Value Driven Maintenance® — discover the hidden value in your maintenance organization

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What is actually the added value of maintenance? A frequently heard question in boardrooms the world over. Even though maintenance is often critically important, few maintenance managers are able to answer the question convincingly, especially when they are asked to express the benefits in terms of economic value added or shareholder value – the language increasingly being spoken in boardrooms all over the world.

It is for this reason that Mark Haarman and Guy Delahay developed the methodology of Value Driven Maintenance®. VDM builds a bridge between traditional maintenance philosophies and managing by economic added value. Not only does VDM simplify the boardroom discussion, it also shows that far from being a cost center, maintenance can create significant economic value, improving the overall business performance.

1. WHAT IS VALUE?

Before you can manage by economic added value, you have to understand what exactly value is. Reference to financial literature reveals that value is defined as the sum of all future free cash flows, discounted to today.

This sounds impressive, but what precisely does it mean? Let’s start by looking at the first part of the definition. A cash flow is the difference between income and expenditure. This is not the same as the difference between revenues and costs, because that’s an item that can be greatly influenced by accounting practices. Some companies use highly creative lease, depreciation and reservation techniques to keep their book profits artificially high (or low!). This does not always contribute to the economic value of the company. Newspapers have been crammed with articles on this subject in the recent past.

The second part of the definition stems from the knowledge that the value of a cash flow is related to time. One euro is worth more today than one euro next year. This is because you can deposit a euro at the bank today and use it to generate income over a period of one year. Therefore, we have to adjust future cash flows.

2. VALUE OF MAINTENANCE

A maintenance manager is likely to say: ‘This theoretical approach is all very well, but what good is it to me in practice? The value of maintenance comes from delivering maximum availability at minimum cost’ While this is true in theory, it’s little help in the day to day operation.

This is because you have to prioritize: do you want to reduce costs or increase uptime? Is a 1% increase of uptime just as valuable as a 1% reduction of costs? And how do you determine the value of safety? VDM provides answers by identifying the value potential of the four value drivers in maintenance and enabling you to manage by those drivers (see Figure 1).

Figure 1: Maintenance Value Drivers

Figure 1 shows what maintenance is all about. Today’s maintenance managers are constantly balancing between higher machine availability (asset utilization) and lower maintenance costs (cost control). In doing so, they must take into account the growing body of laws and regulations covering safety, health and environment. To make everything work, they need to use the right technicians, spare parts, knowledge and contractors (resource allocation).

For all four value drivers, maintenance can help to increase a company’s economic value. In a market where there is more demand than supply, greater machine availability results in more products, more income and thus higher value. On the other hand, lower maintenance costs produce higher value by avoiding expenditure. The same applies to resource allocation. One example is a technical storeroom. Smarter inventory management of spare parts can enormously increase value for a company.

Similarly, the safety, health and environment (SHE) factor affects value. SHE accidents tend to necessitate substantial expenditure, with resulting negative cash flows. Damage caused to personnel, environment and image, for example, will increase expenditure. An even greater danger is loss of the license to operate because of inability to comply with SHE legislation. No license to operate means no production and no income.

3. VALUE POTENTIAL

Maintenance managers must show where there is potential for value within their maintenance organization and should focus on the value driver with the highest value potential. VDM provides calculation models and industry specific benchmarks to determine the dominant value driver within the maintenance organization (see boxes 1 and 2).

Note that the result of the calculation of value will differ markedly depending on the industry involved. For example, in the European industry for construction & building material there is currently less demand than supply and prices are under considerable pressure. The value potential here lies...
mainly in controlling costs and the smarter deployment of people and resources. In most pharmaceutical companies, the situation is the other way round. Demand for medicines continues to grow but the technical availability of the production process is relatively low. This matter is obviously receiving attention. The SHE factor here is becoming more and more important with the growing role of the American FDA (Food & Drug Administration) in the global pharmaceutical industry.

4. VALUE AND TIME
The next example shows that value depends not only on the industry concerned, but also on time. Around 2007 the automotive industry was one of the first industries that experienced the financial crisis. The demand for cars declined dramatically and automotive companies needed to change their strategy quickly, from top floor to shop floor, including maintenance.

Volvo Cars, the Swedish car manufacturer with plants in Sweden and Belgium, after years of focusing on Asset Utilization as their dominant value driver, suddenly found Cost Control became the number one. As their TPM based maintenance strategy was only aiming at plant uptime, Volvo Cars implemented VDM to optimize the maintenance costs. Three years later, in 2010 the maintenance manager from Torslanda, Volvo’s largest manufacturing site, announced that he had been able to reduce the maintenance budget by 50%, without jeopardizing uptime or safety of the plant. The lower cost levels helped Volvo cars to survive the financial crisis and to be ready for the future. They know that as soon as the demand for cars grows again, they need to adjust the maintenance strategy, focusing on Asset Utilization again. And so the dominant value driver – and thus the maintenance strategy – changes over time as a result of the market situation.

