

What Do Visibility and Quality Mean?

ARC INSIGHTS
INSIGHT# 2006-20ECM
May 4, 2006
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Think you know what Visibility and Quality Mean? Marketing hype from suppliers, along with well meaning, but confused, thinking by some analyst firms, has caused a diversity of opinions about what these terms mean.

This Insight provides clarity on Visibility and Quality, based on responses from users of manufacturing systems.

The results should affect the functionality you specify for your next software application acquisition.

In October 2005, ARC Advisory Group conducted a survey among manufacturers who currently use, or plan to acquire, a Production Management software application. That survey uncovered some interesting results which were published in the November 2005 ARC Strategy Report, "*CPM for Competitive Advantage*".

A follow-up survey in Q1 2006 delved more deeply into the question of, "What do Visibility and Quality mean?" This Insight provides the results from the follow-up survey.



Summary: What Is Visibility? Quality?

◆ Visibility is:

- Real-time decision support
- Aggregate data from ERP, CPM, and Automation systems
- Access to information from other systems that is current within 10 minutes

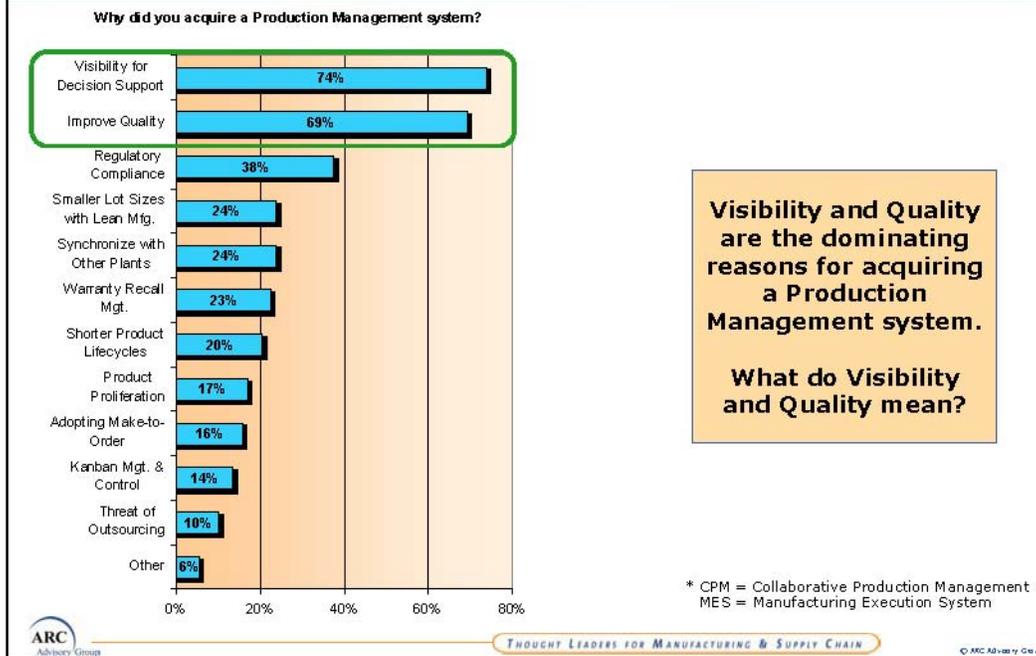
◆ Quality is:

- Fewer product defects to reduce scrap/rework and customer returns
- Alerts when something needs attention

