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CMMS
Templates for Effective Implementations

Position Paper

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Based on the book
CMMS: A Timesaving Implementation Process (ISBN: 0849313597)

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The Modern Maintenance Environment

As we commence the 21st century the burden of providing maintenance services to any organization has grown successively more and more difficult. Yet the technologies to support us today are also greater and more advanced than they ever were. Today we have a greater knowledge base and range of technical and methodology based tools than we have ever possessed. The level of education has far surpassed the level that it was 30 years ago; this includes teaching on most of the new array of methodologies and technologies in the market place today.

The past twenty years has seen the explosion in awareness of RCM and other reliability based concepts, there has also been the further development of these in various other forms for specific industries and market sectors. The result of this awareness has been a great paradigm shift through the majority of industries where maintenance management is required. This is the new understanding about the function of maintenance, its obligations and its responsibilities in the modern industrial environment.

Also we have seen a vast increase in the knowledge of how equipment fails and how, equally importantly, we can detect it. This along with the need for higher reliability in our fixed and mobile assets has helped create an enormous advancement in condition monitoring tools and instruments. Thus we not only have the knowledge of how equipment behaves but we have also a vast array of tools to manage and apply this knowledge. Lastly we have seen phenomenal advancements in the world of computers and communications technology. So much so that today we are easily able to communicate with the other side of the world in a myriad of ways rapidly.

Among the greater advancements in these areas is the functionality afforded us today by CMMS systems. (Computerized Maintenance Management Systems) Today's CMMS can manage all of our possible requirements within the area of maintenance management. Not only that but we are able to create computerized networks to transmit that information immediately anyway in the world where it is needed. This level of technology has been accompanied by the creation, at times integral to the CMMS, of a vast array of specialist systems to manage reliability and condition based information.

Despite all of these great advances in our work environments the great majority of plants and industrial organizations continue to operate in a reactive state of maintenance. Why is this so? Firstly it can be said that although the concepts and new paradigms implicit in modern reliability engineering are widespread, they are still not common practice. So there is some reasoning there. Also the lack of fundamental knowledge regarding maintenance techniques has enabled the spread of some less than adequate methodologies parading as reliability solutions.

However the knowledge of the existence of this information is widespread and the level of application in industry is growing. There are also other factors contributing to the malaise we find generally today; however in my experience, the one overriding factor out of all of the reasons for this is the following:

"The maintenance business processes and the management of them, has not kept pace with the rapid advances in technology"

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There have been almost quantum leaps in the advances in management theory in the areas of business management, accounting and so forth. However the area of management of the business processes associated with Maintenance management has moved forward in a manner that is either slow or not at all in some areas. At times there have been pseudo advances in this area, all of which eventually are revealed for the substandard techniques they are. However the abilities and functionalities of the computerized systems made to manage this process has indeed continued to evolve.

Today the functionalities of CMMS, or the technology to manage maintenance, have outstripped our abilities to do so in practice. It is for this reason primarily that there are so many reactive state maintenance departments, even within those operating with advanced reliability programs.

Maintenance Management – Strategic Importance

Maintenance management has, in very recent times, become considered to be less important in the current business climate in general terms. Yet it falls to maintenance to comply with many of the raising requirements on businesses today. Chief among these is the need to remain competitive. As economic markets become tighter and tighter the need for *strategic advantage* over ones competitors has become increasingly important. The contribution of maintenance management and reliability concepts cannot be undervalued in this area.

Today capital moves around the world at a very fast pace, and countries that were yesterday good havens for capital investment, today are not so much in favour. A case in point here is the Mexican market under the NAFTA agreement. NAFTA gave the Mexican economy opportunities unheard of due to the cheap cost of labour and hence perceived cheap cost of doing business. However rising labour costs and **perceived** low productivity levels has left many companies questioning their investment in this market. Mexican operations are looking at the possibility of losing their *strategic advantage* due mainly to these factors, in various sectors.

