

# Norman Eason's "Maintenance and Asset Management Information Systems"

This book is designed as an aide memoir or checklist for use in choosing, implementing and maintaining your asset information system

**One size does not fit all!**

**Understanding how requirements differ between different types of user arms the user in procuring and implementing a system that works**

## Chapter 1

### Scope of Book

*What's here and what's not*

#### What's here

This book is about the procurement of information systems to assist in the management of maintenance and asset management. It is intended as an **aide memoir or checklist** for use in the procurement exercise, covering the activities and considerations that are necessary for the successful procurement of a system.

This book covers the fundamental problems of what data and information are required for maintenance and asset management and **how requirements vary between different types of user.**

Armed with an awareness of these differences, the reader is then instructed on how to go about the procurement and implementation of appropriate information systems.

**Who is this book for?**

**It is appropriate for those skilled in maintenance and asset management**

**AND for those who are not but are fundamentally involved in using data from the system or contributing data to it— directors, I.T. personnel, accountants, production and operational personnel.**

This logical and empirical approach is appropriate for those skilled in maintenance and asset management. However, it is *essential* for the other readers of this book – the directors, I.T. personnel, accountants, production and operational personnel who are not cognisant of the maintenance jargon but who are fundamentally involved with the provision or use of information to or from the maintenance or asset management functions.

**Maintenance and Asset Management**

Chapter 2 identifies the differences and cautions the reader that movement from a traditional maintenance operation to asset management will take much more than the procurement of an asset management information system; it requires a fundamental change in culture that could take years to achieve. Indeed, the procurement of an asset management information system by a traditional maintenance operation without an accompanying change in culture could have a negative, rather than a positive, effect on the organisation.

**Data to Wisdom**

The reason for procurement of an information system for maintenance or asset management is to make use of the information that it accrues.. The system should be a fundamental part of the Data to Wisdom Ladder – Data, Information, Knowledge,

**Maintenance and asset management are not vertical software markets, i. e., they cannot be defined in a way that will comprehensively address the needs of all users as, for example, a software system for pharmacies or estate agents.**

Wisdom – and the choice of the system will determine its effectiveness. Without an awareness of how data and information interact and how best they can be managed, no system will be effective. Chapter 3 addresses this subject and also introduces the concept of data as an asset, whereby users of information systems are encouraged to view data (and information) as valuable company assets that should be managed in a similar way to all other corporately important assets.

#### **Objectives of Maintenance and Asset Management Systems**

Chapter 4 takes the objectives one stage further. If the use of data and information are the ultimate goals of the procurement and implementation exercises, then it is important to understand the role played by information systems in achieving this objective. Chapter 4 considers the way in which systems evolved to meet the perceived requirements of different types of industry, examines how vendors have addressed conflicting user requirements and explains why users' and vendors' objectives are not necessarily the same. The impact of change on the ultimate effectiveness of the systems is also covered.

**Procurement and implementation is dealt with in detail**

### **The Nature of the Problem**

Chapter 5 gets down to the major problem of difference. Maintenance and asset management activities exist in vastly different operations, including manufacturing, process plant, utilities, buildings and estates, transportation, retail and leisure operations. Although there are certain similarities between each of these activities, the nature of the parent operation fundamentally affects the way in which maintenance or asset management is performed. However, even within a common industry such as brewing, there are so many different factors affecting data and information that it would be unlikely for any two brewing operations to achieve similar effectiveness from the use of identical systems – this refutes a common misconception in purchasing systems.

Since 1980, the author has studied the factors that cause the requirements of each user to be unique. These are covered in depth in Chapters 6 to 12.

### **Evolution and Revolution in the Development of Asset Information Systems**

Chapter 13 looks at the product development of systems and the role that user organisations play.

**The discussion in this book is not limited by any particular maintenance strategic or theory**

### **Procurement**

Chapter 14 is a long chapter devoted to the entire procurement and implementation exercise. Definition of a maintenance strategy, determination of the ownership of data and information, and the handling of recursive data and information are covered. The constraints placed by one's own organisation are considered. Production of the specification and analysis of the market are important sections, as are the formation and control of the implementation team and the management of any compromises that may have to be made after final selection. Sections on implementation, training, testing and acceptance complete the chapter.

### **Successful Implementation**

Chapters 15– 17 cover the understanding needed to keep your asset information system in tune with your needs. It looks at 'through-life effectiveness', how to objectively assess progress and risk analysis in system procurement. A subject as important as maintenance and asset management should include a chapter on ethics - this is handled not only in relation to vendors of systems but also with respect to the users of systems—the organisations themselves and their employees.

**The evolution of information systems was influenced by the ability of software vendors to market their products**

### **What's Not Here**

#### **Maintenance Strategies**

The book specifically steers clear of any discussion of maintenance strategy; there are many books available that cover strategies, theories and procedures. These all have their place in the advancement of maintenance and asset management and, by their very nature, the philosophies that they expound are not static but move along with the progress of knowledge and experience. Any reference to these theories and strategies must therefore take this evolution into account.

