Abstract: A business paper, which considers how measuring Key Performance Indicators in the Production phase using Industrial Information Management (IIM) solutions, allows plant and production managers to improve business processes which deliver outcomes that add significant value to the business.
About the Authors

This document was written by Peter Long, General Manager, Applications Engineering, Citect Pty Ltd.

Peter’s experience in industry spans more than 22 years during which he worked for a number of large Australian and global mining companies. In that time Peter gained experience in many facets of the business involving maintenance, engineering, projects and management including positions with statutory responsibilities. His relationship with the industry continued after leaving the major companies when he worked as a project consultant for 4 years mainly in the area of industrial control and information systems. In pursuit of these fields Peter joined Australian Industrial Automation Company, Citect where he now heads a group of software engineers developing Industrial Information Management applications. Peter’s mix of experience between control systems and management has given him unique insight into the world of plant performance measurement and the associated metrics that drive smart business decisions.

About Citect

Citect Pty Ltd is a worldwide leader in industrial automation and information management. Its Citect and Plant2Business software are complemented by professional services, customer support and training. These solutions are enhanced by strong partner programs and are sold in numerous industries, including water and waste water, facilities monitoring, gas pipelines, mining, dairy, food processing, pharmaceuticals, and power distribution. Citect is headquartered in Sydney Australia, has offices in Australia, USA, Europe, China and Africa, and its products are distributed in more than 40 countries worldwide. For further information, visit [http://www.citect.com/](http://www.citect.com/).
Contents
About the Authors ............................................................................................................. 2
About Citect.................................................................................................................. 2
Contents ...................................................................................................................... 3
Introduction .................................................................................................................. 4
Using KPI’s to drive the business ................................................................................ 4
How to use KPI’s with the improvement process .................................................... 5
What to measure with Process based KPI’s ............................................................. 6
Getting the most out of KPI’s ................................................................................... 7
  1. The attributes of a KPI ......................................................................................... 7
  2. Provide Corporate Standardization ............................................................... 7
  3. Tailoring Dashboards for different users ....................................................... 7
Continuous Improvement and Benchmarking ....................................................... 8
Awareness and Motivation ......................................................................................... 8
Industrial Information Management ........................................................................ 8
Introduction

More than ever before owners, executives and managers of production facilities are searching for ways to maximize the performance of their operations. However, it doesn’t stop there. Once genuine performance gains have been realized it is imperative to maintain, or enhance those results.

For many years improvement gains in production processes have been asset focused where bigger, better, faster has been the goal. Major investment in production assets produced the gains however it often came at a significant cost to the business. At a time when capital funds are tight and return on investment expectations are so demanding business owners are looking towards production efficiencies and effectiveness to extract performance gains and realize the full potential of their existing assets.

Faced with the compelling business need and the strong desire for success managers are looking to adopt sound methodologies to underpin these performance driven initiatives. There are many proven, well documented, methodologies ranging from Balanced Scorecard, Six Sigma to the modern day ISO9001 based on Continuous Improvement principles. Whatever the methodology it is paramount that visibility is provided at every step of the process. Traditionally this visibility has been provided through the use of Key Performance Indicators, presented through a dashboard type environment, which provide insight into both current and historical performance of key business measures.

There is nothing new about measuring performance through the use of KPI’s however their relevance has been limited by the timeliness of the information and the resource required to generate them. Business today needs this information fast. Decisions must be made promptly and operations must be agile and responsive. These business imperatives can be realized through the implementation of a true information management system, which delivers KPI’s through such mechanisms as Digital Dashboards and Visual Analysis tools. This paper discusses ways in which KPI’s can be used to achieve maximum operational performance and maintain the results.

Using KPI’s to drive the business

Lets take the example of a Balanced Scorecard approach. In this case the scorecard is designed to provide executives with a balanced look at the overall health of the business. The following diagram provides a simple illustration of the four key quadrants of the business. At the heart of the scorecard there must be sound vision and strategy that underpins the well-being and strength of the business. Each quadrant represents the cornerstones of a business. Typical KPI’s for the Finance quadrant might include revenue, profit or margin percentages. The Customer quadrant covers measures such as customer satisfaction ratings, support quality and mean resolution times. The Growth quadrant focuses on key learning measures and growth strategies. The area most challenging is the Process quadrant. This area covers the business of producing product or service for customers. For many businesses much of this information is locked up inside
the control automation system making it difficult to extract and present as KPI’s. It is now possible to release this valuable information through the deployment of Industrial Information Management systems where real time data from control systems is integrated with transactional-based data through the use of business rules. The use of IIM systems has revitalized plant performance initiatives providing managers with exciting new ways to drive the business.

