and identify areas of improvement. For example, if the TCO shows that labor costs in operation make up a large share of the costs, perhaps it would be worthwhile to look at automating certain processes.

2. The TCO creates a better foundation for comparing proposals from sellers and making a more informed decision. Instead of focusing only on negotiating the upfront price, you can see how to reduce your total cost of ownership, and challenge vendors about other costs that the system will incur – costs that are probably as big as or even bigger than the initial price. For example, in the article "Total Cost of Ownership: Factors to Consider" from 2015, Intel stipulates that 70-80% of the cost of an IT system comes in the support phase.

Total cost of acquisition

> Pre-contract costs
> Contract costs
> Deployment costs

Total operating cost

> Overhead costs
> System operation costs
> Maintenance costs
> System failure costs
> System redesign costs

Total decommissioning cost

> Decommissioning costs

Figure 1. TCO model: costs during the lifecycle

1.3 Using TCO for better business decisions

To understand the usefulness of TCO, let's look at the simple example in Figure 2. A buyer is considering two different systems: vendor A and vendor B. Vendor A is a premium supplier, with a higher upfront price but more long-term reliability, while vendor B is a lower-cost option with less focus on quality and operation. In the graph to the left, only price is part of the picture, and clearly B offers a lower price.

Figure 2. Cost comparison between two systems, factoring in different aspects

In the middle graph, deployment costs such as installation, training and project management have been added. Let's assume that A can demonstrate that its system can be installed faster and requires less training. For example, vendor A offers more advanced design and installation tools that speed up deployment. Or vendor A's products come out-of-the-box ready to mount, while vendor B's products are shipped in pieces that need assembly. The total costs are now similar for A and B, with a slight cost advantage for B. But it still only shows costs that occur during the first year.

In the graph to the right, we look beyond year one, across the whole expected lifespan of the system. We add operation costs, maintenance, failure and other ongoing costs. Let's assume that A provides credible argumentation that system A requires less maintenance, has a higher uptime, and lower power consumption. For example, vendor A could prove that the products are field-tested to work in the customer's environment, or provide case studies that demonstrate low failure rates. Now, the TCO shows that vendor B is more expensive over the lifetime of the system.

In the white paper "Unpacking best value" from 2012, the authors present a case from SKF, which uses a similar model to explain the cost difference between competing solutions.

2. Introducing risk in the TCO

Over the years, the TCO concept has evolved and matured, and more factors have been brought into the TCO approach. Of particular interest to the security industry is the discussion around cost of risk. In the 2012 white paper mentioned above, the authors argue that costs associated with various risks are real and should be factored into any TCO decision. An illustrative example, quoted in the paper, is the toy company Mattel, which was fined USD 2.3 million for importing products from Chinese suppliers that violated US standards. In addition to the fine, Mattel had to recall 20 million products, not to mention the costs associated with the loss of consumer trust.

2.1 The cost of risk

Risk management is of course a science in itself, and your company needs to find its own method to assess the probability of various scenarios and the potential negative impact of those. But regardless of methodology, we would argue that the cost of risk should be considered as part of the TCO and thus impact the buying decision.

Here is a selection of risk areas that should be of particular interest to you when considering a purchase:

> **Risk of losing critical business data.** For example, if you have a camera system for loss prevention integrated with point-of-sales systems, you expect to get reliable video for each transaction. If the system goes down, and you have no video for your transactions, what are the costs?

> **Risk of cyberattacks.** What would be the cost for you if your system is attacked, leading to system downtime, loss of data, and, perhaps most damaging, lost customer trust?

> **Risk to your brand.** What would be the cost for you if it turns out your supplier is not meeting sustainability standards, whether in environmental, social, economic or ethical aspects? How would that impact your brand?

Let's assume that the buyer in our previous case has made a risk assessment and further qualified vendor A and B from a risk perspective, see Figure 3. In this case, vendor B is considered a greater risk for the buyer and the cost for that is added to the model in the figure below. Now, the arguments for vendor A are even stronger.