A book such as this one, written for a related subject, must thus acknowledge that any references to these strategies and theories should be current and relevant. This is an enormous task, on top of the main task of this book. Therefore, where any reference is made in the book to any maintenance or asset management strategies or theories, the reader should consider such a reference in respect to the **generic** strategy or theory, and not to any particular version or relationship.

#### **Avoiding the limitations of history**

The relationship of the subject of this book to maintenance and asset management strategies and theories is interesting. For many years, the

**Richness of functionality is not necessarily a key attribute of a system; usability of the available functionality by the user organisation is, however, a definite attribute**

evolution of information systems for maintenance management progressed according to the functional requirements of the marketplace, and this was certainly the correct approach at the time. However, in an attempt to gain better market visibility in relation to their competitors, many software suppliers began to advertise their products as being compliant with this or that maintenance strategy or theory. Again, this would appear to be the correct approach. But shouldn't **all** maintenance and asset management information systems comply with the information storage and access requirements of **all** strategies and theories for maintenance and asset management; if this is not the case, then the software vendors are really not doing their jobs!

There may well have been an excuse for inability to handle certain strategies and theories during the evolution of maintenance information systems in the nineteen eighties, but computers have for some considerable time been able to handle any complex structures and activities necessary for these strategies and theories. Thus the promotion of the ability to handle them should not be necessary; rather, the omission of this capability shows a lack of awareness of the requirements or an unwillingness to suitably handle the activity! This book will therefore not be constrained by the progression or limitations of maintenance and asset management strategies and theories.

**Technology may change but the principles behind choosing and using go on**

### **Maintenance Functionality**

Another area that will not be covered by this book, for very good reason, is the **functionality** of maintenance and asset management systems. As with strategies and theories, many books, papers and articles have been written in relation to the functional requirements of maintenance and asset management systems. This book is not intended to add to this list. The functionality of a maintenance or asset management system, as we shall see in Chapter 5 of the book, is diverse, changeable and dependent upon a large number of factors. Richness of functionality is not necessarily a key attribute of a system; usability of the available functionality by the user organisation is, however, a definite attribute. Functional requirements differ substantially between user organisations, and the nature of the system functionality must be expected to change as the operators become more proficient and require more from the system. Thus, although the effect of functionality on the procurement process will be discussed in the book in Chapter 7, no checklist of essential functions will be produced.

### **Technology**

For a book entitled *Maintenance and Asset Management Information Systems*, the next omission must seem strange. Although, as with



**Separating the data and information requirements from the actual hardware and software technology will also allow an organisation to judge the progress of its system objectively, no matter how its corporate I.T. strategy changes.**

functionality, we shall be discussing the effect of technology on the procurement process (in Chapter 8), this will not represent a major discussion on computer technology.

### **We will not be discussing computer technology!**

How can you possibly consider information systems without getting deeply into the software and hardware technology? I will answer this question by asking a whole series of other questions.

- How can you adequately cover a subject as big as the procurement of maintenance and asset management systems while at the same time covering the current spread and future trends in hardware and software technology?
- How can you predict ahead even over the next two or three years what is likely to happen to hardware and software technology?
- How can you predict the likely adoption of this technology by maintenance and asset management organisations?

I have every intention of making the contents of this book both relevant and progressively of use to its readers for many years from its date of issue. Inclusion of tracts of text referring to hardware and software technology that is current at the time of writing is not the best way to ensure that this happens!

There is, however, a much more serious reason why technology should be omitted from this book. As with maintenance and asset management strategies and theories, the procurement of information systems should be considered from the viewpoint of the user's need to store and access data and information relevant to his business. The hardware and software vehicles are important, but they are **enabling mechanisms** which support the business objectives.

Provided that the users' ongoing requirements are met, then the hardware and software can be replaced by faster, cheaper and more relevant current technology - and very often that is just what happens!

Thus hardware and software technology are really secondary to the requirements of the system. It is much more important to get the system requirements correct to begin with, and keep on checking that these are correct.

This is not to say that hardware and software technology are not important for the successful ongoing activity of a system - that would be totally wrong! But they ought to be considered by an organisation's resident computer expert in relation to the current strategy of the organisation and the trends of the market. Separating data and information requirements from the actual hardware and software technology allows an organisation to judge the progress of its system objectively, no matter how its corporate I.T. strategy changes.

### **Other Software Tools for Maintenance and Asset Management**

Finally, in order to avoid any confusion, it is important to state that the book covers only those software systems that act as repositories for data and information related to maintenance and asset management. There are a great many other systems that provide associated facilities such as condition monitoring, risk analysis, stores optimisation, etc. This book does not attempt to cover any of these areas, but does recognise in the relevant chapters that input of data from these areas and output of data and information to these areas is both necessary and important.

### **Key Points in Chapter 1**

This book is an **aid memoir** and **checklist** for the successful procurement of a maintenance or asset management information system

This book does not cover **maintenance strategy**

Any references to maintenance strategy should be considered as referring to the **generic** strategy only

No checklists of **functionality** are contained in this book, since functionality is diverse due to industry types, culture, etc.