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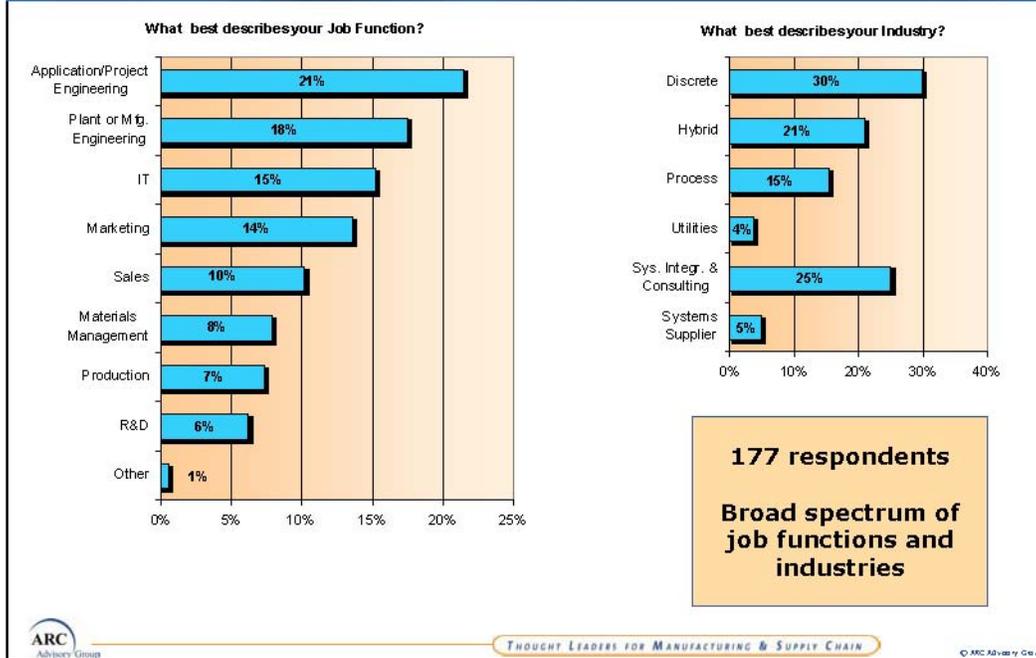
This summary defines Visibility and Quality in terms accepted by users of manufacturing systems.

Why Do Users Buy CPM (or MES) Systems?



The initial CPM survey in October 2005 identified "Visibility for Business Management" (74 percent) and "Improve Quality" (68 percent) as the dominating reasons for buying a CPM system. The next highest reason, Regulatory Compliance, was only 38 percent.

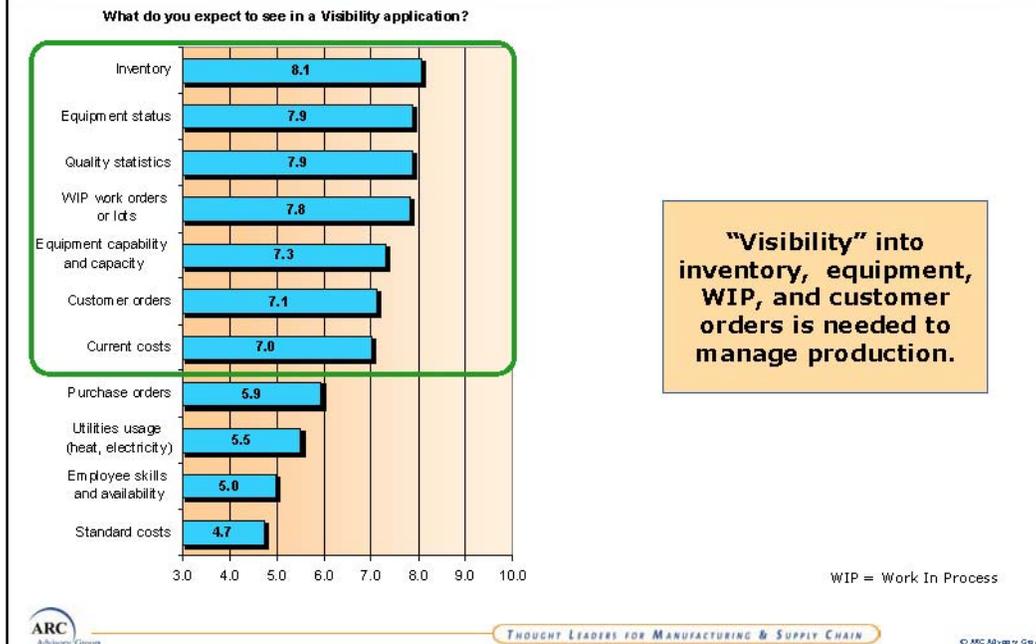
Profile of Respondents of the Follow-up Visibility and Quality Survey



177 people completed the follow-up survey in Q1 2006. This shows that there is a high level of interest in “Visibility” and “Quality” associated with CPM solutions. The respondents have diverse job functions that relate to the specific needs of manufacturers and users of software.

