

Performance Indicators *what you need to know...*

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*This whitepaper addresses the general nature of performance indicators - also known as **measures or metrics**. Specific references are made to Pirana CMMS.*

For more detailed information on maintenance indicators you should refer to Shire's freely available spreadsheet 'Maintenance Key Performance Indicators' and slideshow 'Lean Maintenance Performance Management'. Indicators are listed comprehensively and the underlying issues addressed in a thorough way.



There are two categories of performance indicators - *lagging* and *leading*. Understanding the nature and use of these two types of indicators is critical to your success as an engineering or services manager

Before reading on, please consider this example: MTBF (Mean Time Between Failure) is a lagging indicator, whereas PM Performance, for instance, is one of its many associated leading indicators - *both* are Key Performance Indicators (KPIs). The nature of the relationship between lagging and leading indicators dictates that in order to be good at the first one you must initially excel at most of the second ones. This is the stumbling block for the unwary, so...

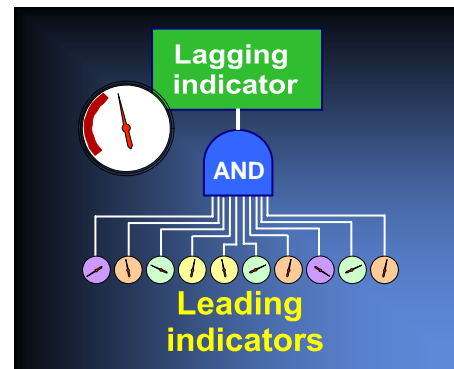
Don't stumble backwards into the future

Lagging indicators are historical, quantified statements of fact; they measure 'outcomes', that is, results achieved. They're therefore backward-looking. They also respond quite slowly to changes made in the workplace.

Leading indicators, on the other hand, are forward-looking and predictive of a desired future state; they measure the 'inputs' which ultimately determine the outcomes. Leading indicators have a much faster response to associated changes made in the workplace.

Every lagging indicator, maintenance or otherwise, has a set of related driving influences. Many of these are common knowledge, but can anyway be deduced by logical analysis. Each influence can be 'measured' by a leading indicator quantifying its specific performance achievement. The direct correlation between the inputs and

outcomes means the relationship between associated leading and lagging indicators is one of simple cause-and-effect. In other words, well-chosen leading indicators are the means to the end defined by their associated lagging indicator.



Lagging indicators follow the trend of their associated leading indicators with a significant time delay. This is advantageous; the in-built delay provides space to reflect on progress, adjust emphasis and take definitive action. Your resulting interventions can therefore be legitimately categorised as preventive or improvement action - not knee-jerks!

Without the aid of an appropriate set of leading indicators, you're not able to prevent plant and process failures or properly action improvements. Your actions will not only be reactive, you'll be thrashing around in the

dark. Trying to control and improve maintenance activities using lagging indicators alone is futile - it places vain hope in after-the-fact guesswork. You could get lucky with your knee-jerks, but trial and error is not a competitive way to proceed.

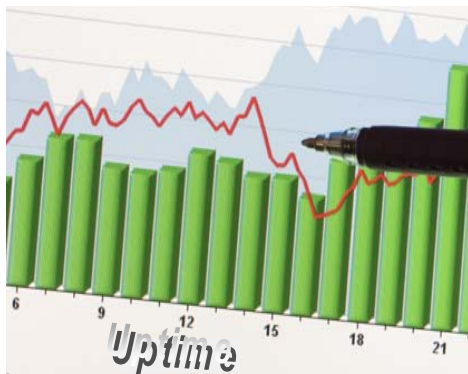
A caution: if you report lagging indicator performance to the powers that be - MTBF, say - without having your own success-enabling, leading indicator framework in place, you're really making a rod for your own back.