Data and information requirements are separated from hardware and software technology, since the former have their own evolution path and the latter change with such speed that their visible relevance is limited

This book only deals with information systems for maintenance and asset management. It does not cover associated software systems such as condition monitoring, risk analysis, or stores optimisation but recognises the need to communicate with them.

# **Norman Eason's "Maintenance and Asset Management Information Systems"**

## **Chapter 2**

### **Maintenance and Asset Management**

As the title of this book shows, we shall be considering the procurement of systems for both maintenance and asset management. It is therefore essential to explain these two terms and to clearly show the difference between them. One of the problems in doing this is the changing perception of these terms in daily usage.

#### **Maintenance**

Maintenance is the more easily understood of the terms. It has been used for decades to describe the support of physical assets, although recently it has also been widely used in relation to the support of intangible assets, primarily computer software. Maintenance has always been concerned with the prevention of failure, failure modes, corrective measures and the co-ordination and analysis of these activities.

A major problem with the term 'maintenance' has always been its perception in general public awareness; it has always suffered from a poor press. Although there are some recent signs that this has started to change, 'maintenance' still cannot be regarded as amongst the major career choices of school leavers. Maintenance has suffered because of this. It is an activity which has evolved from the

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**“ Maintenance departments may well be effective according to their measured parameters but, in many cases, the parameters are wrong. “**

**“the correct parameters should be those associated with the performance of the business”**

experience of its participants and lacks the status which it deserves. This is certainly not to decry the value and effectiveness of experience; far from it. But the evolution of maintenance through this route, coupled with its relatively low status, means that the overall activity is not well placed to benefit its practitioners, their employers, or their industries.

Maintenance is a far from easy activity; it is an activity which is often under-resourced, if not in manpower, then certainly with respect to the funding, facilities and techniques appropriate to maintenance tasks. More importantly, maintenance suffers from the general absence of measurable links between the maintenance carried out and the effectiveness to the business of that maintenance. In a great many organisations, the necessary feedback to monitor this effectiveness is missing. Maintenance departments may well be effective according to their measured parameters but, in many cases, the parameters are wrong.

### **Business Needs**

Obviously the correct parameters should be those associated with the performance of the business. These parameters are relatively easy to obtain for organisations with tangible end products; each maintenance activity can be monitored against the measured throughput, quality and cost of these products.

With intangible products, such as those of an insurance company or bank, measurements of throughput, quality and cost of product are considerably more difficult to obtain. So what happens in these organisations? They measure the maintenance of their facilities by the easiest parameter available; by the cost of maintenance.

**“The practice of measuring maintenance by its cost is widespread throughout industry.**

**Happily this tradition is now being broken by those organisations which are considered by themselves and their peers as ‘world class’”**

Now this may well be an important factor in itself, but the cost of maintenance has very little to do with the relevance or effectiveness of maintenance.

Thus, because of the difficulty in obtaining the real business measurement parameters and linking them to maintenance activities, easy but wrong parameters are used and the maintenance activity is monitored in relation to these erroneous measurements.

Sadly, although suppliers of intangible products have been used as an example to illustrate this point, the practice of measuring maintenance by its cost is widespread throughout industry, including many producers of highly tangible products. This is a tradition that must be broken, and happily it is being broken by those organisations which are considered by themselves, and by their peers, as ‘world class’.

### **Asset Management**

The term ‘asset management’ is a more difficult term to describe and understand than maintenance. Asset management suffers from its usage in areas other than that connected with maintenance. To many people, the term ‘asset management’ conjures up financial assets, city broking, share ownership and the like. This is indeed a common and increasing use of the term. However, there is also increasing use of the term in relation to the maintenance activities of major industrial and commercial organisations. In order to fully understand this application of the term, and to differentiate it from what we have come to understand as maintenance, it is necessary to start by considering the objectives of any business.

**For each resource, be it finance, human resources, or assets, there needs to be a resource manager, who relates the performance of the resource to the goals of the business.**

### **Relationship of Resource Managers to the Business**

Any organisation, no matter in what business it operates, works ultimately towards a *mission statement* which defines the objectives of the business. For many organisations, this mission statement is effectively set in stone and does not change significantly, if at all, throughout the life of the company. However, many other organisations, particularly those that are more astute, progressive and world-class, recognise that the mission statement itself must be progressive and must be re-visited according to new markets, new opportunities and changing legislation.

Beneath the mission statement in the hierarchy of an organisation are the *resources* which are utilised in order to achieve the mission statement. These resources will vary depending upon the individual requirements of the organisation, but will include financial, personnel, design rights, energy and, of course, the physical assets of the company.

For all of these resources, it would seem obvious that the role of the resource in relation to the mission statement should be defined and understood by all management and employees of the organisation. Furthermore, it would also seem logical that whenever the mission statement is changed, the role of each resource should be re-examined in relation to it. Also, if for any reason a resource is subject to a change, whether internal or external, then it is again necessary to re-examine the relationship between the resource and the mission statement.