Together, these factors indicate a high degree of credibility for the survey results and provide confidence that they represent the interests and needs of manufacturers.

Visibility to See Inventory, Machines, and WIP



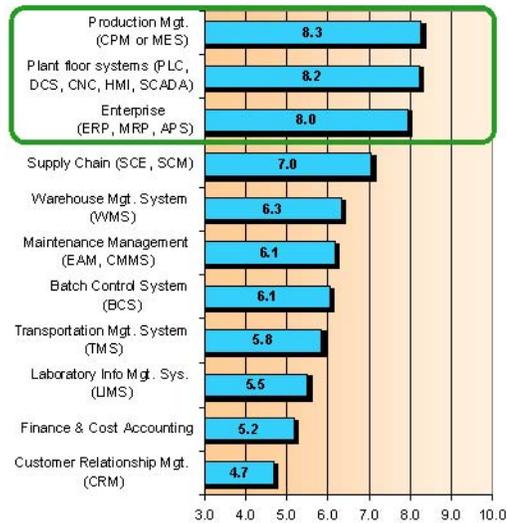
Users of manufacturing systems expect the focus of “Visibility” to provide insight into inventory, equipment availability, WIP, and customer orders to manage the execution of production.

With the high adoption of continuous improvement programs, the quantity of transactions on the plant floor is growing significantly. For example, in a Lean environment, one goal is to reduce lot sizes. Going from a lot size of 200 to 20 increases the number of transactions by a factor of 10 (assuming production volume is unchanged). A Six Sigma program requires data collection to identify defects and reduce variation. Just to identify the sigma level can require thousands of transactions. Government regulations and warranty control are driving adoption of applications for product genealogy and traceability. These factors are dramatically increasing the number of transactions.

How does one manage production as the quantity of transactions grows by an order of magnitude or more? One can not add ten times as many product planners and support personnel. Not only would the cost be unaffordable, but the responsiveness to an exception would be too slow. Manufacturers need software applications to provide the needed visibility.

Visibility into Applications to Manage Production

Data from which applications do you need for Visibility?



Production Mgmt. for WIP
Plant floor controls for Equipment
ERP for Orders



The responses to this question strongly reinforce the answers provided in the previous question. Visibility is needed to manage the execution of production, with a view into the domain areas of inventory, the equipment status, WIP, and customer orders. To obtain that insight, users look to production management, plant floor control, and ERP systems.