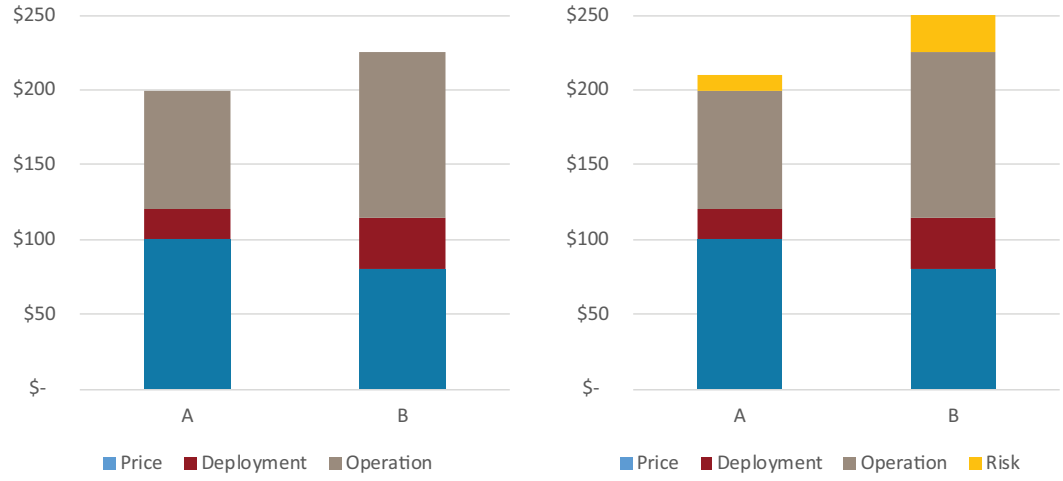


Figure 3. Cost comparison between two systems, adding the cost of risk

2.2 Five things to consider in the TCO

Working with TCOs might seem complex, but it does not have to be. We recommend starting small, with factors that you can quantify and that you believe are important, and then expand over time. Here are five steps to get started:

1. **Scrutinize price.** Take a close look at what's actually included in the price. Does one product require mounting accessories, while the other is out-of-the-box ready? Does one camera model need additional lights, while the other has enough light sensitivity to manage without?
2. **Look at key factors in deployment.** How easy or difficult is it to install the system? How easy is it to integrate with your existing systems? How much training will your staff need?
3. **Look at key factors of operation**: How much time will you need to spend on maintenance? What are the typical failure rates? Be on the lookout for costs appearing in other parts of the system – for example, an IP camera system will likely require you to expand your network and storage, so products with high bandwidth requirements will increase your costs. And what about costs for power consumption?
4. **Look at "hidden" costs.** For example, how easy will it be to change and adapt your system in the future? How much time will your staff spend on using the system? Are there freight or warehouse costs?
5. **Look at cost of risk.** What are the key risks with the systems? Even if you cannot fully quantify the cost of the risks, at least identify the risks and weigh them carefully into your business decision.

3. From TCO to ROI and customer value

Another great benefit of having a solid TCO calculation is that it forms the basis for estimating the value of the system, or the Return on Investment (ROI). As stated in the "Unpacking best value" white paper from 2012: "While the conventional definition of TCO is exclusively concerned with the cost side of customer value, the real power is that TCO provides a foundation for making best value sourcing decisions."

3.1 Why look at value?

The cost of your system is balanced against the expected benefit, or value of the system. What this value is depends on the industry, the customer, the application and many other factors. In the white paper "Total Cost of Ownership: Realizing Procurement's Full Potential in Value Creation" from 2016, the authors define value as, "a set of attributes and expectations meaningful to the organization; a fair return on investment."

In the security industry, there are some obvious values that most buyers would identify, such as reduced theft and vandalism. Other key benefits from an IP security or camera system can include increased – real or perceived – safety for citizens, customers or staff, and business and process improvements in for example retail and manufacturing industry.