### **Credentials of Resource Managers**

Now this argument immediately raises two very important points. Firstly, would it not be advisable for

**Enterprises are paid to create wealth, not control costs. *Peter F. Drucker***

**Each resource manager should be a business manager.**

**But many physical asset resources are handled by operational managers.**

whoever is responsible for each resource to continuously monitor the effectiveness of the resource in fulfilling its role in relation to the mission statement? Secondly, this responsible individual must not only be fully conversant with the operation of his resource. He should be continuously aware of how his resource operates in relation to similar resources in other organisations, with the current best practice in the operation of his type of resource, and with the ongoing relevance of his resource to the business of his organisation. In other words, each resource manager should be a business manager.

This may seem a very obvious statement to make as all financial and personnel managers or directors are obviously fundamentally tied to the ongoing operation and business of their companies. Many physical asset resources are, however, handled by the operational managers or directors of companies. As a result, these resources are likely to take second place in relation to the main activity of the manager or director. Even if these operational managers or directors appoint a manager to look after physical assets, this resource is likely to lose any direct connection to the mission statement, thus removing a link that is still retained by the company's other major resources. In this way, the essential feedback loop and key measurement parameters are likely to become confused or lost. The outcome of this approach is the measurement of a maintenance operation by the easiest parameter available, i.e., by its cost.

### **Maintenance Management in Relation to the Business**

We can see that the main problem here is the lack of appropriate representation for the physical asset



**Where the main objective of the maintenance manager is to keep within each year's budget, the approach is one of "departmental maintenance"**

**Assets are the basis of an organisation's wealth.**

- **R e c o g n i s e their worth**
- **Optimise their worth**
- **And do the same for those that look after them**

resources of the company at a high enough level. These assets may have at one time been recognised as important, but were often the subject of cost-cutting and consolidation exercises. This results in a deterioration in respect for the assets ( and therefore for those responsible for the assets). This is a situation that tends to get worse. If the management of physical assets is considered as a low order activity, and particularly one from which no senior managers or directors are likely to be promoted, then it is likely to deteriorate into the lowly status of a 'necessary overhead'. No real investment is made in the department, it comes well down the priority list in the allocation of people, money and management time, and its budget is likely to be continuously reduced in relation to that of the previous year. This, unfortunately, is a very common scenario. The collective term for this type of activity, where the main objective of the maintenance manager is to keep within each year's budget, is departmental maintenance. There are maintenance management information systems that cater only for this type of operation; these will be referred to in this book as *departmental maintenance information systems*.

### **Asset Managers as Business Managers**

Asset management is somewhat different. Asset management is synonymous with the concept of a true resource manager as described earlier in this chapter. An Asset Manager is a true business manager, responsible for the effective and efficient use of the company's physical assets in relation to the requirements of the business. His business acumen must match, and be complimentary to, his expertise in his specialist field, in this case the operation and support of the company's physical assets. In this

**an asset manager's information system must incorporate all of the requirements of a maintenance manager.... but be much more of a management information system than an application software package.**

respect, his specialist training and experience must include all that would be required of a professional maintenance manager, coupled with the necessary business knowledge and training which would enable him to effectively manage the company's resources and professionally communicate with his peer resource managers. Clearly, this is a considerably different job from that which is traditionally expected of a maintenance manager. It is, however, what is now expected of physical asset resource managers in progressive, 'world class' organisations.

### **Information Requirements of Asset Managers**

It is obvious from these two descriptions that the information systems required by asset managers must be somewhat different from those required by maintenance managers. Of course, an asset manager's information system must incorporate all of the requirements of a maintenance manager, but it will also require considerably more functionality, the ability to emulate complex structures, much more comprehensive interfacing capability and the ability to search extensively for wide-ranging operational information. It must be much more of a management information system than an application software package. It is also likely to be much more difficult to set up and will ask many more questions of the user. This complexity will be seen by comprehensive and progressive users as being necessary in order to flexibly cater for the ongoing requirements of their business. Throughout the book, we shall refer to the information systems catering for these requirements as *asset management information systems*. However, users who conform more to the 'departmental maintenance' type will see such set-up requirements and comprehensive communication as very much of

**There are two distinct types of system requirement and it is very important for any prospective purchasing organisation to recognise which type they belong to.**

an overkill for their activities. Thus there are two distinct types of system requirement and it is very important for any prospective purchasing organisation to recognise which type they belong to. Their decision will not only affect the purchase price of the system; it will also affect the set-up time, the usability and the expandability of the system.