Associated with this is the trend for the overall rising direct cost of maintenance thus requiring greater reliability of assets. Through increased reliability of corporate assets it we are able to move to their design capacities of production and performance. This then assists in the overall reduction of the unit costs of maintenance.

This has differing meaning in differing industry sectors. In a capital intensive industry it takes on a particular level of importance due to the high percentage of maintenance costs as part of the operational budget. In capital intensive industries maintenance can make up almost 45% -50% of the operating budget.

In manufacturing industries, while the percentage cost is somewhat lower, the level of automation and the high impact on the use of capital are where the benefits of reliability are most quickly felt in terms of operational performance. Unreliable assets produce their own strains on the ability of the organization to meet targets that are considered within the operating / production parameters of the organization.

The rising intolerance of society in general to incidents that damage the health of people, the community or the environment is another of the strong newer requirements on

maintenance to deliver high levels of reliability. Thus higher levels of confidence that equipment will not fail causing accidents are required today, more so than at any time in history.

So as is becoming obvious in the modern industrial environment, a company can gain strategic advantage in many ways via assuring the high performance levels of their equipment in a permanent manner.

However even with all of the much needed focus on reliability, none of this will serve us at all in the workplace unless we have the competencies and processes in place to both implement these advances, and to manage them for the long term. One of the major causes for failures in the implementation of reliability enhancement methodologies and/ or projects is the inability, or the unexpected difficulty, of making it happen.

As a simple example let us look at the management in an ordered fashion of preventive maintenance routines. If we have developed our routines correctly they will be focussed on the following points:

1. Detection of the indications of failing equipment so as to be able to take action with adequate anticipation.
2. Providing of human interventions in the forms of servicing, lubrications, replacements or refurbishments in order to maintain the equipment a high state of reliability.
3. Providing failure-finding inspections for protective and other hidden failure devices.

Our schedules should be designed, from the point of view of maintaining high resource efficiency, to be very exact in their frequencies and the work that we are doing. Therefore if we miss a scheduled detection routine, we are in danger of losing control over the adequate prediction or of failure. Equally if we miss a scheduled human intervention we run the risk of excess deterioration possibly leading to a failed state and excessive costs. Again it needs to be noted that this also has severe potential safety and environmental consequences. Of which industry in general is only recently starting to realise.

It then becomes obvious that while the content of this particularly simple example, the reliability focussed equipment strategies, are of course critical. The management of them is equally as critical.

The Decline in Importance

The advent of the financial reporting and management capabilities of some modern day ERP systems has caused a shift in the focus and drive of companies purchasing CMMS systems. During the past three years I have been involved in the sale and implementation of three enterprise level management systems. (This is a rather long sales process) I am currently involved in the pre-sales evaluations of various others.

During all of this time, while maintenance have *normally* been consulted, it is the heads of departments such as financing and product sales departments that are either making decisions or are vetoing the selections of systems focussed on reliability functionalities in

favour of others. This trend, of which I have seen in an exaggerated manner recently at lower levels within various organizations, is not only astounding but somewhat disturbing also.

The enterprise level system is starting to be aimed at financial managers One of the more successful ERP vendors, to my knowledge although I am sure there are others, actually considers it to be its corporate focus to cater to these positions of financial management in any enterprise. Even the amount of after sales support is focussed on financial departments. While maintenance departments, where there are very real, very large and very important issues to be managed are left to their own devices.