3.2 Estimating value

To illustrate the role of value in relation to the TCO, let's revisit our simple case from above (see Figure 4). In the graph to the left, the TCO analysis showed that while system B had a lower price, system A had a much lower TCO over the lifecycle of the system, making it clearly the best choice from a cost perspective.

Now, let's assume that the buyer has analyzed the expected value from systems A and B, and found that system A will deliver a greater value over the lifespan of the system. For example, system A might offer tighter integration with the customer's existing systems (for instance, a point-of-sales system in retail) leading to additional revenue created. In the graph to the right, this is illustrated as the total created value from A and B respectively, and the difference becomes even clearer when we look closer at the resulting value after costs are deducted.

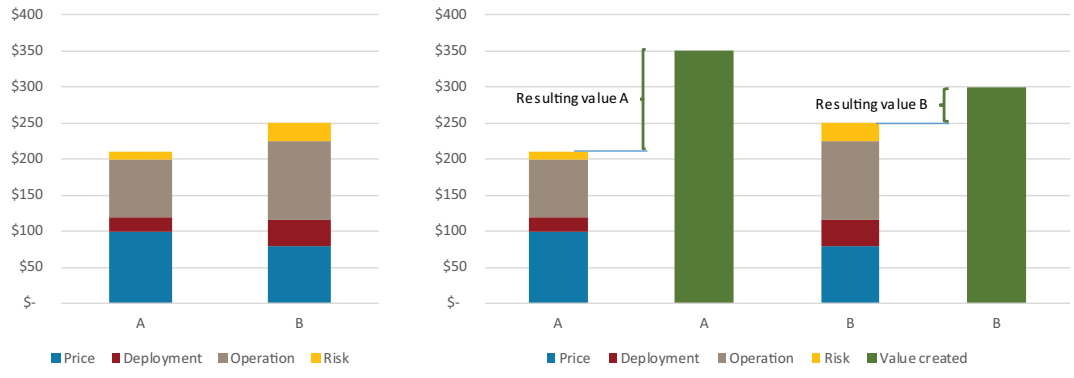


Figure 4. Cost comparison between two systems, adding the value created

With this information, it is also possible to calculate the expected Return on Investment (ROI) for the buyer with system A and B. ROI is typically expressed as a percentage, and calculated with this formula:

$$\text{ROI} = \frac{\text{Value from Investment - Cost of Investment}}{\text{Cost of Investment}}$$

In our hypothetical example above, the difference is significant. System A offers an ROI of 67%, while system B only offers a 20% ROI. The case for choosing system A is now even more obvious.

3.3 Which values are important to you?

In the security industry, it can sometimes be challenging to quantify the value of a deployed system, since many of the benefits are intangible. However, identifying the value is critical to create a reliable business case.

In the 2012 white paper quoted above, the authors list real world examples of how buyers have successfully used value criteria when procuring products and services, and how more or less intangible values have also been included – such as the sustainability, aesthetics, safety, diversity, competence and responsiveness demonstrated by the different vendors bidding for the projects.

In the white paper "The (Real) Price of Security Solutions" from 2016, the authors coin the term "security dividends" and argue for the importance of looking at intangible benefits that premium systems deliver: "An additional benefit of using high-quality security solutions is that they may increase business opportunities for a company. These sorts of intangible results can be described as 'security dividends'."

3.4 Vendors can help

If you find it difficult to quantify values in a buying process, a natural partner to turn to are the vendors. Vendors that have a long track record of providing complex products and services should have a good grasp on the typical outcomes and value their system can provide, and would likely be happy to engage in a value conversation.

Challenging vendors to provide good value argumentation, and scrutinizing case stories and testimonials from other customers that have implemented similar solutions, are good approaches to learn about the potential value of the system in question.

