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# The Total Economic Impact™ Of Deploying TRIM Context

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# Executive Summary

This study was originally commissioned by TOWER software in February 2006. HP acquired TOWER software in March 2008. The TRIM Context solution is HP's document and records management solution.

In February 2006, TOWER Software commissioned Forrester Consulting to examine the potential return on investment (ROI) that companies can realize by deploying the TRIM Context enterprise content management platform. The study focused on the value that can be gained by using TRIM Context for document retention and management.

In conducting in-depth interviews with a TRIM customer, Forrester found that this organization was able to avoid significant increases in labor costs that would have otherwise been required to retain and manage documents. Use of the TRIM Context solution also helped the customer improve the efficiency of a number of document-intensive business processes, enabling it to avoid further headcount increases and reassign staff to other tasks. The customer has been extremely pleased with the financial return that it gained from its investment (summarized in Table 1 below) in TRIM Context

**Table 1: Summary Of Financial Calculations**

| | Category | Value |
|---|---|---|
| S1 | Present value of benefits | $1,343,514 |
| S2 | Present value of costs | $981,113 |
| | | |
| S3 | Net present value | $362,401 |
| | | |
| S4 | Return on investment | 37% |
| | | |
| S5 | Payback period | Less than 12 months |

Source: Forrester Research, Inc.

This case study focuses on the specific benefits of the customer's use of TRIM to retain, manage, and use electronic documents. This organization faces the difficult, yet common, challenge of dealing with a rapidly increasing volume of electronic documents with many versions being widely distributed both internally and externally. This solution is playing a key role in helping it address this challenge.

An important lesson learned from this and other implementations of enterprise content management is the vital role that effective change management plays in enabling driving the business value gains. Significant cost savings are possible when the solution is actively used to capture, manage, and retrieve important documents. Key success factors for achieving this include maximizing ease-of-use, gaining full management buy-in, refining business processes and incentives, and adequately training users.

## Purpose

The purpose of this study is to provide readers with a framework for evaluating the potential financial impact of the TRIM Context enterprise content management platform. Forrester's aim is to clearly show all calculations and assumptions used in the analysis. Readers should use this study to better understand, develop, and communicate a business case for investing in TRIM Context.

## Methodology

Forrester was selected for this project because of its industry expertise in enterprise records management and for its Total Economic Impact™ (TEI) methodology. TEI not only measures technology costs and cost reductions, it also takes into account the ability of technology to improve the efficiency and effectiveness of business processes.

For this study, Forrester employed four fundamental elements of TEI in modeling the financial impact of TRIM Context:

1. Costs and cost reduction.

2. Benefits to the entire organization.

3. Flexibility.

4. Risk.

Given the increasing sophistication of the IT investment analyses being used by enterprises, Forrester's TEI methodology serves an extremely useful purpose by providing a complete picture of the total economic impact of purchase decisions. Please see Appendix A for additional information on the TEI methodology.

## Approach

Forrester used a four-step approach for this study:

1. Forrester gathered data from existing Forrester research relevant to TRIM Context specifically and enterprise records management in general.

2. Forrester interviewed senior representatives from the vendor to fully understand the potential value proposition of its solutions.

3. Forrester conducted a series of in-depth interviews with an organization that is currently using a TRIM Context solution.

4. Forrester constructed a financial model representative of the customer's implementation. This model is described in the TEI Framework section below.

## Key Findings

Forrester's study yielded the following key findings:

- For the customer interviewed, TRIM Context provides a very cost-effective solution for managing the retention and use of both paper and electronic documents. This enables the organization to address important compliance requirements while also improving document-intensive business processes. The business model presented in this case study focuses on the benefits gained from using TRIM Context to manage electronic documents.

- Among the overall gains enabled by TRIM Context, the largest quantifiable benefit for this customer has been the avoidance of significant records management labor costs. This

customer has also been able to avoid hiring additional staff in two business areas as the volume of electronic document-based work increased.