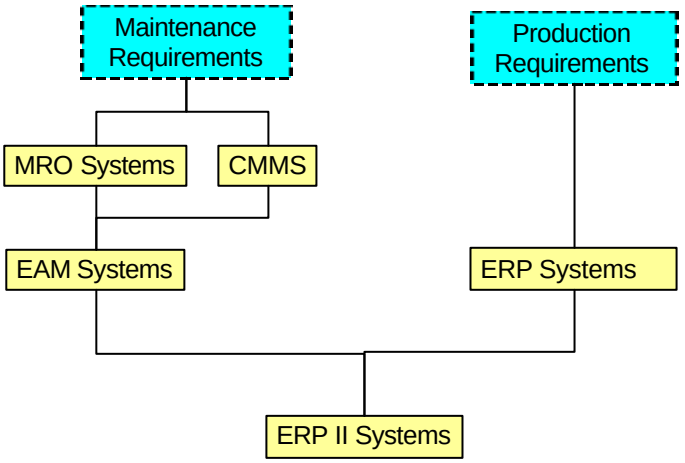
So in effect we are seeing, on a global scale, the subjugation of issues of reliability, safety, cost effectiveness, asset integrity and corporate resource planning to the management of financial reporting and procedures. The recent Enron disaster and other similar recent events, it appears certain, will further enhance this perceived requirement in the financial areas.

I was once a firm believer in the coming age of the CRO, or Chief Reliability Officer as a permanent corporate position akin to that of the COO, Chief Operating Officer. Although still a firm believer in the necessity of this position, it no longer appears to be a possibility in the short to medium term.

We as maintenance professionals need to put the case for reliability and management of maintenance firmly back on the corporate agenda so that we will be able to really achieve strong leaps forward in reliability, cost effectiveness and strategic advantage in our organizations. As long as the reliability responsibilities of corporations are not understood or given low priority in overall goal setting, we are doomed to have many future decisions regarding the requirements of maintenance determined by decisions in other areas of corporate activity.

The CMMS in Industry

The CMMS industry is divided into various styles of system providers, all of which are defined within the book *CMMS: A Timesaving Implementation Process.* For the requirements of this position paper we will only be speaking about the two main types. Those are ERP (Enterprise Resource Planning) and EAM (Enterprise Asset Management) style systems.



ERP Systems

The modern day ERP system is built on the needs of management of production planning and the optimization of resources to carry out these plans. Effectively they are the

products of the MRP and MRP2 theories and methodologies. There has been an enormous expansion in the use and implementation of these systems due to various factors. Principally however the manufacturing sector, at a global level, is immense. Secondly there has been the trend towards financial management requirements as detailed above. ERP systems tend to be outstanding performers in these two areas in particular. However it needs to be understood that *the management of maintenance is not, and never has been, a part of the MRP methodologies.*

Thus the implementation of these systems is generally not done with the requirements of the maintenance function in mind. Some of these style systems have developed reasonably strong maintenance management functionality, but the overall focus is ***not*** on the management of resources and information in the manner required by maintenance professionals.

EAM Systems

EAM systems have descended from the needs of maintenance in capital intensive industries. When we commonly refer to as CMMS we are, more often than not, referring to the functionality that is encapsulated in the large EAM style systems. Today they are truly enterprise level systems and include the relevant sub systems for managing finances, materials, human resources and even sales in some systems.

The EAM system is unique in its model for management of materials for capital intensive industries, and maintenance functionality in general. This is further given credibility by recent moves of major ERP producers to develop and market EAM style systems.

The Market

The market has grown increasingly competitive in both these areas. In the beginnings of the industry it was very much a vendors market, however today it is more and more a market determined by the buyer. The options among the low, medium and high end systems are staggering.

Within the next few years those CMMS providers that do not comply with the basic requirements of maintenance, will find themselves on the declining end of the CMMS market, or even extinct. Maintenance can and should be more demanding regarding CMMS functionality and pricing, the ability to find a good deal among providers is greater than ever and is set to become increasingly so. Yet the great many of the buyers in today's sales are blissfully unaware of many of these factors and distinctions, leading even further towards the failure of systems and to their outright overpricing in many instances.