### **System Expansion**

Expandability is important and we shall be considering the requirements of system expansion in Chapter 10. It will, however, be necessary for some organisations to consider their eventual transfer from a departmental maintenance organisation to that of an asset management organisation. This is a much greater task than merely changing the type of information system. It has strategy, culture and change management implications. Therefore, it is essential that an organisation honestly identifies its current type of maintenance operation before embarking on the procurement of an information system. If it can accurately be defined as a departmental maintenance operation, then there are three options. The first of these recognises that the operation will remain a 'departmental maintenance' activity for the foreseeable future, in which case asset management information systems need not be considered. The second case is when a move to asset management has been agreed and planned. In this case, all the other relevant activities, such as strategy definition and change management, will have been put in place, and the objectives and requirements of an asset management information system will have been defined. Thus procurement of an asset management information system to meet current and future requirements should be able to proceed in an organised and professional manner.

The third and last option is potentially full of risks. This is where an organisation with a current departmental maintenance operation believes that it should have an asset management operation and embarks on the procurement of an asset management information system without having put in place the necessary preparatory and parallel operations of strategy definition, culture management, change management, etc. Unfortunately, this is a very common occurrence, caused by organisations not being honest with themselves and misplaced egos being fed by unprofessional vendors. Problems encountered by adopting this approach are discussed in Chapters 15 and 17.

**Take this simple test to determine what attitude your organisation takes.**

Here is a test for whether or not your organisation has a departmental maintenance or an asset management attitude: -

Is any director or executive measured positively by the results of maintenance?

If this is true, then your organisation has an asset management attitude.

It must be remembered, however, that an asset management attitude is not the same as an asset management policy, but is a very important first step.

## Key Points in Chapter 2

- Maintenance management is not the same as asset management
- The difference depends on the **attitude** of the parent organisation
- Maintenance is generally under-rated, and is usually measured by its **cost**
- Maintenance should be measured by the **effect of the assets on the business**
- All of a company's resources should work towards the company's **mission statement**
- If the mission statement changes, then the relationship of all the company's resources (including the physical asset resource) should be re-considered
- Managers responsible for the physical asset resource should be **business managers** as well as having skills in their own speciality (maintenance)
- Two distinct types of information system are necessary - a **departmental maintenance information system** and an **asset management information system**
- An asset management information system caters for the more complex structures and relationships necessary for an effective corporate management information system, but also includes all the capability of a departmental information system
- It is extremely important that an organisation decides whether it operates a **departmental maintenance policy** or an **asset management policy**, and, if the former, whether it intends to progress to the latter
- Progression from a **departmental maintenance** scenario to an **asset management** scenario requires more than a change of information system - a change of **culture** and a considerable amount of **planning** are necessary

# **Norman Eason's “Maintenance and Asset Management Information Systems”**

## **Chapter 3. Part One**

### **Data and Information**

We are concerned in this book with the procurement of *information systems*. When we think about information systems, we normally envisage them fundamentally as software that is resident on a computer of some sort. Here, however, we shall consider information systems in a more generic manner, because it is essential that we remove any consideration and constraint of technology and get right down to basics in relation to information associated with maintenance and asset management. Of course, we shall ultimately be concerned with software and we also accept that this software must reside on some computer or other. However, the prime objective of *Maintenance and Asset Management Information Systems* is not the implementation of software or hardware - it is the *acquisition of a facility that enables the collection, storage and use of DATA and INFORMATION to assist in the management of maintenance and assets.*

#### **Fundamental Requirements of Data and Information**

We must start by putting technology aside so that we can consider what we mean by the key terms in the above statement - *data* and *information*. There

is an implied truth in the statement; that *data and information will be beneficial* in our management of maintenance and assets. If that were not the case, then there would obviously be no point in collecting and storing it, far less in going to the trouble and expense of procuring software and its supporting hardware to enable this to be accomplished. But it will really only be beneficial if the data and information are *correct and relevant*, and continue to be so throughout the period of their use.

### **Essential Requirements**

This raises some interesting points. When are data and information *correct*? When are they *relevant*? How do we define the appropriate *period of their use*? How can we ensure that they continue to be *correct and relevant throughout the period of their use*? These fundamental questions must really be considered before the implementation of any facility for storing data and information. If they are not properly addressed, and suitable answers established for each user organisation, then assumptions will be made which may seriously affect the outcome of the implementation exercise.

### **The Nature of the Market**

From an information systems viewpoint, the maintenance and asset management market is not a *vertical market* - i.e., it is not a market that can be defined in anything like a precise manner. It is more of a *horizontal market* - applicable to almost any industry and commercial enterprise. Therefore, it is not difficult to see that the data and information requirements of maintenance and asset management systems will vary depending on a user's industry or business.

**“Assumptions  
are the things  
you don't know  
you're making.”**

*Douglas Adams  
The Hitch Hiker's  
Guide to the  
Galaxy*

**Asset Management  
is a *Horizontal* rather  
than a *Vertical*  
market**

**data and information requirements will also vary depending on the *culture* of a user organisation**

What is not so obvious is that the data and information requirements will also vary depending on the *culture* of a user organisation. This covers a vast area, including company history, skills transfer, competitiveness, personnel policies, staff relationships and the rigour of management.