- A critical element of the success of any implementation of content and records management is getting those involved in creating and using documents to actively use the solution. Important best practices are making the solution very easy and efficient to use, gaining full management buy-in regarding its use, refining business processes to take advantage of its capability, evolving incentives to motivate proper behavior, providing adequate user training, and ensuring that the users perceive value in using it.

- Electronic documents need to be captured by the records management system at the time of creation. Waiting to capture electronic documents when they are finalized, as is common with the management of paper documents, can create significant problems due to the fact that so many versions are often created and widely distributed both internally and externally. The capture of electronic documents also needs to be flexible, with options including automated capture, manual capture, and drag-and-drop capture.

- The investment in time and expense required to implement TRIM Context software is relatively small when it is used for applications in which its packaged nature is well-suited, such as when the business content of documents is a primary focus and the search and retrieval is being done by professionals (e.g., legal staff, call center personnel, purchasing, and librarians). It is important to note that the implementation of the associated retention policies, procedures, and classifications plans (e.g., file plans) may require a significant investment in time and effort beyond the software implementation, as was the case with this customer.

## Disclosures

The reader should be aware of the following:

- The study was originally commissioned by TOWER software and was delivered by the Forrester Consulting group. TOWER software was acquired by HP in March 2008..
- TOWER Software reviewed and provided feedback to Forrester, but Forrester maintained editorial control over the study and its findings. Forrester did not accept changes to the study that contradict Forrester's findings or obscure the meaning of the study.
- The customer names for the interviews were provided by TOWER Software.
- Forrester makes no assumptions as to the potential ROI that other organizations will receive with TRIM Context. Forrester strongly advises that readers use their own estimates within the framework provided in the report to determine the appropriateness of an investment in TRIM Context.
- The study is not meant to be used as a competitive product analysis.

# TRIM Context: Overview

## Background

The compliance requirements placed on organizations are becoming increasingly stringent as regulators seek greater levels of accountability and transparency in the wake of a number of very visible corporate scandals. At the same time, rapid improvements in technology are causing an explosion in both volume and types of documents being created while providing the means for

these documents to be easily edited and widely distributed. As a result, both public and private sector organizations need to develop effective records management strategies, processes, and infrastructure that enable them to comply with regulations and streamline business processes.

The rapid growth in the use of electronic documents has not only increased the volume of documents that must be managed but has also affected the process by which they are managed. In the old paper-based environment, the document creation and editing process was relatively centralized, consistent, and visible across the organization. A typist would create the physical document, working with the person providing the input. Final versions of documents were captured and filed in a relatively limited number of known physical locations.

The process in the old environment was aided by the fact that companies often had formal document retention functional organizations that would capture, categorize, and retain the final versions of important business documents. Many companies have downsized these resources in the last few years as more and more content originated in, or was converted to, digital format. Instead of realizing that electronic records management is more challenging than physical records management, organizations believed that "going digital" would be a panacea. However, the reality is that electronic records management is more complicated and challenging than anyone could have imagined.

The challenge is a direct result of the pervasive use of word processing software and email that produces multiple copies and versions of documents and stores them in a wide array of managed and unmanaged repositories. Multiple instances of important business documents wind up residing on the hard drives of employees, partners, and customers. This greatly affects the ability of companies to comply with regulations and efficiently run their information-intensive operations. In order to address this problem, companies need to capture a document at original point of creation, and then manage it throughout its life. [Reference Forrester research on this point: "Retention Management: The Holy Grail of Records Management" Robert Markham, April 20, 2006.]

A number of software vendors have responded to this need by providing solutions for content and records management. The key issues that should be considered when selecting an appropriate solution include:

- Cost and effort involved in deployment, including all product modifications, additional development, consulting, and training.

- Capability provided to flexibly categorize documents in order to later retrieve and use them for all foreseeable business- and compliance-related purposes. This can be a challenge since the potential uses of a document may not be fully known when it is initially created and categorized.