During the last two years in particular the sales of large end CMMS systems has dropped off significantly. There is a large amount of discontent and disillusionment over what benefits can be provided and how much needs to be invested to receive these benefits. There are a great number of CMMS disasters also. These include projects that do not deliver the promised benefits or the promised changes in the operations that clients were originally offered. Although this market is starting to pick up again, it remains an area of doubt and of overriding discontent.

Recent development in this area is the employment of web based functionality to deliver the maintenance administration function. The implications in this area are immense, and will see the emergence of a whole new range of services that will be offered and that will lend themselves to outsourcing style arrangements. However current technology leaves a great deal to be desired in terms of delivering comparable functionality

Conventional views on software development and sales tell us that this will be not allow ASP's to be truly competitive in today's marketplace. However recent surveys by respected commentators in the area show major increases in the application and use of ASP systems. Mainly in the small to medium range companies. This appears to be due mainly to expense and complexity of the major large scale systems.

Therefore it can be seen that the advanced functionalities of the major large scales systems may have reached the point of diminishing returns, whereby companies are deciding to buy systems with less functionality due to price considerations.

Reasons for Failure

Before we can begin to analyse the reason for failure of CMMS system implementations we first need to determine what a failure of a CMMS implementation is. Failures in this area can be many and varied, for example it can include:

- Cost overruns
- Time Overruns
- Lack of end user usage of the system
- Failure to achieve promised benefits
- Even failure to become part of the every day life of a corporation.

So the amount of ways in which we perceive a CMMS failure is great. Also great is the number of ways in which we are able to create the environment for this failure. There are a number of these but as a grouping we can generally say that there was a basic failure in the definition of requirements. This is a statement that is made often and understood little.

So what do we mean by the failure of the definition of requirements?

Among the single most common reasons for CMMS failure I have seen is the lack of content. Or the lacks of understanding of what are the requirements of the assets that we are charged with managing. (The content of the system) As such the implementation of a computerised system, even when one was already in place, will only allow us to manage a poor situation better.

Another part of the failure to define requirements is in the definition of the business processes and the rules of the business as they exist today, and how we want them to exist tomorrow. The implementation of an enterprise level system is a tumultuous event with far reaching consequences throughout an organization. Even at a department only level it can have far reaching consequences throughout the organization.

Therefore we can see the implementation process as a means of taking the quantum leap in maintenance management techniques. It is a time of firstly: definition, and secondly:

the redefinition of the maintenance processes in use. Therefore as a part of this level of requirements definition we need to look at the business rules, processes and the physical scope of a CMMS implementation. This in terms of physical locations, number of final users and so on.

The defining of requirements step is something that requires an excruciating level of detail in some areas. However the payback from this is large and permanent. Over the years I have seen clients becoming a lot more efficient in their definitions of what they require from CMMS. However it is still very much a case of "*this is what we do today, give us a system that will do that!*".

In these cases the benefits possible through process reengineering has been lost from the outset and, frankly speaking, they become set up for a "dump and run style" implementation. (A particularly nasty but common practice.) In these cases it is all too common to find corporations trying desperately, after the event, to redefine their processes to match the functionality of the CMMS.

Other common failing of CMMS implementations: (All of which in one form or another are a part of the failure of requirements definition)

- Lack of executive support and "push"
- Even more dangerous, lack of middle management support.
- Lack of understanding of the benefits and implications of the implementation
- Poor change management. (Continuance of "fiefdoms" within the organization.)
- Lack of training in either the systems usage, or in the processes that we have, or have developed, to proceed in our maintenance mission.
- Poor follow up on processes and impact of the implementation
- Lack of cross department usage and or understanding (Lack of the internal client focus)

Another frequent occurrence is the lack of control over the implementation process by the client. This often is one of the causes of companies not attempting to implement all of the possible changes within a project. The perception that the organization is not ready, or that the change would be too great is a view of maintenance management from a generation ago. With the rates of change in the world around us everyday, how can we really believe that we need to isolate our organizations from this?

The template process is a means of avoiding these common traps and achieving success throughout the organization in the implementation of this essential management tool.