Clearly, as organisations are affected by so many different factors, it is not possible to provide a common definition of what data and information should be collected for maintenance and asset management. However, the problem does not stop there. Even two organisations in the same industry with similar cultures that implement the same system at the same time are likely to start with different maintenance history. Furthermore, even if they make a clean sweep and start again, then it is unlikely that they will have the same learning and development rates. Thus their requirements for, and use of, data will be different, and will be likely to remain so thereafter.

### **Specific Requirements**

The previous paragraph shows that *correct and relevant data and information* becomes very specific and personal. And so it should. It is relevant to an organisation's *own* way of working. It is relevant to its *own aspirations and its own improvement capability*. It can, and should, be the basis of its competitiveness - and could ultimately be the factor that ensures its continued existence! Increasingly, process and manufacturing plants within the same organisation are finding that they are competing with each other to produce the company's products. Each plant is required to show that they are operating more efficiently and effectively than other plants in order that they may

**Correct and relevant data and information becomes very specific and personal**



**The myth of efficiency lies in the assumption that the most efficient manager is ipso facto the most effective; actually the most efficient manager working on the wrong task is not effective.**

*R. Alec Mackenzie,  
U.S. Management  
Consultant and  
Author, 'The Time  
Trap'*

continue to manufacture their current products or be allowed to bid for the manufacture of new products. Fundamental to the achievement of differentials with respect to efficiency and effectiveness is the operation of the company's physical assets at each plant. And fundamental to this operation is the ability to monitor efficiency and effectiveness and provide proof to plant and company management that this is happening.

Note that efficiency and effectiveness are not the same, nor is one likely to occur because the other is present. This is put most succinctly in the quotation from Alec MacKenzie in the sidebar.

It is only possible therefore, to be sure that the tasks which are worked on by maintenance and asset management staff are *efficient and effective* by being able to rely on *correct and relevant data and information*. Furthermore, unless one wants a static organisation, then *correct and relevant data and information* are essential for the *progression* of any organisation. They give an organisation necessary and powerful weapons to handle *change*. Change arising from the need to compete, change arising from the need to keep up to date with legislation, change because of financial and market fluctuations, and change because *few things last for ever!* Change will happen, whether we like it or not. And maintenance and asset management operations have *never* been able to remain separate from changes that happen to the business.

What *data and information* will provide for maintenance and asset management operations is the ability to handle change from a position of strength rather than from the previous norm of weakness.

**“Change is a law of life, and those who look only to the past or the present are certain to miss the future.”**

*John F. Kennedy*

**If you don't look after the DATA, then you cannot trust the INFORMATION.**

## **Definitions**

We live in an age where many words are used ambiguously or wrongly. Words thus tend to deteriorate and their constant use results in confusion. An excellent example is confusion with the subject words of this chapter - data and information. What exactly is data and what is information; what is the difference between them and when should each be used? In order to answer these questions, we must start at the basics, i.e., we must refer to the dictionary.

**DATA** - facts given, *from which others can be inferred*

**INFORMATION** - intelligence given  
- knowledge

*Chambers English Dictionary*

Chambers defines a *fact* as *a real state of things*. *Data* is the fundamental mechanism for providing *information*. Put another way, *information* is inferred or acquired from *data*. Thus, if the *data* changes, then the inferred or acquired *information* must be re-assessed. Furthermore, if the data is *wrong or suspect*, then the information will be *wrong or suspect*

If you don't look after the DATA, then you cannot trust the INFORMATION.

**KNOWLEDGE** - assured belief  
- that which is known  
- information  
- enlightenment  
- learning

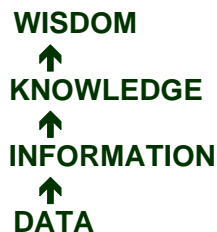
**WISDOM** - the quality of being wise  
- judgement  
- the ability to make the right use  
of KNOWLEDGE

*Chambers English Dictionary*

However, the impact of data goes further. We started at the base level with *data* and have climbed up a level to *information*, which we have seen to be fundamentally dependent upon *data*. Let's explore the next two levels up, those of *knowledge* and *wisdom*.

We saw in the earlier definition that *knowledge* was an alternative for *intelligence*. Just as *knowledge* is linked to *intelligence*, so also is it linked to *wisdom*. Thus we now have a link right down from *the quality of being wise and judgement* to *the quality of the collected data*.

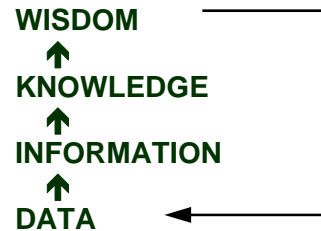
**The Knowledge  
to Wisdom  
Ladder**



We can thus see that there is a recognisable structure linking the basic data collected to the mechanism for decision-making at the top of the organisation. This data to wisdom progression, like most important structures, appears logical and simple once the links between the entities are identified and understood. The structure, however, is not complete. It requires a feedback loop enabling the definition of the data and the manner of its collection to be able to be changed as a result of the

**Effective Data to Wisdom Ladder.**

acquired wisdom. This forms an effective *Data to Wisdom Ladder*.