- Support for all document types to be managed, such as hardcopy and the many forms of digital media.

TRIM Context is designed to be an enterprise content management solution with a focus on enabling organizations to better manage content through its life cycle directly at the point where end users interact with it. The platform organizes information around the three dimensions of: 1) documents; 2) virtual collections of documents or "business contexts"; and 3) "locations" of the source of the documents, enabling them to be clearly segmented by department, geography, etc. It makes extensive use of business rules for categorization (e.g., documents inheriting retention properties of folders, rules-based records declaration), and provides full support for both paper and electronic documents.

## Interview Highlights

The following section illustrates an ROI analysis for the TRIM customer that was interviewed for this report. This model is based on estimates of the costs and benefits of using TRIM Context for this implementation. Since it examines just one TRIM customer, the calculations and data used should not be seen as a general purpose quantification of the potential return that other organizations may achieve from investing in TRIM Context. Readers must use their own information to determine their specific potential return.

# TEI Framework

## Description Of Customer Organization And Assumptions

The TRIM customer interviewed for this study is a government organization in the communications sector. The organization has 550 employees, all of whom are active users of TRIM Context. The primary customer contact that participated in interviews has also worked directly with TRIM Context in five previous roles within the government and therefore was able to provide extensive insight into the financial benefits of using the product.

This customer has been using TRIM Context for 10 years to manage its paper-based records. For the past four years it has been working to further improve the effectiveness of its paper-based recordkeeping while also extending this capability to manage electronic documents (e.g., Word, PDF, Excel, and PowerPoint files). The objectives of the work throughout the past four years have been to: 1) further improve compliance with governmental regulations regarding accountability and transparency, and 2) reduce costs by improving the efficiency of the creation and use of information within key business processes. This case study is focused on the costs and benefits of using TRIM Context to manage the customer's electronic documents during the three-year period starting when the solution was first used for that purpose.

Prior to the use of TRIM Context for managing electronic documents, employees created documents and stored them on their local hard drives. This was beginning to create substantial problems in meeting the regulatory requirement of continually disclosing all of the documents that had been created by the organization. It was also beginning to significantly affect productivity in a number of business areas.

Expanding the existing TRIM Context implementation to enable the management of electronic documents primarily entailed increasing the number of users of the system. Most electronic documents generated by this organization are now managed by TRIM Context. The documents are stored in a central repository and are categorized using the application's business context capability. Documents are captured at time of creation. Email is used to distribute documents during their creation and use. However, the documents themselves are no longer sent as attachments. Instead, a link to the document residing in the TRIM Context system is included within the email, enabling it to manage documents as they are continually edited and used. This also reduces the burden on the network as documents are only downloaded if and when they are accessed.

In developing the business model for this case study, the assumptions outlined in Table 2 were used based on the experience of this customer.

**Table 2: Assumptions Used In The Business Case**

| Ref. | | |
|---|---|---|
| A1 | Discount rate for NPV calculation | 15% |
| | Cost of resources (annual full-time equivalent) | |
| A2 | Legal professional | $100,000 |
| A3 | Contact center professional | $50,000 |
| A4 | Records management professional | $60,000 |

Source: Forrester Research, Inc.

## Benefits

For this TRIM customer, the primary benefits enabled have been improving the efficiency and effectiveness of addressing information compliance requirements and increasing the productivity of employees involved in document-intensive business processes. All 550 users of TRIM Context benefit from the use of solution through improved ability to capture, classify, retrieve, and use paper and electronic documents. The overall productivity gains are significant, estimated at a 2% to 4% savings of time on average for all users, with major productivity gains occurring during large information-intensive projects (e.g., conducting the due diligence of a merger). Taking a conservative approach, formal quantification of benefits within the financial model has been limited to areas in which use of the solution has affected a large percent of the users' time. The benefits associated with these "heavy users" are more straightforward to quantify and verify. As a result, they are more defensible.