The Template Process

During the past 7 years I have been involved either directly or indirectly in a great number of CMMS system implementations. These have ranged from small 5 person workshops to gigantic multi country applications. In this process I have seen a great

number of the common failures listed above, but also a great deal of waste in the process of implementation.

After a while it became evident that the same debates regarding various parts of the implementation process were held again and again. As were many of the hours and hours of work that went into developing standards and processes. It began to amaze me how frequently I had been involved in the recreation of maintenance management, only to arrive at exactly the same definitions and standards in almost every case.

The template approach to CMMS implementations is designed to provide a successful format to CMMS implementing as well as a "jump start" to projects via the use of pre-defined, flexible practices and standards. These standards are able to be applied to any implementation and include the important points required to ensure the integrity of the maintenance delivery function.

In reviewing sites after an implementation many of the standards and procedures used within the template approach have also been able to be applied in a manner that assists greatly in the optimization of any CMMS and in its better acceptance by maintenance professionals and others within the company.

By utilising a template approach there is an ability to take firm control over the project from the very outset. From process design, to the functionality definitions, the training required, project size and scope as well as assignment of team members through to the post implementation impact analyses. Rather than being led by the consultancy firm through all of the steps required in a manner that is out of your control and is generally restricted by various contractual definitions and obligations.

7 Steps to Rapid more Successful Implementations

Listed below are the 7 steps are that form part of the template approach. Each of the steps mentioned here are very broad and generally require a series of different management tools in order to achieve the ultimate goal. That is a rapid and successful project in full control of the client organization.

1. Define the ROI attainable, and therefore the budget

CMMS provides benefits in a variety of areas. These include availability, increase in planning and scheduling efficiencies, increased use of standardized information, advanced inventory management and a greater volume of information available for reliability and efficiency analysis of the delivery of the maintenance function.

It does need to be added that while maintenance history information has little to no effect on the determination of maintenance strategy development, it does have a very large effect on the application of processes of failure elimination or root cause failure analysis.

There are obviously many areas from which an accurate savings could then be calculated given some variables beforehand. Once the saving has been calculated we can then look at defining exactly what our budget may be able to be set at. A saving of $100,000 allows us a spending limit of $1,000,000 if we are intent on a 10% ROI for example. A very normal way of managing this step is to ask the vendors to provide an ROI figure, often in

dollar terms, or percentage of saving, and often in a manner that is not linked to the actual purchase of a CMMS system.

As with all of the steps included in the template approach, part of the focus is to allow clients, or potential clients, some level of control over the entire process. This needs to begin with expectations of pricing and return on investment targets. Thus beginning the exercise of control from very early in the project.

2. Define the tactical goals of the implementation

The tactical goals are those that we also want to achieve apart from the ROI. However in order to better focus the overall implementation efforts there is a need to tie these with the overall ROI. It is important to note that finishing on time and on budget are not tactical implementation goals. They are givens. We do not at any time set out to fail in this crucial area.

For example, if one of the ROI goals is to achieve a 10% reduction in inventory levels. (Warehouse materials for maintenance in this case) Then we would be advised to address this requirement in the tactical goals. This may be expressed as increases in inventory rotations and of the service level of maintenance stock. These two indicators provide a good guide to creating processes for the efficiency and effectiveness areas of warehouse management.

Some other typical tactical goals of the implementation may include:

- increases in the estimations accuracy index
- increases in maintenance preparedness
- increases in planned and scheduled work
- better communications between the warehousing and maintenance departments
- better internal client focus from the human resources department to the maintenance department
- overall reduction in information management systems

3. Define the operating environment of the business

The operating environment of the business forms the base of the requirements statement we will need to define through this process. During this step we need to be defining what the physical and corporate environment factors are that affect our selection of system. Although somewhat tedious and, mos assume, straight forward. This is a pivotal part of our process.