Data is thus used as a *resource* in the business of decision-making. Here we have an appropriate analogy with the resources that we considered in the previous chapter. Just as the resources mentioned then were fundamentally important to the success of the business, so the data resource is the basis for the ultimate wisdom and decision-making in each part of an organisation.

Let us now take the analogy one step further. We discussed in the previous chapter the role of physical assets as a resource to the business. Now we are considering data as a resource for the generation of wisdom and the ability to make judgements and decisions. It is a short step, therefore to examine the possibility of data being an asset. When we look into the life cycles of data and assets, the similarities are compelling.

**Data as an Asset**

Once again, let's start at the basics and examine data and assets in relation to their dictionary definitions.

**DATA** facts given, from which others can be inferred

**ASSET** something advantageous or well worth having

*Chambers English Dictionary*

**“Where is the wisdom we have lost in knowledge?**

**Where is the knowledge we have lost in information?”**

*T.S.Eliot,  
'The Rock' (1934)*

**Quality of wisdom, knowledge and information all rely on the quality of the basic data.**

**Data and all its derivatives are VALUABLE ASSETS in any organisation, and must be recognised as such.**

We have seen earlier that data is valuable, provided that it is correct. Assets are advantageous, well worth having - valuable - *provided that they are well looked after!* Quality of wisdom, knowledge and information all rely on the quality of the basic data. Thus data is certainly advantageous and well worth having, *provided that it is well looked after.* Data can thus be considered to be a *valuable asset.*

Just as a physical asset needs to be looked after or maintained, so data needs to be looked after and maintained. Both maintenance tasks are necessary for the same reason; if they are not done, then the asset will deteriorate and its relevance to the owning organisation will be suspect.

Data is a valuable asset

- if it is acquired correctly
  - if it is stored correctly
  - if its life is managed
  - if its usefulness is monitored
- i.e., it is just like a physical asset!*

DATA and all its derivatives - INFORMATION, KNOWLEDGE AND WISDOM - are VALUABLE ASSETS in any organisation, and must be recognised as such.

Just as physical assets have a finite life cycle, so data has a finite life cycle. This may seem a novel concept for some, as it is common nowadays for organisations, because of the low cost of computer memory, to neglect the data life cycle and let data reside on their systems long past its usefulness, even to the stage where its presence starts to become difficult for the system manager.

**Practically all large corporations insure their databases against loss or damage or against their inability to gain access to them. Some day, on the corporate balance sheet, there will be an entry that reads '*Information*'; for in most cases, the information is more valuable than the hardware that processes it.**

*Grace Murray  
Hopper, Retired US  
Rear  
Admiral, Washington  
DC, 1987*

I have come across a great number of organisations that even transfer such 'stale' data from one system to another because that decision is much easier to make than the decision to investigate the real value and use of the resident data. *Does this seem familiar?*

Just as an old, neglected physical asset can become a liability, so data that is not properly looked after ceases to fulfil its planned use and becomes a problem to the user organisation. Similarly, just as physical assets go through an installation phase and are situated in the most appropriate position to serve the anticipated role defined for it by the organisation, so data has to be installed in the most appropriate environment to ensure correct use as defined in its installation plan. In the case of data, its 'site' is the information system, so it is essential that the information system is capable of handling the anticipated, *and the actual*, life cycle of the data.

As an interesting extension to this idea of an information system being a 'site' for data as an asset, what would be regarded as the 'site' for wisdom? How fit for its task is this site and how does it ensure that its retained wisdom is relevant and that inappropriate wisdom is replaced?

The Data to Wisdom Ladder is only true if the implementation and storage mechanism at each stage is appropriate and capable.

### **The Data Life Cycle**

It is important to understand each step in the life cycle of data. At the start of life, it is acquired. At the end of life, data - or information - is discarded, although, as we have seen, this is not always the

**Wisdom is the ability to see round corners.**

*Anonymous*

**The data and information life cycle must be managed according to the changing requirements of the business**

case! What happens between these two events must be controlled. Normally what happens is the following: -

Data is collected

More data is collected

- *What happens to the old data?*

Data is processed into information

- *What happens to the data?*

New information is acquired

- *What happens to the old information?*

Policies change and new data and information are required.

- *What happens to the old data and information?*

The data and information life cycle must be managed according to the *changing requirements of the business*, and not be left to stagnate and become suspect. It is therefore *imperative* that any information system selected to hold and operate upon this data and information should be capable of handling these life cycles *without imposing its own constraints* in conflict with the life cycles.