3.5 Five things to consider in defining value

Here is a way to get started on defining potential value:

1. **Identify which values are important to you**. Map the challenges and possibilities that you face. Speak to peers, investigate case stories, and challenge vendors to help you understand more of what you should expect from the system.
2. **Look at direct value.** What is the value created from increased loss prevention, decreased theft, minimized vandalism or prevention of burglaries?
3. **Look at indirect value.** Will your legal expenses decrease from reduced slip-and-fall claims? Can you re-negotiate insurance costs? Will a more robust security system decrease costs such as service disruption fees due to metal theft or security problems in public transportation?
4. **Look at value created in new areas.** Will you improve revenue in your retail stores due to store optimization solutions? Will traffic systems increase your income from parking fees?
5. **Look at important soft values.** Will your retail security system improve staff retention and customer experience? Will your school security system decrease bullying and help attract more students? Will your city surveillance solution contribute to reduced traffic congestion, minimized pollution and improved reputation among citizens, visitors and businesses?

4. Three case studies – Getting real with TCO and ROI

During the past years we have used the TCO and ROI approach to analyze a number of real installations. With the kind support and permission of key customers and Axis partners, we can present the long-term cost of ownership of these installations, as well as the value created by the IP systems.

4.1 TCO applied in a smart city installation

MUNICIPALIDAD DE VICENTE LÓPEZ

Vicente López is situated in the northern section of the greater Buenos Aires area in Argentina, with a population of approximately 300,000. In order to create a secure environment for its citizens, the local government has deployed a large video surveillance solution based around Axis cameras.

4.1.1 TCO for Vicente López

A TCO analysis was conducted in early 2017 of this 1,500-camera project, calculated over a 10-year expected lifecycle. The analysis revealed a TCO of around USD 29,000,000. The analysis shows among other things that about 34% of the total cost is mainly made up of investments in hardware and software, and 66% occurs during installation, maintenance and operation.

The largest costs are the system operating cost and the contract cost. Other relevant costs are the overhead cost and the maintenance cost, which all together make up for 15% of the TCO. The significant overhead costs in the TCO are mainly due to the continuous training of new personal (e.g. operators). The TCO cost distribution for the main categories of the system is shown in Figure 5.

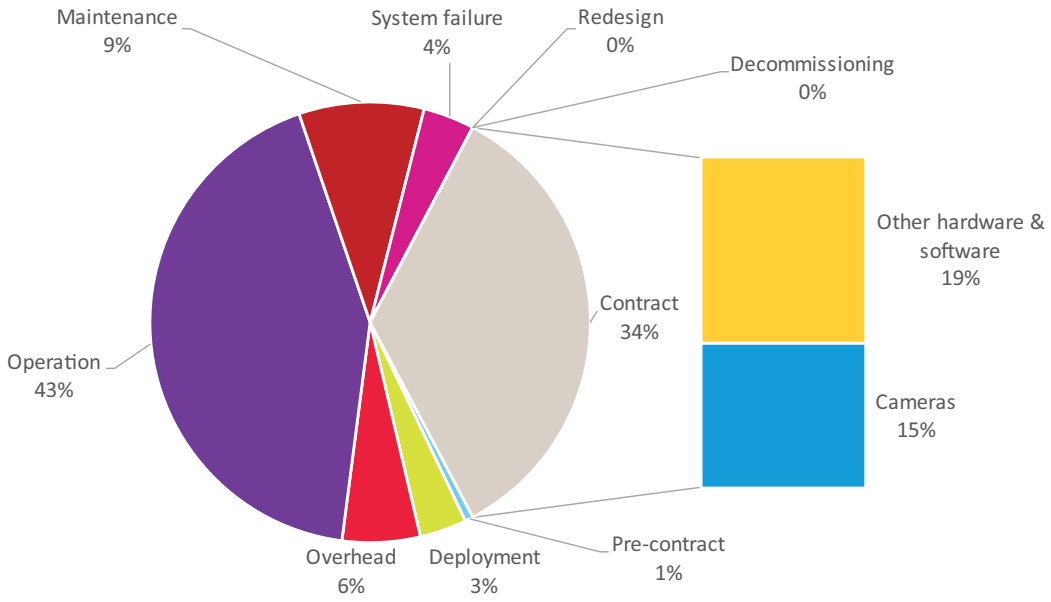


Figure 5. TCO for Vicente López.