5. VALUE AND COMPETENCES
Once the dominant value driver and its value potential has been identified, the maintenance function must be organized accordingly. Which competences (see Figure 2 – page 17) are, and are not, important? Take the example of a plant in construction & building materials. The market situation means that most value is currently achievable by controlling costs. So the right-hand value circle must be configured from maintenance budgeting to cost analysis. The opposite applies to the pharmaceutical industry. There, the left-hand value circle must be organized from equipment performance planning to loss analysis. Interestingly, both value circles include the competences of reliability engineering, planning & preparation and maintenance execution. These competences are the link between the four value drivers (including SHE Management) and thus form the heart of VDM. On the bottom of the model you find the competences related to the four maintenance resources: MRO Supply Chain Management (spare parts), Service Supply Chain Management (services...
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**Box 2: Example of VDM Calculation**

Say a paper factory produces 1,000,000 kilograms of high-quality paper each year, with 50% asset utilization. The price of each kilogram of paper is €10, with a profit margin of 50%. The factory’s annual maintenance costs come to €500,000. The new maintenance concept will not influence the SHE factor. This makes the value of this improvement proposal:

- **FSHE,t = 70%**
- **CFAU,t = €5,000,000 x 15% x 10 = €75,000**
- **CFCC,t = €52,000**
- **CFRA,t = €7,500**
- **CFSHE,t = €0**
- **r = 16% (internally determined discount factor)**

Given the preventive nature of maintenance, the reliability engineer expects to increase asset utilization to 55% and to reduce the inventory of spare parts to €250,000. The price of each kilogram of paper is €10, with a profit margin of 50% asset utilization. The annual management costs for the inventory of spare parts (personnel, space, insurance, etc) equals 15% of the value of the stocks. The maintenance concept is of a highly corrective nature, with a SHE factor of 70%.

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To calculate the value of maintenance, this formula can be applied in the following way:

\[
PV_{\text{maintenance}} = \sum \left( \frac{FSHE,t \times (CFAU,t + CFCC,t + CFRA,t + CFSHE,t)}{(1+r)^t} \right)
\]

Where:

- **PV** = value (present value)
- **CFt** = future free cash flow in year t (cash flow)
- **r** = discount rate

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\]

Where:

- **PV_{\text{maintenance}}** = value of maintenance
- **FSHE,t** = SHE factor in year t (% of compliance with SHE regulations)
- **CFAU,t** = future free cash flow in year t from asset utilization
- **CFCC,t** = future free cash flow in year t from cost control
- **CFRA,t** = future free cash flow in year t from resource allocation
- **CFSHE,t** = future free cash flow in year t from SHE
- **r** = discount rate

**Box 1: VDM Formulae**

The definition that value is equal to the sum of all future cash flows, discounted to today is translatable into the following formula:

\[
PV = \sum \left( \frac{CFt}{(1+r)^t} \right)
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- **FSHE,t** = SHE factor in year t (% of compliance with SHE regulations)
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**6. VALUE AND BEST PRACTICES**

Now we know which competences need to be improved, we need to determine how. For this purpose VDM puts forward hundreds of best practices that were collected from the leading maintenance organizations in different industries. All these best practices have been assigned to competences in the VDM model, so that you know which best practices to use in which situation. Total Productive Maintenance (TPM) enjoys a reputation mainly as the best practice for registering, analyzing and improving production losses (Asset Utilization). In contrast, Asset Based Costing (ABC) is a proven best practice for properly controlling maintenance costs. Using these best practices, a technical department can quickly become a professional maintenance organization that adds value to the overall business performance. In VDM terminology, this is called the Most Valuable Maintenance Organization (MVMO).

**7. VALUABLE?**

Is VDM valuable? Hundreds of maintenance organizations around the world and across industries think it is. Managing by value is not just a must; it is the only way to discover the true significance of maintenance. VDM makes maintenance more than a cost center because it contributes in various ways to a company’s economic prosperity. In fact, VDM confirms what we already thought, but now we have the proof!

**References:**

3. Investor information on www.bp.co.uk

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**The VDM Master Class**

Mainnovation, in association with Conference Communication, announces the launch of the Value Driven Maintenance (VDM) Master Class. This will be a one-day case-study conference in the UK (Warwick University) on October 23rd 2013, which will feature a complimentary follow-up one to one benchmarking service and access to a series of Master Class webinars. There will also be the option to attend the Maintenance Business Experience – the interactive business game for maintenance and reliability professionals – at a discounted rate.

For more information, email info@maintenanceonline.co.uk or telephone +44 (0)1252 783111.

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