The business benefits that have been quantified in the model can be broken down into the following two categories:

1. Avoiding the hiring of additional records management staff needed to address compliance requirements.

2. Avoiding the hiring of additional staff, and being able to reallocate existing staff, to support document-intensive business processes.

The quantified benefits are summarized in Table 3.

**Table 3: Benefits Due To TRIM Context**

| Ref. | | (US$) Year 0 | Year 1 | Year 2 | Year 3 |
|---|---|---|---|---|---|
| | Reducing the need for the following resources: | | | | |
| B1 | Records management professionals not hired | 3 | 6 | 4 | 4 |
| B2 | Cost avoided by records management | $180,000 | $360,000 | $240,000 | $240,000 |
| B3 | Avoided cost of thesaurus tool | $10,000 | | | |
| B4 | Legal professionals not hired | | 1 | 2 | 3 |
| B5 | Cost avoided by legal department | | $100,000 | $200,000 | $300,000 |
| B6 | Contact center professionals not hired | | 0 | 0 | 2 |
| B7 | Cost avoided by contact center | | $0 | $0 | $100,000 |
| B8 | Subtotals | $190,000 | $460,000 | $440,000 | $640,000 |

Source: Forrester Research, Inc.

### *Meeting Compliance Requirements For Retention And Transparency*

Without TRIM Context, approximately half of a full-time equivalent resource would have had to be assigned to each business department to identify and manage all of the documents created. These resources would have been responsible for:

- Identifying documents being created and developing a "file list" of all new documents. The organization is required to publish a consolidated file list on its Web site every six months (some files related to confidential commercial matters being exempt).
- Working with the legal team to define the classification and retention period for all new documents.
- Creating, modifying, and auditing adherence to a file plan (i.e., the taxonomy by which things are managed).
- Enforcing and ensuring the auditability of the file plan.

The customer does have two centralized resources handling this function today since there are some employees that are not yet fully using all the capability TRIM Context. However, if TRIM Context wasn't deployed, three person-years of records management resources would have had to be used to initiate the creation of an electronic records management capability (i.e., Year 0). Six full-time equivalent (FTE) resources would have been required during Year 1 to further build out the capability, and four FTEs would have been needed to continue to develop and support the capability during Years 2 and 3. The fully burdened costs of a records management resource for this customer is $60,000 (reference A4), resulting in benefits of $180,000 in Year 0, $360,000 in Year 1, and $240,000 in Years 2 and 3 (reference B1 and B2). The organization would also have had to invest in a thesaurus tool which would have cost approximately $10,000 (reference B3) in Year 0.

### *Improving Document-Intensive Business Processes*

The document search, retrieval, and management capabilities of TRIM Context enabled this organization to improve the efficiency and effectiveness of multiple groups that rely heavily on the use of documents. One example has been the legal team that is responsible for providing advice across the organization. This team uses TRIM Context to log all requests for documents, distribute the work to be done to the various team members, and file all responses. The business context capability of the system enables the lawyers to quickly find all of the information needed to address a particular request. By using the solution to manage the responses, all involved are able to easily access the latest information throughout the life of the particular issue.

The legal team comprises 20 people in two locations. The size of the staff has remained constant throughout the past four years. Due to the increase in volume of electronic documents involved and the number of requests for advice being handled by the team, additional legal resources would have had to be hired if TRIM Context was not being used. The customer estimates that one additional resource would have had to be added in Year 1, expanding to two additional resources in Year 2, three additional resources in Year 3. The fully loaded cost of a legal professional for this customer is $100,000 (reference A2) resulting in a savings of $100,000 in Year 1, $200,000 in Year 2, and $300,000 in Year 3 (reference B4 and B5).