How to use KPI’s with the improvement process

In order to put some perspective to the use of KPI’s we should firstly look at the improvement process itself. The well respected improvement methodology, Six Sigma, is a wide ranging and comprehensive topic in itself but in its most basic...
form we can see how KPI's become the mechanism for visibility into the process. As shown in the simple DMAIC process the use of KPI's can provide visibility into the Measure, Analyse and Control phases. Using IIM systems to generate the KPI's means managers then have a powerful tool enabling decisions to be well founded and made in a timely manner. This will dramatically increase the likelihood of the improvement initiative being successful and in a greatly reduced time frame.

**What to measure with Process based KPI's**

In simple terms there are two main ways to improve the area of process. One way is to improve the efficiency of the process. That is, to get more out of the process through improvements in the use of time, assets, resources and cost. The other way is to improve the effectiveness of the process. That is, to improve the output of the process in terms of quality or variance form customer specification.

The choice of which KPI’s to measure will vary according to the nature of the business and the process improvements that will return the greatest gains. However, like the business as a whole, it is healthy to monitor a range of KPI’s in order to give a balanced view of the process quadrant. As an example, a balanced view of a production facility might include a mixture of Production based KPI’s, Asset based KPI's and Quality based KPI's as shown in the following illustration.
In the above example the production based KPI’s are focused on product quantity and throughput and the process yield. They have been placed in the center of the dashboard in large dials in order to accentuate the importance of this information. On the left side we have asset based KPI’s such as Availability and OEE and on the right we have quality based KPI’s indicating the ensuing product specification. Along the bottom we also have KPI charts, which provide an historical perspective of how performance is trending over time.

**Getting the most out of KPI’s**

1. **The attributes of a KPI**
   The fundamental aspect of a KPI is that it must convey the information simply, clearly and in context. It is the context aspect that brings power to the KPI. The four attributes of importance are
   - Value,
   - Target,
   - Status, and
   - Trend.
   It may not be practical to convey all attributes in a single KPI but a combination can achieve the same result. The value provides the result of the KPI expression. The target puts the value in perspective, as the difference between the two is important. The status adds significantly more meaning to the value by indicating the nature of the value. For example the value might be in the “red” range indicating that the value is not acceptable. It may also be in the “green” range meaning that the value is OK. You may also include an “orange” range to indicate that the value is in trouble and so on. Finally we need to indicate the KPI trend. This can be achieved through the use of trend charts but it could also be simply indicated by a symbol. For example we could use an “up arrow” to indicate an improving KPI or conversely a “down arrow” to indicate a KPI getting worse.

2. **Provide Corporate Standardization**
   One of the most challenging aspects of using KPI’s across an entire corporation is standardization. The use of IIM systems can provide the mechanism to create standard KPI formulas and deploy them throughout the organization. As a result executives and managers can compare the performance of their assets in a fair and consistent fashion. It also reduces the risk of biased or manipulated information influencing major business decisions. As an added benefit true performance can now be rewarded and analysis can reveal corporate wide systemic problems.

3. **Tailoring Dashboards for different users**
   To extract the most benefit out of IIM systems users can tailor KPI dashboards for specific users. Typical examples might be:
   - Production Dashboard focusing on production and inventory based KPI’s.
   - Maintenance Dashboard focusing on Asset and Maintenance based KPI’s.
   - Quality Dashboard focusing on product quality and laboratory based KPI’s.
Corporate or Business Unit Dashboard focusing on a balanced overview of production, asset and quality based KPI’s.

Public Dashboard focusing on KPI’s that motivate the workforce.

Continuous Improvement and Benchmarking
The establishment and monitoring of key performance indicators is an essential part of continuous improvements programs. Making this data timely and easily accessible to all levels in the organization engenders motivation and recognition in all employees.

Within an organization or across an industry, KPIs can be standardized and used to benchmark individual operations against their true capability and against those using world’s best practice. Measuring and monitoring the performance of an operation against its “Maximum Sustainable Throughput” can establish improvement trends. The MST will begin to increase as plant and operational improvements are realized ensuring the process of continuous improvement.

The key differentiator is that an on-line IIM system can provide this information on a continuous basis, not just at month end, thereby reducing the continuous improvement cycle time.

Awareness and Motivation
The operation’s business plan contains the production, quality and cost targets required for the business to be profitable and provide a return for shareholders. Visualizing KPI’s via a digital dashboard exposes this information to all employees throughout the business. The dissemination of business objectives serves to share common goals and focuses the organization on key business drivers. This provides a powerful motivational tool for management to reach all levels of the organization.

Industrial Information Management
The use of KPI’s in business to improve performance is not a new practice however what is exciting is that KPI’s can now be generated automatically, from combinations of real-time information and business transactions, in a consistent reliable fashion enabling businesses to become more dynamic and responsive to their customers needs. The mechanism for achieving this is through the use of a quality Industrial Information Management system that forms the information hub for the business. IIM has the ability to access data from all key business systems, transforming the data through business rules, and presenting the outcomes as powerful information with live Key Performance Indicators.