

# Financial SMS



**Excel worksheets help airline safety officers to predict return-on-investment while proposing risk mitigations.**

BY WAYNE ROSENKRANS

Airline leaders who hold corporate purse strings appreciate safe flight operations as much as anyone. Yet, paradoxically, an already-high level of safety these days could make them balk if their director of safety proposes improvements yielding vague financial returns. So safety specialists increasingly are challenged to make a business case — not just a safety case — complete with convincing return-on-investment (ROI) calculations and time factors, according to John Cox, a retired airline captain and chief executive officer of Safety Operating Systems, and Triant Flouris, professor and dean of academic affairs, Hellenic American University.

In a presentation to Flight Safety Foundation's 64th annual International Air Safety Seminar (IASS) in Singapore in November, Cox and Flouris recommended that safety management systems (SMSs) incorporate sophisticated

financial analysis, beginning with tools such as a Microsoft Excel worksheet that they developed to assess safety interventions in ways that acknowledge the perspective of chief financial officers (CFOs). Senior management tends to respect safety officers' expert opinions if properly validated, they added.

Cox said the goal has been to "give safety officers the ability to speak the language of the financial boardroom in a way that accomplishes their safety goal ... a tool that is easy to use and brings in that language ... and numbers that CFOs recognize."

Their concerns prompted hypothetical questions as they explored the issue. As air travel becomes safer, does it become so safe that further improvements lack sufficient value financially to be implemented? In other words, can senior management justify the cost of additional programs to lower an already low accident rate?

"We have seen already a paradigm shift for safety programs, in their design and inclination toward proactivity [such as] SMSs," Flouris said. "Conventional wisdom says that what safety officers do is a cost center ... we need to start thinking of safety not in terms of cost and revenue centers [but as] a value-producing center."

Value-chain management today has become a business management method highly relevant to airline safety, one that shows the value of each input in an airline's production equation. "Traditional costing methods have not provided true organizational costs [of safety]," Flouris said. "We have to start looking at our airlines as integrated organizations, not as silos. ... In most cases, we have not had accounting for multi-dimensional departmental costs." Even the cost of rebooking passengers, for example, must be factored into the safety officer's business case.

Their proprietary worksheet<sup>1</sup> is based on a financial methodology called time-driven activity-based costing (TABC) and also reflects the presenters' research on typical costs of all activities — that is, anything that generates cost — relevant to the financial effects of airline safety initiatives. Essentially, any activity in the airline that “touches safety” should be part of the accounting at the organizational level under TABC.

Cox said the worksheet, with separate data tabs for each aircraft type in airline fleets, is customizable by safety officers who likely are not financial analysts. The worksheet is “fairly extensive,” he said, and captures details such as aircraft maintenance costs, fuel burn, flight crew and cabin crew labor, gate agent labor, airline-level operating expense, average passenger load factor,

average ticket price, average landing fees, rescue-aircraft leasing fee, catering cost, cost of aircraft out of service, aircraft repositioning, hotels, meal vouchers, emergency-slide repacking, gross profit, and operating profit. The worksheet incorporates a cost database of variables defined and attributed to government and private-sector sources. Safety professionals can use or update the suggested amounts in prototyping their business case, including the ROI.

If the chief financial officer accepts the TABC premise, the worksheet gives senior management a reasonably accurate prediction of the corporate-level bottom line, they said. “For our [worksheet demonstration of a hypothetical] diversion ... we account not only for variable costs but an appropriately prorated portion of the fixed costs generated,” Flouris said.

This demonstration showed overall financial consequences of the diversion of a Boeing 757, with 251 seats and a 92 percent load factor on a planned four-hour flight from Los Angeles to Atlanta. The flight was diverted to Oklahoma City after 2.5 hours because of smoke odor, and the crew conducted an evacuation. The scenario included a rescue airplane

that retrieved passengers and ferrying of the 757 to Atlanta for maintenance.

“We ended up with an event that would cost about \$131,000,” Cox said. “To generate that amount at the bottom line, it would take \$7 million of revenue — that amounts to [more than] 20,000 revenue passengers assuming a \$337 average ticket price. Now you have your chief financial officer’s attention. ... Even without four slides being repacked, under the same conditions, it is still a \$67,000 event. ... An average U.S. airline with about 100 to 110 airplanes averages about 13 diversions a year ... so their average annual cost of diversions is about \$880,000 using these assumptions.”

A director of safety with a well-documented proposal for reducing those costs by 75 percent by spending \$1 million on a new safety initiative could demonstrate a payback in 16 months and net savings of \$3.6 million over the [subsequent] five years, according to the worksheet’s ROI calculations. “So the safety officer brings about \$800,000 a year to the bottom line ... 10 diversions did not occur ... and 1,500 passengers did not have to go through a diversion scenario,” he added.

IASS attendees suggested that future versions of their worksheet integrate easily with SMS architectures, insurance data, safety event reporting systems, training costs, value-based management rules and data from failure-prediction systems — such as vibration monitors attached to aircraft cooling fans (*ASW*, 3/11, p. 46) to prevent smoke-fire-fumes diversions.