4.1.2 Cost per system phase

Acquisition
Acquisition represents USD 11,035,000 or around 38%. The largest part of the acquisition phase is the initial product investment, also referred to as contract cost, which represents 34% of the TCO. More than half of that contract cost, or 19% of the whole TCO, is for video management software, network, storage, initial training and hardware other than cameras. The other half is camera cost, making up around 15% of the TCO for the system.

The other costs that occur during 'year zero' of the system in this model are pre-contract and deployment costs. Pre-contract costs include among other things system design and vendor evaluation. Deployment costs cover everything connected to installation, configuration and integration. Together, pre-contract and deployment costs account for around 4% of the TCO.

Operation
Operation represents USD 17,555,000 or around 62%. During operation of the surveillance system, a number of costs are incurred, the main one being system maintenance. This covers all planned and regular maintenance (cleaning etc.) of cameras, servers, software etc. Operation also includes costs due to system failure as well as software license fees and power consumption. System operating costs represent the single largest share of the TCO for this system, amounting to around 43% of the TCO (which includes not only the cost for monitoring the system but also electricity costs), followed by maintenance cost (around 9%) and overhead cost (around 6%), which includes regular training for operators, server room maintenance, insurance costs, etc.

Decommissioning
The decommissioning represents the third phase in our TCO model, and it is an important and often overlooked factor in the initial costing stage of a project. From a sustainability perspective, it is essential to properly dismount and recycle equipment at the end of its lifetime, and these costs should be factored into the system's lifecycle. In the TCO analysis for Vicente López, however, for simplicity, the decommissioning costs were set to zero.

4.1.3 Conclusions and observations for Vicente López

Some cost factors have not been taken into account, for example, the costs for alarm failures and costs incurred in the business operation due to system downtime. Some other costs, as mentioned above, are set to zero, like the decommissioning costs.

In the Axis TCO white paper from 2016, we looked closer at some technologies that can bring additional savings, such as Axis Zipstream for minimized storage and bandwidth. In the Vicente López case, we used the TCO to simulate the savings from introducing Zipstream in the cameras. The analysis showed a potential of saving USD 450,000 or around USD 300 per camera.

The benefits of the system include much faster response time for emergency staff, smoother traffic flow and overall a better sense of security for its citizens. Quantifying these benefits are of course challenging and the exact ROI difficult to determine – probably not unusual in a city surveillance project.

One additional benefit of the TCO analysis is that is has allowed the city managers of Vicente López to better forecast the costs of the system, and to have a concrete and constructive dialog with other decision makers in the municipality regarding budgeting and future expansion of the system.

4.2 Saving costs in the hotel industry

Christie Lodge is a hotel facility in Avon in the Rocky Mountains of USA. To protect its customers, staff and assets, Christie Lodge has deployed an AXIS Camera Station-based video surveillance solution with around 40 Axis cameras.

4.2.1 TCO for Christie Lodge

This TCO study of the Christie Lodge in Avon, Colorado, USA, was conducted in mid-2017. The system was initially installed in 2014, and the customer calculates a 7-year lifespan. Based on the time and money spent in preparation, installation, operation and maintenance of the system, the estimated Total Cost of Ownership for Christie Lodge will arrive at USD 91,000 over seven years. See Figure 6 for details.

About 54% (USD 50,000) of the TCO are acquisition costs and relates to planning, equipment purchase, installation and training. 44% (USD 40,000) of the TCO are operating costs covering operation, maintenance and failure. Around 2% of TCO (USD 2,000) were estimated as final decommissioning costs.

All in all, the system costs around USD 5,600 per year.