Operating context definitions may include, but definitely not restricted to:

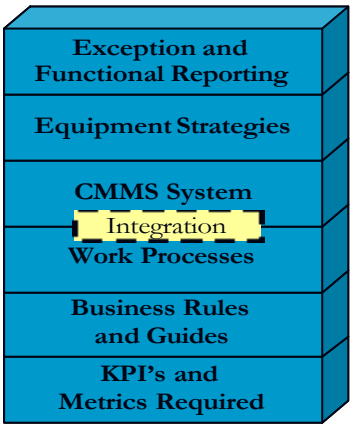
- How many sites are we going to implement the system in?
- What systems exist today that will need to stay in place? (Therefore what are the interfacing / integrating requirements?)
- What is the IT platform of our corporation?
    i. (*This point reveals something else in CMMS implementation that is of critical importance. Do not allow the implementation to become*

hijacked or derailed by interference from IT departments. As always we need to attempt to focus our attention on the overall benefits we will gain in the arenas of maintenance management, reliability of our physical assets and optimization of the use of our human assets.)

- How do our people work? (Rostering or shift arrangements, local or remote sites etc)
- What are our equipment classification types? (Many or few?)
- What are the current and future requirements for reliability focussed functions such as condition monitoring?

This area is obviously a large one and one that needs to be treated seriously as it forms the base, along with our ROI and cost statements, of our overall efforts.

4. Define the steps required to achieve the tactical goals



The diagram on this page illustrates a 6 step progression required to create implement proceed along the path to the realization of the tactical goals that have been created. In this particular case the goal would be the achievement of a planned state of maintenance management. (Steps to the Planned State of Maintenance Management©) However all of these steps, not including the 5th step, are essential elements for the creation of any business process involving modern day CMMS systems. This is especially true for the areas of maintenance and engineering.

For example in the 5th step in a process of inventory optimization the equivalent step may be the creation of spares management policies.

This part of the process is, without doubt the most laborious and difficult areas of any implementation template. This includes a vast number of areas all covered under the one heading. It is also the area where there exists the majority of waste in the implementation process. Many of the arguments are repeated time and time again in each project.

This paper includes a brief overview of what the terms of Business Rules and Work Processes; however a detailed approach to the steps required would need to cover all of these steps in this model. And as always, there are a number of common themes and principals that can be applied in each of the steps.

Business rules refers to a series of standards within the organization with regards to how we are going to manage maintenance in a generic and homogeneous manner.

Some example areas would include:

- Definitions of technical change management qualification procedures
- Rules on the prioritization of work, and how this is to be applied to the efficient management and programming of resources
- What are the maintenance indicators that will be applied
- How do we classify maintenance and work type.

There are a range of business rules associated with the implementation process. However as a general guide we need to be looking at those things that will be able to guide maintenance efforts in a generic sense over the entire operation. And these need to be created to suit the corporate goals of the organization.

Work processes refer to all the processes within the maintenance organization. These may include:

- Maintenance Planning and Scheduling
- Backlog management
- Technical Change Management
- Shutdown planning and execution systems
- Inventory management and dispatching systems

Some of the expected outcomes of this phase should be the development of role descriptions and role interactions, as well as the Work Order Life Cycle. ©

From here we are able to determine what are the business rule and process requirements of our system, as well as what are all of the roles who need to interact with the system, and at what point their intervention is required. For those systems with complex authorization functions this step should also provide the basis for easily determining the authorities required by each role.

This step can be used, in its complete form, for redefinition of the maintenance hierarchy if this is deemed appropriate.

5. Define the Training Matrix and plan for Delivery.

As a consequence of the previous steps we should have arrived at a point whereby we have our roles of people who need to interact with the system defined, and via the Work Order Life Cycle© we should also have determined when and what the interaction both with the system and in the process needs to be.