Another organization that has benefited in a similar way is the team responsible for licensing. This group takes calls throughout the day from all over the country. It uses TRIM Context to log all incoming calls, gather information to be used for the calls, and manage the response to each licensing inquiry. This process is complicated by the fact that multiple people can be involved in

addressing an inquiry from start to finish. Significant productivity gains have resulted from the fact that the people responding to calls can quickly determine the status of an inquiry and get access to all of the relevant information. The licensing team comprises 10 people. Due to the use of TRIM Context, two FTE resources have been reallocated to other value-added activities during Year 3. The fully burdened annual cost of these FTEs is $50,000 (reference A3) resulting in a savings of $100,000 in Year 3 (reference B6 and B7).

## Costs

A very comprehensive review of IT costs is undertaken with the TEI methodology to determine the total investment required to achieve the benefits outlined in the previous section. This includes all incremental investments in hardware and software, the internal and external resources used, and any training needed for both the IT staff and users. The costs are summarized in Table 4.

**Table 4: Costs Of Implementing TRIM Context**

| | | (US$) | | | |
|---|---|---|---|---|---|
| **Ref.** | | **Year 0** | **Year 1** | **Year 2** | **Year 3** |
| C1 | TRIM Context software licenses | $200,000 | | | |
| C2 | Maintenance and support (18% of license fee) | $36,000 | $36,000 | $36,000 | $36,000 |
| C3 | External consulting services and training | $87,000 | | | |
| C4 | Hardware purchased (computing and storage) | $54,750 | | | |
| C5 | Internal labor costs — implementation | $55,000 | | | |
| C6 | Internal labor costs — records management | $59,000 | $100,000 | $180,000 | $280,000 |
| C7 | Subtotals | $491,750 | $136,000 | $216,000 | $316,000 |

Source: Forrester Research, Inc.

The list price for purchasing TRIM Context for 550 users would be approximately $300,000. However, these licenses provide support for managing both electronic and paper documents. For the purposes of this analysis, the cost of licenses allocated to the benefits of managing electronic documents is $200,000 (reference C1). For this customer, the additional $100,000 has been justified by the benefits associated with managing paper-based documents during the past 10 years (not included in the quantified benefits of the model). Automating the management of paper-based documents by this customer has enabled the organization to avoid hiring two additional permanent staff to implement and operate a manual process.

The annual maintenance for the TRIM Context software is 18% of the license cost, or $36,000 per year beginning in Year 0 (reference C2) for the license cost allocated to managing electronic documents. The customer also purchased $87,000 worth of external consulting and training services (reference C3) and acquired computing and storage hardware that totaled $54,750 (reference C4).

The customer used internal labor resources totaling $55,000 on the installation and deployment of the solution (reference C5). The ongoing internal costs to support TRIM Context for managing electronic documents was $59,000 in Year 0, $100,000 in Year 1, $180,000 in Year 2, and $280,000 in Year 3 (reference C6). These resources provide help desk support for internal users and handle requests to create and build the classification of files.

## Risks

A key component of the TEI process is quantifying the inherent uncertainty involved in estimating the costs and benefits of a technology project. This uncertainty results from numerous potential risk factors related to the vendors and products involved, the architecture being used, the culture of the organization, the impact of potential project delays, and the sheer size of the project. A full TEI

analysis of a specific project would quantify this risk using ranges for each cost and benefit. The range is entered in the form of a low estimate, a most-likely value, and a high estimate.

Since this study is dealing with the actual historical costs and benefits of an existing implementation, uncertainty is not factored into the calculations. However, for those readers estimating expected costs and benefits, the following potential impacts should be taken into consideration.

The ability to get people to enter the necessary information into the system and then use it once it is there (i.e., change management) is an important risk to be aware of and factor into implementation plans. Following are best practices for mitigating this risk:

- Make the creation, editing, and distribution of documents as easy as possible for the users (e.g., terms used and click/drag/drop user interface). In the case of this customer, users are given many options for completing the same task. It is important that the process of using TRIM Context be fast, convenient, and straightforward.

