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Root Cause Analysis could be one of the strongest tools that your maintenance organization ever puts its hands around.

When economics inspire belt-tightening, corporate leadership often cuts programs that don't scream savings and profit. After all, those programs cost money to implement and maintain, and their effectiveness and return on investment often is unproven.

For a program to survive this scrutiny, it must stand on its own value. Root cause analysis (RCA) is one such program. Executives who are not close to the RCA process might notice only the expenses for employee training (or perhaps they only notice the high profile RCAs that occasionally occur). People closer to the RCA program have an intuitive sense of the program's value—*enough to know that it should serve as the cost-cutting tool rather than becoming a victim.*

When management is evaluating the maintenance function, it may be fairly easy to see how RCA is helping to cut costs, but not so obvious that it is generating revenue. Historically, many managers have not shared information about business revenue and profit margins with the maintenance team. In some cases, the managers themselves do not know the profitability metrics. When this occurs, maintenance teams might not be aware of their own bigger-picture revenue impact. Thankfully, this situation is changing.

So, how can RCA program champions in maintenance develop a tangible understanding of the

associated benefits, cost savings and profit generation within the context of revenue goals? Further, how can the RCA champions effectively inspire senior leaders to recognize the returnon- investment? What exactly are the results, why are they worth calculating and sharing, and how is this best accomplished? Can the case be presented powerfully enough for executives to recognize that investing more in the RCA program will pay off in the short and long term?

Sample RCA results

Client savings data indicates that many companies see the immediate return on money invested in RCA training. In our company's experience, a fair estimate of initial training costs per person—*including software and training courses*—is about $1500. In most cases, if one trained person completes just one RCA and implements solutions, the savings alone pay for an entire group training class twice over. So there's an immediate 100% return on investment (ROI). This return grows exponentially when additional people from the same class perform RCAs on a regular basis.

Once the RCA program is up and running, the paybacks start to roll in, as the following companies reported.

- A global chemical company evaluated more than 100 RCAs performed by its reliability engineers and found the average value returned on each to be $75,000 USD per year. The average cost per RCA, including solutions, was $1500, yielding an ROI of 4900% after one year. RCA also is a key part of this company's safety program, where it has realized more than a 75% improvement in its injury and illness incident rate— *from 2.4 to 0.59*—in an eight-year period.

- A second global chemical company found that each RCA resulted in $17,000 USD per year savings by eliminating maintenance problems. This organization's average ROI on each RCA was 1100% after the first year.
- A manufacturing company saved $1,300,000,000 USD through RCA, by discovering an innovative solution to one of its product problems. In that same RCA, this company also discovered $19,000,000 USD per year in previously unknown waste that could be eliminated.

- A global telecommunications company has saved millions of dollars by using RCA to analyze and correct problems in its global mobile phone and networking business through reduced service interruptions and outages.

Calculating results

It's surprising so that many companies fail to calculate and communicate payback or ROI on

RCA, considering the impressive results these types of analyses often deliver. Plain and simple, there's a perception that it's too difficult—*or even impossible*—to obtain the data needed. For most of us who don't design rockets for a living, having exact data is rare. (For those who do design rockets, having exact data also is a rarity.) Still, by using conservative data, an organization should be able to develop defendable metrics that demonstrate the value of its RCA. Remember, data is used to draw conclusions for the end-goal of making a decision. With a little digging, sufficient data normally is available to make very solid decisions—*resulting in admirable payback*
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Herein lies an opportunity to understand that you can be conservative—*and, accordingly, relatively accurate* —wit
hout having exact data. When calculating payback, you need close estimates. If an organization spends a great deal of time seeking the ultimate precision in this data, it likely is spending more time than the situation warrants. The result is diminishing utility from the additional precision, as well as from problems that are allowed to linger on a little longer and cost a little bit more. Penciling in conservative estimates is the safest. Even if other people reviewing the data are inclined to poke holes in your approach, you can objectively respond that the savings or income is probably much higher.

Since arriving at these figures may seem easier said than done, why and how did the previously mentioned companies do it? Calculating the results of qualitative programs enables their champions to evaluate program effectiveness individually and collectively. Calculating ROI illuminates needs for program improvement and—*when done thoroughly and reasonably*—earn
s credibility within the organization.

Return on investment Return on Investment (ROI) = Net Savings/Cost x 100 *Where:*

Net Savings = Annual Cost of a problem before RCA minus annual cost of problem after RCA solutions are implemented minus cost to implement RCA and solutions

Cost = Annualized Cost of: (RCA + Solution + RCA training)

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Table I. Calculating ROI From RCA: Chronically Failing Dryer Example (Annualized Costs Over a 5-Year Period)

ROI = Net Savings / Cost x 100%

Net Savings =
(Reduction in total costs – Cost to implement RCA – solutions) / (Cost to implement RCA + solutions)

Net Savings / yr =
[(30 – 1) (failures / year) x ($750,000 + $150,000) / 30 (cost / failure)] = $870,000 / yr

Cost of training / yr =
$1500 / 5 x 5 people on team = $1500 / year

Cost of solution / yr =
$180,000 / 5 (capital) + $10,000 (operational costs) = $46,000 / year

Cost of RCA / yr =
$25,000 / 5 = ($5000 / year over 5 years)

Cost to implement RCA + solutions =
$46,000 + $5000 + $1500 = $52,500

ROI = ($870,000 – $52,500) / $52,500 x 100%

ROI = 1557%

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