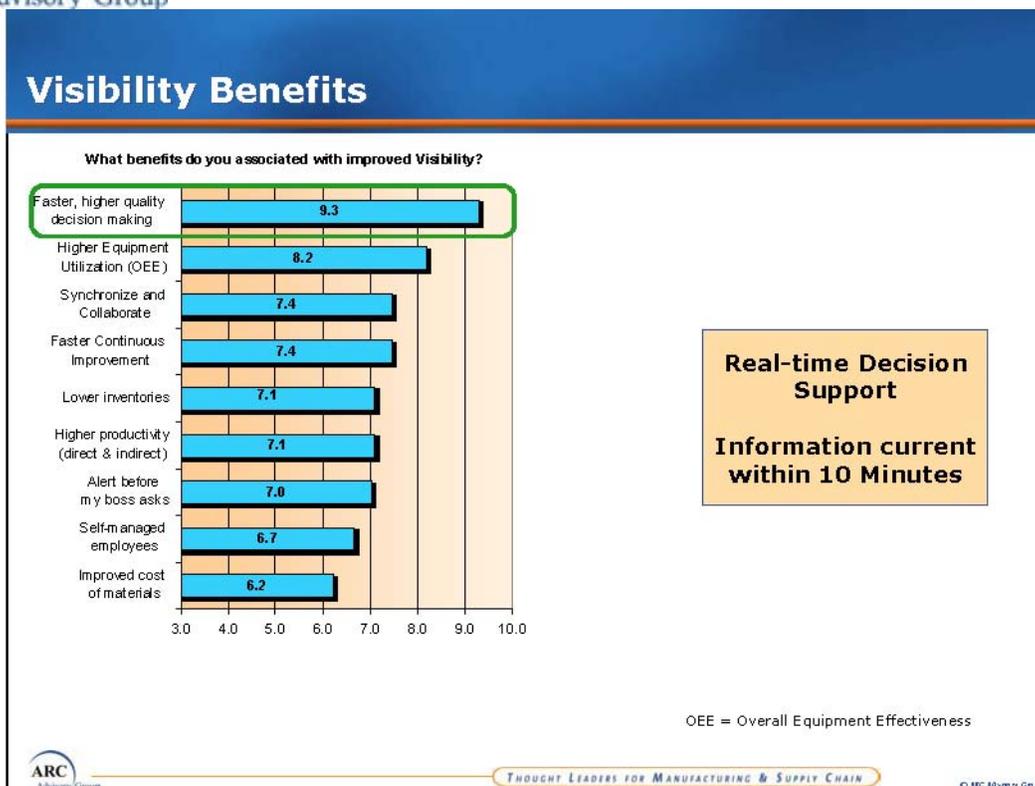
Visibility moves along the vertical axis of the ARC Collaborative Manufacturing Management (CMM) Model, providing real-time information to manage operations from the business systems down to the plant floor.

Visibility into the supply chain and WMS ranked fourth and fifth, while inventory ranked as the number one expectation in the previous question. This indicates that visibility into supply chain execution and management applications will become an increasingly important requirement. Then, visibility will also span the horizontal axis of the CMM model.

APS = Advanced Planning and Scheduling BCS = Batch Control System CPM = Collaborative Production Management CMMS = Computerized Maintenance Mgt. Systems CNC = Computer Numeric Control CRM = Customer Relationship Management DCS = Distributed Control System EAM = Enterprise Asset Management ERP = Enterprise Resource Planning HMI = Human Machine Interface
 LIMS = Laboratory Management System MES

= Manufacturing Execution
System MRP = Material
Resource Planning

PLC = Programmable Logic Controller SCADA = Supervisory Control and Data Acquisition
SCE = Supply Chain Execution SCM = Supply Chain Management TMS = Transportation
Management System WMS = Warehouse Management Systems