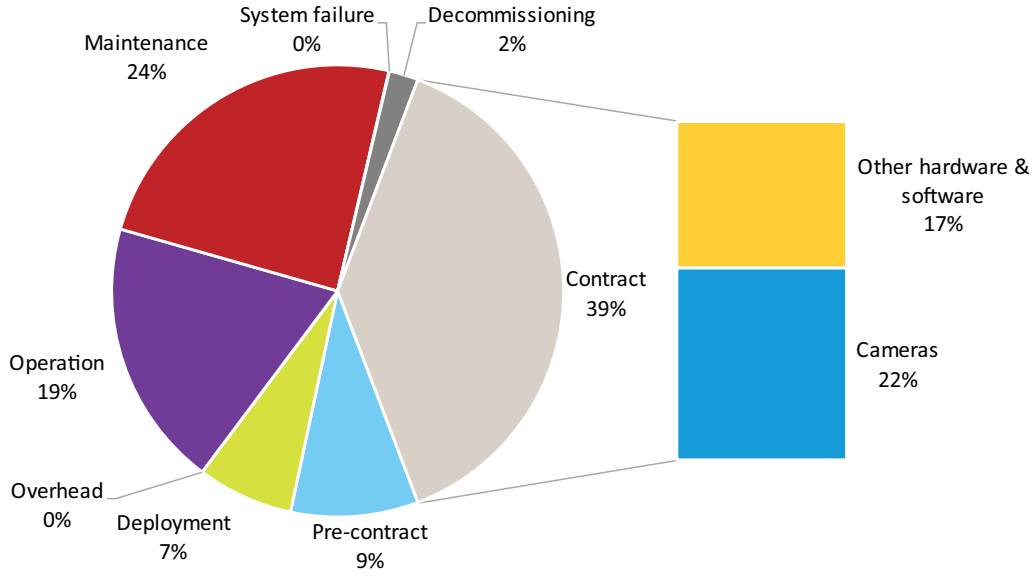


Figure 6. TCO for the Christie Lodge hotel facility.

4.2.2 ROI for Christie Lodge

Christie Lodge has experienced numerous benefits of its surveillance system. Staff feels more secure, and the video has been used to clear up a number of guest complaints, car incidents and even a couple of burglaries committed at properties bordering Christie Lodge. But the main savings for Christie Lodge has come from two sources: reduction of its rented security staff, and battling liability claims.

Before the deployment of the Axis system, Christie Lodge used to have a security person patrolling the site 16 hours per day, but with the surveillance system up and running they have reduced that to having a security guard on site for eight hours each night to guard the reception and walk around the property.

Furthermore, Christie Lodge is from time to time approached with liability claims. The typical cases are so called "slip and fall" cases where individuals claim to have slipped and injured themselves e.g. on carpets, in stairs, or in the parking lot; and then requesting compensation from Christie Lodge for medical expenses etc. Before the video surveillance system was installed, Christie Lodge had limited possibilities to question these types of claims. Now, however, the high-quality video allows them to look at each accident and separate the valid claims from claims that are more or less fraudulent.

Altogether, Christie Lodge estimates that they save around USD 40,000-USD 50,000 each year with the new system. This means that the investment paid off already at the end of second year of operation, creating an ROI at the end of year seven of no less than 257%. See Figure 7 for the ROI graph with a break-even during year two.

Figure 7. ROI for the Christie Lodge hotel facility.

4.3 Significant ROI from reducing retail shrinkage

RC Willey in Salt Lake City, USA, is a leading home furnishings retailer with retail outlets and distribution centers spread across western USA. They have deployed an enterprise video surveillance system with 800 Axis cameras, installed in stores and in the distribution centers.

4.3.1 TCO for RC Willey

This TCO study of RC Willey in USA was conducted in mid-2017. With a seven-year expected lifespan of the system, the Total Cost of Ownership for RC Willey will be around USD 1.39 million. See Figure 8 for a detailed break-down of the TCO.

About 76% (USD 1.05 million) of the TCO happens during acquisition and relates to planning, equipment, installation and training. 23% (USD 340,000) of the TCO covers costs for operation, maintenance and failure. Around 1% is an estimation of the decommissioning cost.

The yearly cost for running the system is slightly above USD 46,000.

