

How To Prove The Value Of Safety

Free ROI software from the FAA identifies the costs and forecasts the savings of improving hazardous ramp conditions.

By Dr. Bill Johnson

Your recent quality and performance data confirm an unacceptable trend. Last month you had damage to aircraft ... and ground equipment ... and people were injured. You identified the contributing factors to these three categories of challenges.

Now you must decide how to allocate resources to address the issues. And they are *all* important issues. How can you ensure a financial and safety return on the investments you make to fix the problems? The answer is a straightforward math problem that calculates return on investment (ROI).

Figure 2: Questions to estimate probability of success.

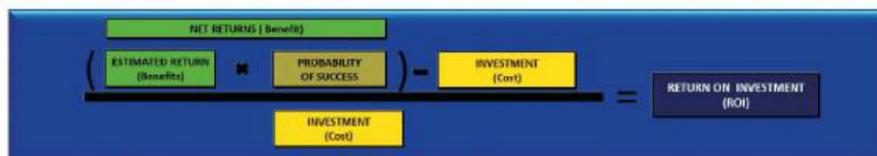


Figure 1: ROI made easy.

This article describes new ROI software developed under an FAA human factors project. Management consultant Booz Allen Hamilton Inc. developed the software under contract to the FAA Civil Aerospace Medical Institute.

The goal is to deliver an effective, yet easy-to-use ROI tool into the hands of mid-level management. It has the potential to justify a variety

of safety and efficiency interventions, including interventions related to human factors. This tool is provided at no cost to the industry.

FINANCIAL RETURN

ROI is merely comparing the money invested to the value returned. Figure 1, taken from the new FAA software, shows the data necessary to calculate ROI.

Let's use aircraft ground damage as an example. Assume that you

5 Probability of Success - "How likely will the Returns be realized?"

Part A: Enter a score based on your best assessment of how the project will be managed.

Success Categories	Select Score 1-5:
Prior Experience	
1 At least one person on the project team has a working knowledge and experience with Project Management processes	4
2 At least half of the project team has successfully completed more than two projects of similar size and function	4
3 The project sponsor has successfully led to completion more than two projects of similar size and function	3
4 The customer has signed off acceptance of more than two successfully delivered projects of similar size and function	5
5 The customer, leadership, and the project team have worked on a successful project of similar size and function in the past	5
Sub-section average score	4.2
Leadership and Customer	
6 The project has defined roles and responsibilities for customer, leadership, and project team members	4
7 The project has a sponsor with budget authority	3
8 The customer and project team have agreed to readily identifiable deliverables and success criteria	5
9 Leadership and the customer agree to participate in all milestone project review meetings	2
10 Leadership and the customer agree to sign-off deliverables according to the predefined success criteria	4
Sub-section average score	3.6
Resources	
11 Leadership and the project team agree there are sufficient resources available until the end of the project	4
12 The project team has matched the skills and abilities of the team members to the needs of the project	5
13 All materials required for the project are available, or have a committed delivery date in line with the project plan	4
14 The sponsor commits to support a request for additional resources, if required	5
15 The Safety and Quality departments are involved in the project planning, development and implementation	4
Sub-section average score	4.4
Planning	
16 Leadership and the project team have developed and approved a business case that aligns to organizational objectives	3
17 Leadership and the project team agree the project plan is SMART (Specific, Measurable, Achievable, Relevant, and Time-bound)	3
18 Leadership and the project team agree that appropriate milestones have been built into the project plan	4
19 Leadership and the project team have developed and approved a risk log with contingencies	4
20 A communications plan has been developed and will be implemented to inform stakeholders of progress	5
Sub-section average score	3.8
Probable returns - "How much of the estimated Returns will be realized?"	80%

Note: Overall probability of project success can be improved by addressing the project risks that are weakest in your assessment above

Check if Project is Complete

had 2.5 incidents of aircraft ground damage each month over the past 12 months. Counting repairs, delays, rescheduled flights, etc., the average cost per incident was \$200,000. (By the way, that's below International Air Transport Association estimates.) Once you conducted the investigations, including peer-to-peer assessments (See the September issue of *Ground Support Worldwide* for "Collecting 'Predictive' SMS Data"), you identified a number of contributing factors including:

- Poor ramp painting for clear zones,
- Inadequate maintenance of ground equipment,
- Improper adherence to company procedures, and
- Lack of availability of sufficiently trained personnel.

As with any analytic program, the quality of diligence and data accuracy provided will affect the accuracy of the ROI analysis.

Correcting each of these contributing factors has an associated investment cost. Of the 30 incidents in the past year, you decide you could reasonably address 25, since five of the incidents are outside your control. From a financial perspective, the return would be \$5 million (\$200,000 x 25) of reduced aircraft damage. From a safety perspective, you would be targeting 25 safety threats.

To calculate the investment you must estimate the following costs:

- Repainting safety zones on ramps (\$500,000).
- Refurbishing selected ground equipment (\$800,000).
- Developing improved procedures and training personnel to use the new procedures (\$200,000).

- Creating an incentive program to reward personnel for reduced ground damage (\$500,000).
- The total investment would be about \$2 million that would be spent over six quarters.

You cannot guarantee that your interventions will be 100 percent successful. Therefore, you must estimate the probability of success. The FAA

software offers guidelines to help make that judgment call. Questions, based on project management, help establish the probability of success. (See Figure 2.)

For this example, we will estimate the probability of success at 80 percent. In other words, the interventions will likely prevent 20 incidents in a six-month period, and the probability of success multiplied by the return provides a net return of \$4 million.