The devil is in the detail

Lagging maintenance indicators quantify the top level, strategic goals - the primary maintenance outcomes contributing most substantially to a business's success and its shortcomings. Two of the primary lagging maintenance indicators are MTBF and MTTR (Mean Time To Repair). These factors are the undisputed drivers of Uptime, Availability and OEE. Other important examples are SLA compliance and the frequency and impact of Adverse Incidents. While these are among the foremost factors to track, there are tens of others you can choose from to augment them.

When you do maintenance 'right', you'll hit the strategic numbers management is looking for - and maybe get a pat on the back. Doing the 'right things' is effectiveness and doing the 'right things right' is efficiency.

The problem is that lagging indicators don't actually measure the multiplicity of things you have to do 'right' on the day - and day after day - in order to achieve the strategic results you're aiming for. The devil is in the detail and, because lagging indicators don't focus on the detail of *what* and *how* on the ground, they're practically useless for controlling the real-time activities of maintenance. To do that, you need leading indicators targeting the prerequisite maintenance practices that you have to adopt and be good at. Only then can you start to achieve the outcomes management expects and holds you accountable for.



Leading indicators are used to identify trends – they're not pass-fail monitors. You'll have good days and bad days, so an improving batting average is what you're aiming for with each of your selected indicators.

Total focus on the task in hand

Lagging indicators are like the trackside scoreboard at a motor racing circuit. The scoreboard displays track positions, lap

times, speeds, and so on. It's good for keeping spectators and commentators informed - and handy for drivers, especially the losers, to reflect on after the race. But that's it. During a Formula One race, the leader is not looking backwards or sideways at the scoreboard; he's totally focused on the track ahead and his task in hand, hyper-conscious of the information being fed back from his car's real-time dashboard array. This presents the leading indicators that directly influence his race performance.

The car's dashboard array alerts of any developing problem – with oil pressure, water temperature, etc. In an F1 car, the dashboard also feeds back up-to-the-minute information on driver performance compared with the previous lap on successive sectors of the track. And, there are blinking red-green-blue gear-shift advice lights which enable the driver to time his actions to perfection. Real-time detail is what's important for driver success.

Formula One team philosophy in respect of the dashboard display is: 'all the information the driver needs and nothing more'. So, there's no speedo. To realise the potential of the car and win the race, the driver has to constantly push his speed to the limit. All things being equal, the driver's competence, confidence and commitment determine the speed; a speedo is an unnecessary distraction in the car.

There are parallels to draw in maintenance for the engineering and service manager. To realise the innate potential of the equipment and facilities in your care, and of your crew, you must be hands-on, fully engaged and precisely informed. You need clear forward

visibility and an array of in-the-face, up-to-the-minute information to guide you. You need real time detail. Pirana provides you with these essentials in a superbly interactive way.

Pirana allows the monitoring of two sets of indicators: a leading set on the Dashboard and a lagging set on the Scoreboard. You can focus on the Dashboard while keeping an eye on - but not distracted by - the Scoreboard. The first will tell you how you're doing and the second will tell you, and inevitably your boss and others, how you've done.

Align maintenance with business needs

Your boss and your customers have performance needs and expectations; these can be sometimes fuzzy. It's logical that concrete goals should be established. The way to do this is to select the headline lagging maintenance indicators that best apply to current aspirations and circumstances. In manufacturing, Availability and other OEE influences will figure, along with their drivers: MTBF and MTTR. In services, contractual SLA measures will be king.

Performance targets must be agreed for each selected lagging indicator. Afterwards, the ball is in the engineering or service manager's court. You must get down to the job of delivering the required performance. To do that, you have to choose and implement your own leading indicators – the means of performance delivery.

Total system overview

Maintenance management in any sector is a complex business process with many discrete, yet closely interrelated, activities. To have any chance of satisfying your lagging indicator targets, you need a total system overview.

Your leading performance indicators must therefore target vital aspects across-the-board. Chosen indicators should provide information on crucial aspects of your maintenance system's health and performance, warning of a particular developing condition before it becomes a real problem, alerting you to new events, and prompting you to necessary action.

And, leading indicators should be monitored in aggregate – just like the set of instruments and annunciators on a car's dashboard.