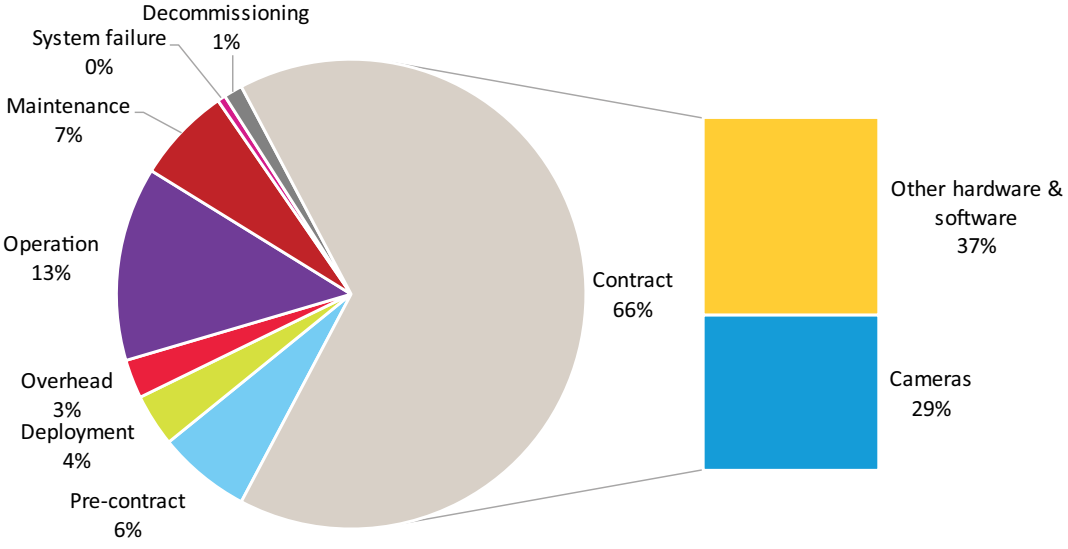


Figure 8. TCO for RC Willey furnishings.

4.3.2 ROI for RC Willey

The main savings for RC Willey from the video surveillance system comes from reduced shrinkage. They have experienced a drastic reduction in shrinkage, and the customer attributes that reduction primarily to the new camera system and its area coverage and high-quality video recordings.

In addition, RC Willey has used the system to mitigate litigation claims. As a successful retailer, they are approached every year with a number of substantial "slip and fall" claims, where customers claim that they have injured themselves in or around the stores. These claims can be as high as USD 100,000 or more. Thanks to the high-resolution video, RC Willey can now prove exactly what has transpired in each case. This has allowed them to battle false claims, and reach fairer settlements in other situations.

RC Willey estimates that the yearly savings from the Axis video surveillance system is around USD 5.7 million. With an upfront investment of USD 1.05 million and a yearly cost of USD 46,000 this means that the cost of the system is saved already in the first year, and the final ROI after seven year arrives at no less than 2,768%. See Figure 9 for the ROI for RC Willey.

Figure 9. ROI for RC Willey furnishings.

5. All cases are unique

As the cases show above, the TCOs are very different depending on the situation. There are no simple rules that state that a certain share of the cost is always products, or maintenance or something else. On the contrary, every project has a unique cost distribution, and it is up to each project to conduct a TCO analysis to capture that reality.

For the value of the system – the ROI – the differences are even more pronounced. In the city surveillance case, the benefits had not been quantified enough to make a complete ROI calculation. In the retail and hotel cases, the cost savings were clear and tangible, and it was possible to calculate an estimated ROI. In both these cases the ROI was very high, with a break-even arriving early in the lifecycle of the systems. However, it is worth noting the difference in magnitude between the cases.

6. Conclusions

TCO analyses are powerful tools that can help you better calculate the cost of a planned or existing system. TCOs and ROIs also help you estimate the value the system could deliver. Including a TCO and ROI perspective in your buying process can help you evaluate competing offers more reliably. For instance, the models can be used to determine if a high-quality solution that is more expensive upfront will save costs and deliver more value in the long term.

The case studies demonstrate that the TCO and ROI are different from situation to situation, even though both the hotel and retail cases show a high ROI where the systems essentially pay for their own costs within one or two years.