From here we are able to determine the training matrix for the implementation process. This is something that needs to be considered very carefully as it all too often leads to either the success or failure of the implementation effort. A crucial part of the training matrix is the development and deployment of training focussing on the processes we have defined in the previous step. This is without a doubt one of the key elements of CMMS failure.

Once the system is bought the training tends to focus on the functionality of the system, the recommendations of consultants and the half serious attempt to adapt existing processes to the new system. I have seen many times, and I am sure that I am not the only person, many processes created ***after*** an implementation. Thus often we are trying to adapt the organization to the requirements of the system instead of the other way around.

6. Define the management team and their required interactions and the Project Plan

There are basic rules to an implementation project; however most of these circle around the themes of involvement and empowerment of the implementation team. Depending on

the size and scope of the project the design and interrelations of the team required will change markedly.

It needs to be accepted that the elimination of the software vendor's consultancy services is not an aim of the template process. However there is a need for greater industry wide understanding of how to manage these type of efforts. Therefore potential clients can be empowered with greater control throughout the entire exercise. At this point in time we should have the requirements document pinpoint accurate including: (among other points)

- Interfaces / Integration points with other systems
- Migratory data should be recognised and a plan created for the management of this
- Processes have been re-defined to ensure the implementation of best practice CMMS management processes. And the functionality requirements will have fallen out of this. (Graded in the typical "Critical / Important / Nice to have" style of rating)
- Training requirements have been defined and have been planned out in terms of which role require what training is required for what roles.
- Key implementation information regarding size of project, team members identified and other critical information.

So at this point we are able to both create the requirements document and draft a general implementation plan for the rapid and successful project, executed under the control of the client organization.

7. Constant reviews and measurement against project objectives and timeframes

This stage is better stated as "Planning for Success" the project does not end until the benefits are realized and the "new" maintenance focus is both implemented and embedded within the corporate culture.

For this reason there needs to be the usual raft of project controls during the project to mark critical stages and points of control. But there also needs to be the planning of post project points of control. In these control points we can realise self audits of the system, of the project, of the amount of change that has occurred and perhaps future possibilities for dramatic change.

Conclusion

With the advances today in technology it has become obvious that there is a need for maintenance management theory and practice to catch up with the advances made in business management theory and practice generally. With a focus on the everyday processes that we use to implement and control reliability initiatives we will really begin to realise great leaps in company performance and cost effectiveness of maintenance. As well as realising the vast array of benefits available from an implementation of reliability growth initiatives and applications of new technologies.

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The current state of CMMS technology is at a very advanced level, in a lot of cases far more so than our ability to apply it. This tool has very strong and provable results, yet there are a great number of projects involving CMMS systems that end in failure and in cost and time overruns. The proliferation of vendors in this market, instead of driving costs down, has been driving them up. When this fact is combined with the common occurrence of CMMS "failures" it becomes obvious that the market should be buyer driven. Vendors need to be challenged and compared rigorously over pricing, after sales service and contractual guarantees. (Possibly even to the shared risk model recently adopted by some)

By using a template approach we are able to realise immediate benefits to the implementation process as well as to the delivery of the maintenance function. We may even be able to create the changes required without the purchase of a new CMMS by better utilising what we have today.

The principal gains to be made from adopting a template approach to CMMS implementations is through the application of the seven steps in which we can:

- Gain control of the process from the outset
- Redefine maintenance functions as per CMMS best standards
- Greatly reduce implementation time and outside consulting firm reliance
- Optimise the efficiency of the maintenance processes used to implement reliability initiatives and new technologies
- Greatly reduce implementation costs

As a final note it is necessary to restate the need for all of us, as maintenance professionals, to make the effort necessary to place the reliability and maintenance functions of our organizations firmly on the corporate agenda. It is the recent decline in the importance, or perceived importance, of this area that has led, in part, to the growing number of clients dissatisfied with CMMS systems. This is true especially among the high end or "tier 1" systems. (Principally through inadequate or indifferent selection focus with respect to the maintenance function)

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