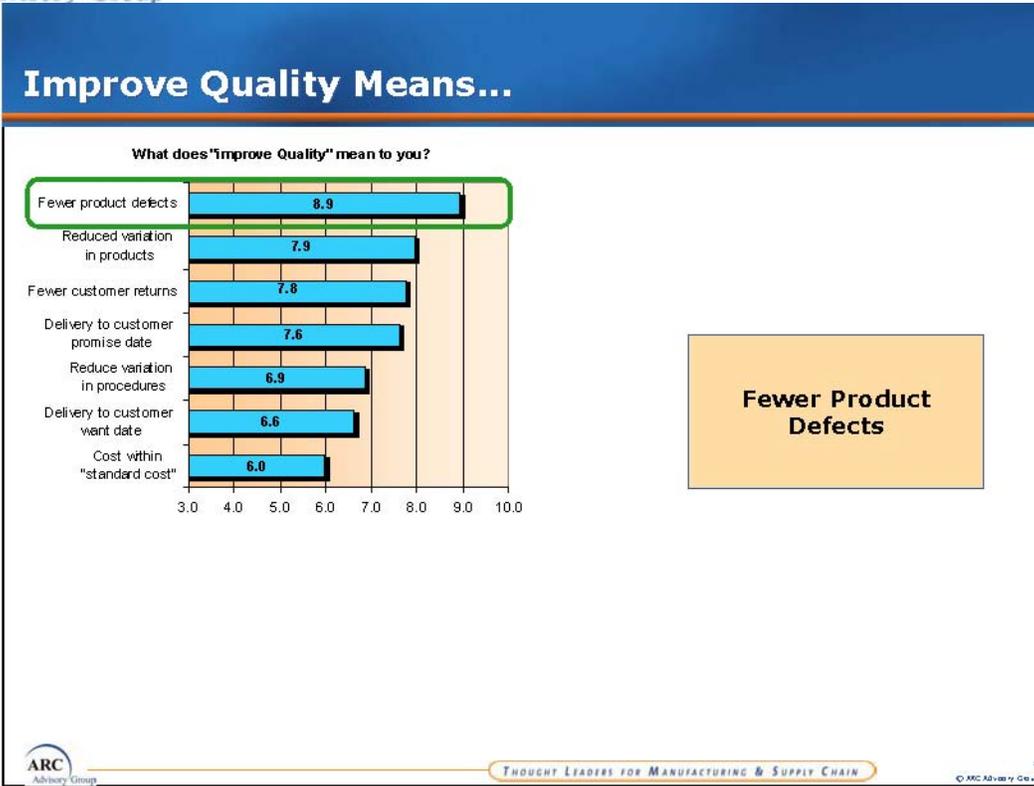
Decision support is the leading benefit of Visibility. Faster and higher quality involves “real-time” access to information, but what does “real-time” mean in this context? Simply put, the data needs to be current. ARC client discussions indicate their goal is a range between 5 and 30 minutes, with the most frequent choice being 10 minutes.

Improved decision support is a “soft” benefit in justifying the acquisition of a system to provide Visibility. Discussions with ARC clients indicate that this justification is often all that is used. They feel it is the only way they can successfully adopt new business processes that significantly increase the volume of transactions.

Others need solid financial benefits. The survey substantiates a couple of areas.

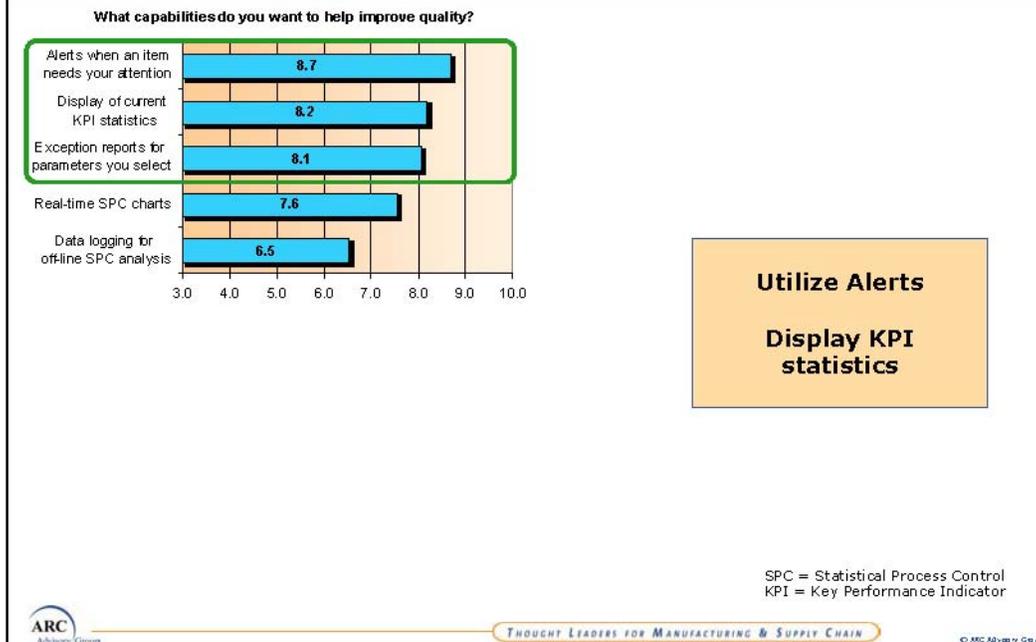
- 1) One is improved equipment utilization by monitoring overall equipment effectiveness (OEE). This is effective when volume is increasing and a capital investment can be avoided as a result of an improvement in capacity.
- 2) Another is lower inventories. Visibility improves the management of WIP,

particularly with the increase in the number of transactions. Real-time information allows one to reduce safety stock and effectively manage the smaller lot sizes.