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1. Project Cost Summary		2011 Q4	2012 Q1	2012 Q2	2012 Q3	2012 Q4	2013 Q1	Total Investment
Cost Category								
Labor	\$	175,143	293,690	48,689	33,696	55,686	-	606,304
Facilities Technician	\$	75,000	-	-	-	-	-	75,000
Facilities Supervisor	\$	4,870	-	-	-	-	-	4,870
Ground Equipment Technician	\$	33,169	33,690	33,690	33,690	33,690	-	168,459
Ramp Personnel Supervisor	\$	2,500	-	-	-	-	-	2,500
Supervisor	\$	2,690	-	-	-	-	-	2,690
Clerical Support	-	2,000	-	-	-	-	-	2,000
Ramp Personnel	\$	-	60,000	-	-	-	-	60,000
Supervisor	\$	1,000	10,000	-	-	-	-	11,000
Training Specialist	\$	32,930	32,813	-	-	-	-	65,743
Management team	\$	10,893	10,690	-	-	-	-	21,583
Supervisor	\$	-	-	10,000	-	-	-	10,000
Misc	\$	2,340	-	-	-	-	-	2,340
Non-Labor	\$	492,500	200,000	200,000	200,000	212,500	100,000	1,607,500
Facilities	\$	250,000	-	-	-	-	-	250,000
Training	\$	187,500	90,000	90,000	100,000	112,500	-	580,000
Inventory Program	\$	55,000	10,000	110,000	100,000	180,000	100,000	555,000
Total	\$	667,643	493,690	298,689	267,386	268,186	100,000	2,005,594
2. Project Benefits Summary								
SAFETY RETURN: This is the amount of Return that is expected if the Safety Intervention is implemented as planned without any issues.								
Financial Return Category								
Aircraft Damage	\$	-	1,000,000	1,500,000	1,300,000	1,000,000	500,000	5,300,000
Total	\$	-	1,000,000	1,500,000	1,300,000	1,000,000	500,000	5,300,000
Safety Return Category								
Aircraft Damage	\$	-	-	-	-	-	-	-
Total	\$	-	-	-	-	-	-	-
Problem Return: This is the amount of Return that is expected because there are certain Project Planning risks identified in Step 1.								
Financial Return Category								
Aircraft Damage	\$	-	800,000	1,500,000	900,000	600,000	400,000	4,000,000
Total	\$	0.0	4.0	6.0	6.6	6.6	2.0	26.6

Figure 3: Partial ROI summary.

With good estimations of return, probability of success and amount of investment, you are able to calculate the ROI. The FAA software helps schedule the quarterly investment as well as forecast the timing of the

expected incident reduction. Figure 3 is a partial summary of project costs, benefits and return based on assigned probability of success.

Figure 4 shows a graph representing an overview of the project. In this example, the payback is predicted within three quarters and the return

on investment continues to grow. The graphs and depictions are dedicated to the financial ROI.

The graph shows that the project achieves payback by the third quarter. Over the six-quarter period, the payback ranges from a low of \$4 million to a high of \$5 million. This is a very respectable return on investment.

ROI CAVEATS

Crunching the financials is straightforward. Safety ROI is another challenge for many reasons. It is difficult to show that the actions above improved safety. Safety is often intangible and, as a result, it is hard to quantify. Safety is based on an integration of many activities, not on just individual actions and programs. While difficult to show the safety return, the FAA research team continues to work on the issue. Safety ROI will be based on reducing events while financial ROI must be based on the money. The

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intricacies of the safety calculation are described in the embedded user documentation and will be discussed in the final technical report.

Our example of 30 ground damage events is clearly an indication of existing safety hazards. Reducing ground events would help improve and ensure safety. In this case, having 30 aircraft ground damage incidents over the past 12 months and expecting the interventions will likely prevent 20 incidents over the same period will result in an estimated 10 events a year in the future. This is a likely safety improvement.

provided will affect the accuracy of the ROI analysis.

The tool is designed for operational managers in ramp or maintenance organizations. The developers suggest that you use the model on small interventions before you tackle large complex ROI. If you work in a large company, your own finance team may want to add additional factors into the equation. The demonstration shown here was done in advance of the project's completion. The same model can be used after the fact, meaning that there is no need to estimate the probability of success.



Figure 4: A picture tells the story.

This reasonably straightforward solution may require a bit of training. By discussing these issues in a team setting, however, all employees can learn to understand the positive impact on safety derived from each intervention.

The FAA software provides more detail than this short explanation. It helps assign specific categories and values to returns and investments. As with any analytic program, the quality of diligence and data accuracy

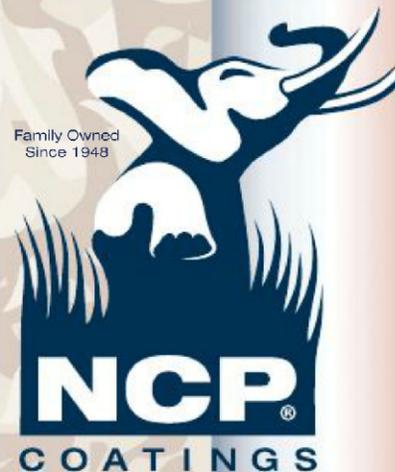
To get started, go to www.mxfatigue.com. That will take you to the ROI software and associated additional guidance material. Once the software works for you, then you can write the next ROI article for *Ground Support Worldwide*. ■

About the Author: Dr. Bill Johnson is the chief scientific and technical advisor for Maintenance Human Factors at the FAA. He spent more than 25 years in the private sector as a scientist and engineering executive prior to joining the FAA.

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