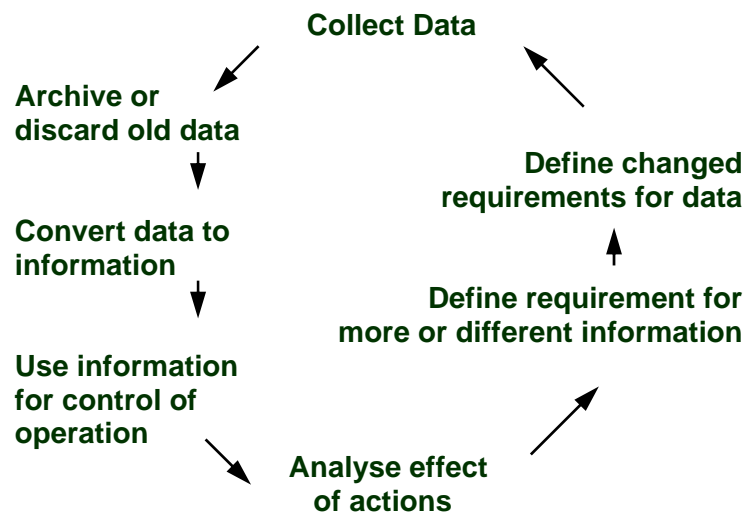
It must always be borne in mind that the objective of the implementation of an information system is to facilitate knowledge that is current and relevant to the business. The acquired - and *retained* - information must always be pertinent to - but also subordinate to - this objective.

The data and information life cycle must therefore look like the following: -

**Technology is so much fun but we can drown in our technology. The fog of information can drive out knowledge.**

*Daniel J Boorstin,  
US writer, academic, and  
librarian of Congress,  
New York Times, 1983*

**the degree of control and independence of a departmental operation is likely to vary considerably from one organisation to another**



### **Information Requirements for Maintenance and Asset Management**

We have seen in Chapter 2 that there is likely to be a significant difference in the requirement for information depending on whether the organisation is implementing a *departmental maintenance or asset management* policy. As the degree of control and independence of a departmental operation is likely to vary considerably from one organisation to another, and consequently their need for, and ability to acquire, information will also vary, it is not possible to define exactly what information such organisations should collect. It is possible, however, for them to interpolate from the requirements of *asset management* what subset would be appropriate for their own activities. Thus we shall concentrate on the information requirements of asset management operations.



**Maintenance and asset management operations are not well-known for their ability or willingness to handle change!**

The requirement for information will depend upon the changing business role of each asset or group of assets. This would seem obvious from the discussion of business needs in this and earlier chapters. However, the key word here is *changing*.

Maintenance and asset management operations are not well-known for their ability or willingness to handle change! The changing business role should be reflected through the *correspondingly changing maintenance and asset management strategy*. Once the duty cycles, uptimes, quality expectations, energy usage and operating cost targets of plant and equipment have been defined according to the business objectives, and *mechanisms for monitoring them and changing them according to the changing business requirements have been put in place*, then the *maintenance and asset management strategy* can be defined.

The definition of what information, and consequently what data, is required to support this strategy is thereafter a straightforward exercise. However, the ease of definition should not lead to a slackness of control. Two facts should always be borne in mind. These are:-

**The NEED FOR INFORMATION should always be questioned.**

**The QUALITY OF INFORMATION should always be monitored.**

These two points cannot be emphasised too strongly. If the rigour with which they are implemented is allowed to slip at any time, then it will affect *everything* connected with the information system, and the whole information operation will become suspect. This is a situation from which it is

extremely difficult - and expensive - and embarrassing - to recover, so it is best not encountered. However, to avoid it is not easy. It requires very rigid control of the entire information operation, including data validation and information comparison checks. It is so easy to let these slip. In order to help in preventing this from happening, remember two further points: -

**Think of the COST and EFFORT that it took to justify and implement the information system.**

**Think of the COST and EFFORT that it will take to recover from a suspect information situation and regain corporate confidence and respect.**

### Key Points in Chapter 3 Part One

- A maintenance or asset management information system is a facility that enables the collection, storage and use of **data** and **information** to assist in the management of maintenance and assets.
- For data and information to be **beneficial**, it must be **correct and relevant**.
- The maintenance and asset management market is a **horizontal** market, not a **vertical** one.
- Differences in system requirements depend as much on **culture** as they do on types of industry.
- Efficiency and effectiveness are not the same; efficiency applied to the wrong task is not effective.
- Data and information enable maintenance and asset management operations to handle **change** from a position of strength.
- **Data** - facts given, from which others can be inferred
- **Information** – intelligence given, knowledge
- If you don't look after the **data**, then you cannot trust the **information**.
- **Knowledge** – enlightenment, learning
- **Wisdom** – the ability to make the right use of **knowledge**
- **Data => Knowledge =>Information =>Wisdom**
- **Data** is an **Asset**
- The Data to Wisdom Ladder is only true if the implementation and storage mechanism at each stage is **appropriate and capable**.
- Data and information life cycles must be managed according to **changing requirements of the business**.
- The relationship between the **maintenance and asset management strategy** and the **business objective** must be constantly monitored and adjusted if necessary.
- The **need for information** should always be questioned.
- The **quality of information** should always be monitored.
- Consider the **cost and effort** that it took to **justify and implement** the information system.
- Consider the **cost and effort** that it will take to recover from a suspect information situation and regain corporate confidence and respect.