The survey response clearly shows that improved Quality translates to fewer product defects.

Capabilities to Improve Quality



With the rising volume of transactions, exception reporting via alerts is the optimum approach needed to manage production. The bandwidth to review activity, analyze, and then determine needed changes is not there. Systems are needed that use business rules to determine exceptions and alert those who need to know.

The display of KPI statistics is a key element of a Lean Manufacturing program. The high ranking is consistent with the high adoption rate of Lean.

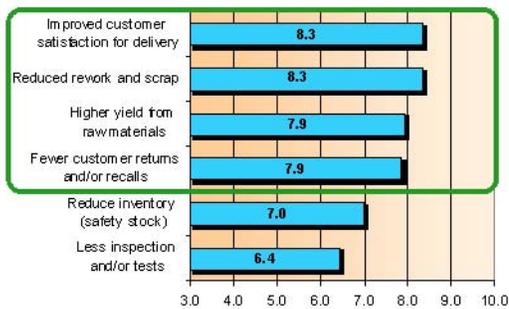
The relatively low rating of SPC (Statistical Process Control) is disappointing, particularly the data logging for off-line analysis. Key components of the Six Sigma DMAIC (Define, Measure, Analyze, Improve, Control) process uses statistical process control. The Measure and Analyze steps involve data logging and off-line statistical analysis.

Unfortunately, many individuals probably recall the statistics course they took in school. Concepts like design of experiments, random sampling, normal distribution curves, and sigma calculation scare people. Simple Pareto charts are easier to understand and, nearly always, all that is needed.

For those managing a quality program, it is recommended to “keep it simple” with Pareto charts.

Benefits of Improved Quality

What benefits do you associate with Improved Quality?



Fewer Defects
Meet Customer Delivery

Again, the survey response clearly shows that Quality means fewer product defects. The benefits of fewer defects include meeting delivery schedules, less rework and scrap, high yield, fewer customer returns -all of which are ranked highly in the chart.

Recommendations

- ◆ **Include Visibility into ERP, CPM and Automation systems as a requirement for new systems and upgrades**
- ◆ **Design systems for a data transfer latency and information display of 10 minutes or less**
- ◆ **Get data directly from the source application; not replicated in an intermediate database**
- ◆ **Use displays of KPIs for team self-management**

- ◆ **Start with Pareto analysis for ranking defects and prioritizing those to be corrected; beginning with SPC scares people**



vision
experience
answers

THOUGHT LEADERS FOR MANUFACTURING & SUPPLY CHAIN

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Acronyms used in this report: APS = Advanced Planning and Scheduling (Finite Capacity Planning) BCS = Batch Control System CPM = Collaborative Production Management CMM = Collaborative Manufacturing Management CMMS = Computerized Maintenance Management Systems CNC = Computer Numeric Control CRM = Customer Relationship Management DMAIC = Define, Measure, Analyze, Improve, Control) DCS = Distributed Control System EAM = Enterprise Asset Management ERP = Enterprise Resource Planning HMI = Human Machine Interface KPI = Key Performance Indicator LIMS = Laboratory Management System MES = Manufacturing Execution System MRP = Material Resource Planning OEE = Overall Equipment Effectively PLC = Programmable Logic Controller SCADA = Supervisory Control and Data Acquisition SCE = Supply Chain Execution SCM = Supply Chain Management SPC = Statistical Process Control TMS = Transportation Management System WIP = Work In Process WMS = Warehouse Management Systems