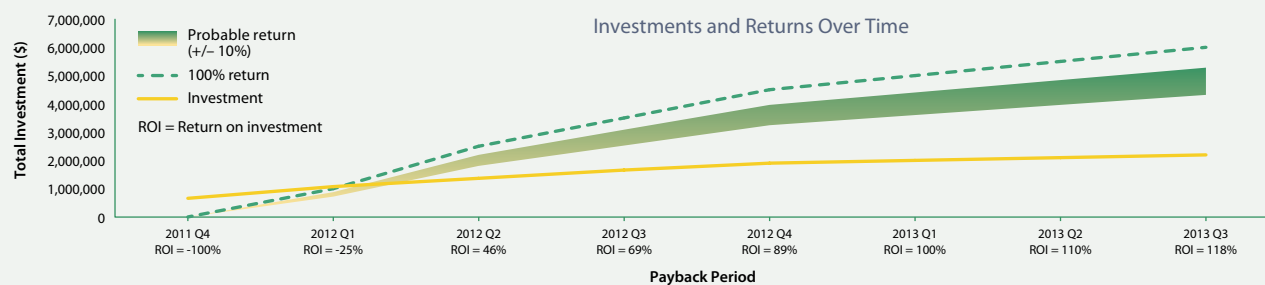
### FAA’s New ROI Simulator

In a separate presentation, William B. Johnson, the U.S. Federal Aviation Administration (FAA) chief scientific and technical adviser for human factors in maintenance, announced a new worksheet and Microsoft PowerPoint course<sup>2</sup> designed to help any aviation safety manager communicate with financial specialists. “Our Return-on-Investment<sup>3</sup> Calculator for Human Factor Interventions has a lot of built-in directions, [including estimated] probability of the ROIs, and helps users do a prediction of whether or not a project is going to work,” Johnson said. The worksheet also plots summary charts

Cox, Flouris and Johnson



### Example of U.S. Federal Aviation Administration Worksheet Graph



**Note:** The dashed green line shows maximum returns possible when there is a 100% probability that a proposed aviation safety intervention will succeed.

Source: U.S. Federal Aviation Administration

**Figure 1**

showing “who does what, when and for how much money,” when the organization would recoup its investment, how payback would occur incrementally and the quarterly ROI changes in relation to the scheduled expenditures, he said.

FAA documentation says the worksheet primarily has been designed to help users “make strategic decisions regarding human factor interventions” in aviation safety. The software’s navigation panel of five color-coded labels guides users through the step-by-step sequence to calculate multiple ROIs, and a built-in user guide defines terms and provides brief explanations regarding the ROI calculator.

The term *returns* in the FAA worksheet refers to quantifiable indicators expected — for example, expected change in cost and/or frequency of specific safety events and the number to be eliminated. Changes may include labor productivity gains, cost savings, time savings, reduced rework or avoidance of aircraft damage. Each return must be assigned either to the safety results section or the financial results section.

Worksheet steps include estimating and scheduling investments, estimating and scheduling returns, estimating the probability of success, generating a project summary, and generating a project analysis. Investments include

all costs associated with developing and implementing the human factors intervention (the project), such as labor costs (employee roles, hourly salaries and labor time) and non-labor costs (such as annual number of flights/flight hours, facilities improvement, new technology and materials).

The investment schedule specifies a start year and quarter, and shows percentages of the total investment allocated over six quarters. This facilitates discussion of the intervention’s life-cycle from the financial accounting perspective. Each return assigned to be a financial indicator has metrics enabling before-and-after comparisons. The return schedule functions as preparation for project tracking, and shows duration of benefits by quarters, allocation of payback by quarter and ROIs within and beyond six quarters if needed.

Users answer a short built-in survey to gauge the project’s probability of success. In this way, the formulas account for risks of failure due to the project leader’s level of expertise, team members’ experience in similar projects, quality of planning and success/failure in relevant prior projects. The survey also enables users to quantify effects of having a project sponsor who brings budget authority, agreement on

deliverables, a relevant business case and careful tracking of milestones.

Within the project summary, a project benefit summary automatically generates plus/minus 10 percent variations in investments, best-case and worst-case scenarios, and how desired ROIs become “discounted” (that is, diminished) by any probabilities of success rated at less than 100 percent. The project summary also lists safety returns metrics and their probabilities.

For easy visualization, a final project analysis comprises five graphs: investments and returns over time (Figure 1), investment profile, financial return profile, probability of success, and total safety events over time. ➔

#### Notes

1. For worksheet details, send an email to Cox <j.cox@safeopsys.com>.
2. These products can be downloaded at <[https://hfskyway.faa.gov/Fatigue/Documents/Final%20ROI%20Calculator\\_2003\\_20111028.xls](https://hfskyway.faa.gov/Fatigue/Documents/Final%20ROI%20Calculator_2003_20111028.xls)> and formulas can be unlocked for customization, if desired, with the included password.
3. The FAA worksheet contains the following formula: ROI = estimated return (benefits) times probability of success (a percentage) minus investment (cost), all divided by investment (cost). The higher the ROI, the more money the airline makes from the investment.