- Ensure the bandwidth and design (e.g., caching servers) of the network minimize the chances of problems with both real and perceived response times.

- Gain management buy-in and active support.

- Refine document-intensive business processes to take advantage of the capability of the system.

- Refine incentives to motivate the proper behavior and provide users with adequate training.

- Inform users of the benefits of using TRIM Context directly for them and for the organization. Usage will be greatly improved if the users see direct value from using the system.

- Nurture and promote the results of “champions” that gain considerable value from using the system. This generates useful best practices while serving as a powerful example for the other users in the organization.

The startup phase of deploying an enterprise content management system presents an important challenge that needs to be managed. When the system is first installed, no benefit is gained from the system since there are no documents stored in it. However, it is important that users invest the time to load documents. It is important to minimize this period of time that users have to invest effort in loading documents without getting any benefit in return. For the customer interviewed, this period was limited to a few weeks as a number of users proactively loaded existing documents into the system and were therefore able to quickly gain benefits.

## Flexibility

Flexibility, as defined by TEI, represents an investment in additional capacity or capability that could, for some future additional investment, be turned into business benefit. Flexibility would also be quantified when evaluated as part of a specific project (described in more detail in Appendix A). For this study, the potential options for flexibility are identified and described qualitatively.

Flexibility options with TRIM Context include being able to use the same platform for:

- Managing Web content by integrating directly with a Web-content-management system. This would enable the large amount of very dynamic content that is available over the intranet and public Web site to be managed by TRIM Context processes and infrastructure.

- Enabling Web-based self-help for those making inquiries or requesting assistance from this organization.

# Summary Of TEI Analysis

In order to calculate the financial return on the investment in TRIM Context, the present value of the benefit and cost cash flows are calculated, using the assumed discount factor of 15% (reference A1) to reflect the time value of money. The present value of the stream of annual benefits (reference B8) is $1,343,514 (reference S1). The present value of the stream of annual costs (reference C7) is $981,113 (reference S2). The net present value (NPV) of $362,401 (reference S3) is derived by subtracting the present value of the costs from the present value of the benefits. The NPV is then divided into the present value of the costs to calculate the ROI of 37% (reference S4). The payback period of less than 12 months (reference S5) is arrived at by observing that the cumulative benefits by the end of Year 1 are $650,000 (reference B8) while the cumulative costs during this same period are $627,750 (reference C7). These results are listed below.

**Table 5 (repeated from Executive Summary): Summary Of Financial Calculations**

| | Category | Value |
|---|---|---|
| S1 | Present value of benefits | $1,343,514 |
| S2 | Present value of costs | $981,113 |
| | | |
| S3 | Net present value | $362,401 |
| | | |
| S4 | Return on investment | 37% |
| | | |
| S5 | Payback period | Less than 12 months |

Source: Forrester Research, Inc.

As with any analysis of an investment, these values should be considered in combination. The NPV provides insight into the overall magnitude of the expected return. The ROI shows what the expected return would be, in percentage terms, relative to the upfront investment. The payback period indicates the expected amount of time before the net returns from the use of TRIM Context first exceeds the investment in the solution.

# Study Conclusions

The customer interviewed for this case study is very pleased with the 37% ROI from the TRIM Context solution. TRIM Context has enabled the organization to very effectively manage its paper-based documents for 10 years. Throughout the past four years, the solution has played a pivotal role in enabling it to provide cost-effective services at a time when the rapid growth in the use of electronic documents would have otherwise required a major increase in resources.

# Appendix A: Total Economic Impact Overview

Total Economic Impact is a methodology developed by Forrester Research, Inc., that enhances a company's technology decision-making processes and assists vendors in communicating the value proposition of their products and services to clients. The TEI methodology helps companies demonstrate, justify, and realize the tangible value of IT initiatives to both senior management and other key business stakeholders. The TEI methodology consists of four components to evaluate investment value: 1) benefits; 2) cost; 3) flexibility; and 4) risk.