If you are interested in learning more about TCO or ROI, or to discuss your project requirements, please contact your nearest Axis representative, which can easily be found on **www.axis.com/contact/**.

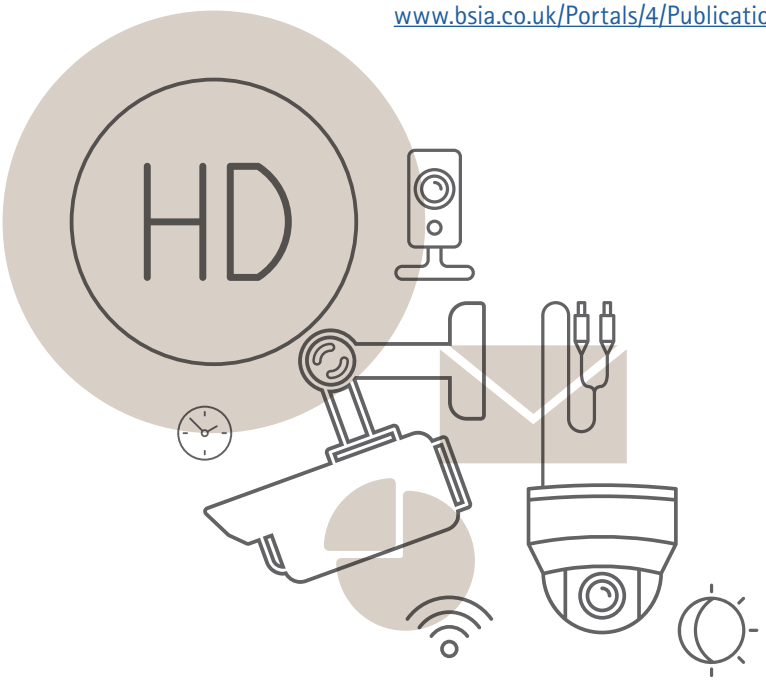
7. Links

7.1 Axis resources

1. Axis Total Cost of Ownership page and TCO white paper from 2016 - www.axis.com/tco
2. RC Willey Case study - www.axis.com/global/en/customer-story/4093
3. Vicente Lopez
   a. Case study - www.axis.com/global/en/customer-story/4567
   b. Video case study - www.youtube.com/watch?v=WgoU1vBSPAQ
4. Axis product quality web page and white paper - www.axis.com/quality
5. Axis Zipstream web page and white paper - www.axis.com/zipstream
6. Axis sustainability web page - www.axis.com/sustainability

7.2 Other resources

1. Intel article "Total Cost of Ownership: Factors to Consider" from 2015
   https://software.intel.com/en-us/articles/total-cost-of-ownership-factors-to-consider
2. SIG white paper "Unpacking Best Value: Understanding and Embracing Value Based Approaches for Procurement" from 2012
   www.vestedway.com/wp-content/uploads/2012/11/TCO-Best-Value-White-Paper.pdf
3. NIGP Business Council white paper "Total Cost of Ownership: Realizing Procurement's Full Potential in Value Creation" from 2016 - www.nigp.org/docs/default-source/New-Site/white-papers/totalcostofownership-white-paper-final.pdf
4. BSIA white paper "The (Real) Price of Security Solutions" from 2016
   www.bsia.co.uk/Portals/4/Publications/the-real-price-of-security-solutions.pdf.pdf



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About Axis Communications

Axis offers intelligent security solutions that enable a smarter, safer world. As the market leader in network video, Axis is driving the industry by continually launching innovative network products based on an open platform - delivering high value to customers through a global partner network. Axis has long-term relationships with partners and provides them with knowledge and ground-breaking network products in existing and new markets.

Axis has more than 2,700 dedicated employees in more than 50 countries around the world, supported by a global network of over 90,000 partners. Founded in 1984, Axis is a Sweden-based company listed on NASDAQ Stockholm under the ticker AXIS.

For more information about Axis, please visit our website www.axis.com.

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