So, configure your leading indicator Dashboard to display everything you need to keep your eyes on and monitor repeatedly, if not constantly, for you to be able perform confidently and effectively to achieve your strategic targets. All the information you need and nothing more, that is; work

statistics should certainly be displayed. Give careful consideration to choosing the 'critical few' parameters - five to ten - that best suit your immediate needs. Refer to Shire's guidance: *Maintenance Key Performance Indicators*.

Choosing the best indicators requires careful thought, but it's not an arduous task; given your business goals, the immediate imperatives and prevailing circumstances – and a bit of engineering common sense - the decisions will be more or less obvious.

Best practice makes perfect

Each leading maintenance indicator is *always* associated with a maintenance best practice; the connection between the two is simple and clear cut. A leading indicator is a numerical expression of its associated best practice and provides a practical means of deploying and monitoring the best practice's implementation in the workplace. A lagging indicator, with its many associated leading indicators, obviously depends on an equivalent number of maintenance best practices. A lagging indicator is innately complex and, to reiterate, it cannot be controlled except by divide and rule.

Look around for straightforward examples of best practice you can and should be using – this high value activity is known as 'benchmarking'. As stated, Shire provides free, comprehensive guidance in other publications. You can also root out maintenance indicators and benchmark best practices from sources like: BSI 15341:2007, SMRP (The Society for Maintenance & Reliability Professionals – www.smrp.org), a sister organisation or a supply chain partner.

Good provenance adds weight when you need to convince others in your organisation. You may also spot something valuable on your travels, or in the media – and it could be from a totally different sector.

In the days before KPIs came on the scene, an organisation's maintenance performance was judged by noting the presence or absence of known best practices. Nothing has really changed except that, with the use of computers, we're getting much smarter at measuring and putting a number on the results. It's become very easy to make objective comparisons between operating units and track incremental improvements in their individual performance.

To reaffirm, don't focus on more than a handful or two of benchmark best practices at any one time. The management time and attention their implementation will inevitably consume is considerable. Your Dashboard must balance the inherent complexity of maintenance management against your own time-bound capacity to assess, plan and coordinate activities. The Working Time Directive has its good points!

Maintenance performance is ultimately determined by the practices in use and, critically, the behaviour of those individuals applying them; these are the real determinants of maintenance success. Your main concentration and effort should therefore be on bedding-in your chosen best practices in the workplace, educating and guiding members of your crew and other contributors to ensure the necessary winning behaviours. Being able to see the results of their input efforts directly reflected in

improving indicator values will drive their commitment and enthusiasm.

Leading indicators measure and express in quantified terms what's happening on the ground – they keep a tally. They tell you if you're getting better or worse - and they help you decide what's working, what's not and what, who and where to push to get your next incremental win.

One big proviso – it's no use measuring if you don't take action. It's a total waste of time. The only purpose of measurement is to trigger and guide appropriate action. Performance management demands that you have a bias for action – so it's essential that you never duck out of taking prompt controlling action in response to your measures.

Sustaining your gains

You may gain, but can never sustain, competitive maintenance and business performance without achieving the prerequisite level of competency in each contributory best practice. Competency has to become embedded within your organisation; ingrained discipline is what you're looking for. Going back to the car driving example: even with a fully informative dashboard, some individuals still run out of fuel and even blow up their engines! Success is not assured without the necessary attentive, disciplined behaviour. That takes good leadership to achieve.

Let's go!

The drivers of maintenance management success are generally well-known:

maximisation of planned work, preventive maintenance, schedule compliance, failure analysis, ready availability of spare parts, operator maintenance, etc, etc – savvy individuals in the workplace can reel them off – and yet they're too often ignored. Better uptime, equipment reliability, process capability, costs, safety, profit and your own success as an engineering or services manager all depend on them. So, with a bias for action, make a start; set the targets and configure your Dashboard. Let's go!



Pirana CMMS is your essential partner on the road to maintenance success. It will make your journey so much easier, less stressful and more successful. ■

If you're wondering, it's a Cobra dashboard

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