## Benefits

Benefits represent the value delivered to the user-organization — IT and/or business units — by the proposed product or project. Oftentimes product or project justification exercises focus just on IT cost and cost reduction, leaving little room for analysis of the impact of the technology to the entire organization. The TEI methodology and resulting financial model places equal weight of the measure of benefits to that of costs, allowing for a full examination of the impact of the technology on the entire organization. Calculation of benefits estimates involves a clear dialogue with the user organization to understand the specific value that is created. In addition, Forrester also requires that there be a clear line of accountability established between the measurement and justification of benefits estimates after the project has been completed. This ensures that benefits estimates tie back directly to the bottom line.

## Cost

Costs represent the investment necessary to capture the value, or benefits, of the proposed project. IT or the business units may incur costs. These may be in the form of fully burdened labor, subcontractors, or materials. Costs consider all the investments and expenses necessary to deliver the value proposed. In addition, the cost category within TEI captures any incremental costs over the existing environment due to ongoing costs associated with the solution. All costs must be tied to the benefits that are created.

## Flexibility

Within the TEI methodology, direct benefits represent one part of the investment value. While direct benefits can typically be the primary way to justify a project, Forrester believes that organizations should be able to measure the strategic value of an investment. Flexibility represents the value that can be obtained for some future additional investment building on top of the initial investment already made. For instance, an investment in an enterprisewide upgrade of an office productivity suite can potentially increase standardization (to increase efficiency) and reduce licensing costs. However, an embedded collaboration feature may translate to greater worker productivity if it is activated. The collaboration can only be used with additional investment in training at some future point in time. However, having the ability to capture that benefit has a present value that can be estimated. The flexibility component of TEI captures that value.

## Risk

Risk is the fourth component of the TEI methodology. Risk is a measurement of the uncertainty to benefits and costs estimates contained within the investment. Uncertainty is measured in two ways: 1) the likelihood that the costs and benefits estimates will meet the original projections, and 2) the likelihood that the estimates will be measured and tracked over time.

TEI applies a probability density function known as "triangular distribution" to the values entered. At a minimum, three values are calculated to estimate the underlying range around each costs and benefits estimate. The expected value — the mean of the distribution — is used as the risk-adjusted

costs or benefits number. The risk-adjusted costs and benefits are then summed to yield a complete risk-adjusted summary and ROI.

# Appendix B: Glossary

**Discount rate:** The interest rate used in cash-flow analysis to take into account the time value of money.

**Present value/net present value (NPV):** The present or current value of (discounted) future net cash flows given an interest rate (the discount rate). Present value often refers to individual cost and benefit cash flows and NPV is the sum of the present values. A positive NPV normally indicates that the investment should be made, unless other projects have higher NPVs.

**Payback period:** The breakeven point for an investment is the point in time at which net benefits (benefits minus costs) equal initial investment or cost. Other things being equal, the better investment is usually the one with the shorter payback period. The example below illustrates the concept:

Payback Period = A + (B/C) where:

- A = Last year in which the net cash flow is negative = Year 1
- B = The absolute value of the net cash flow of A = Year 1 = 30
- C = The yearly net cash in the year following A = Year 2 = 90
- Payback period = 1 + (30/90) = 1.3 years (or about 16 months)

| | Initial | Year 1 | Year 2 | Year 3 | Year 4 |
|---|---|---|---|---|---|
| Total costs | (100) | (10) | (10) | (10) | (10) |
| Total benefits | | 80 | 100 | 100 | 100 |
| Yearly net cash (total benefits – total costs) | (100) | 70 | 90 | 90 | 90 |
| Net cash flow (net cash flow in Previous year + yearly net cash) | (100) | (30) | 60 | 150 | 240 |

**Return on investment:** A measure of a project expected return in percentage terms. ROI is calculated by dividing discounted net benefits (benefits minus costs) by discounted costs.