



Real-Time Manufacturing Intelligence

Powering Manufacturing Efficiency and Supply
Chain Performance

An Informance Business Whitepaper

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EXECUTIVE SUMMARY

In today's cut-throat manufacturing environment, business decisions must be made in real time. The stakes are high. Lack of real-time information about manufacturing operations may lead to reduced product margins, or significant revenue loss due to missed opportunities.

An enterprise's manufacturing plants are arguably the most important component of its supply chain. Plant level performance can have repercussions up and down the supply chain. Valuable information and trends are often hidden in events on the shop floor. An enterprise must uncover this information and convert it into insight, making "Manufacturing Intelligence" a competitive weapon against its competitors. An enterprise needs to leverage Real-Time "Manufacturing Intelligence" to achieve higher levels of supply chain performance.

This whitepaper highlights key supply chain and financial strategies that can be implemented through effective management of plant level operations. It highlights some key considerations for each of the following objectives, and the resulting business benefits:

- Inventory and Replenishment Management
- Production Efficiency and Cost Reduction
- Revenue Growth and Capital Investments

Informance is a leading provider of Manufacturing Intelligence solutions. By combining best-of-breed software capabilities with advisory services, Informance delivers a comprehensive solution enabling enterprises achieve a higher level of supply chain performance with real time visibility and valuable insights into manufacturing operations.

INTRODUCTION

Manufacturing continues to be the engine that drives economies around the world. With competition mounting from global suppliers, and an ever increasing push towards mass customization and shortened product lifecycles, there is an increased need for manufacturers to be more responsive and flexible. Manufacturers must make rapid decisions using real time information and make continuous adjustments based on changing environments.

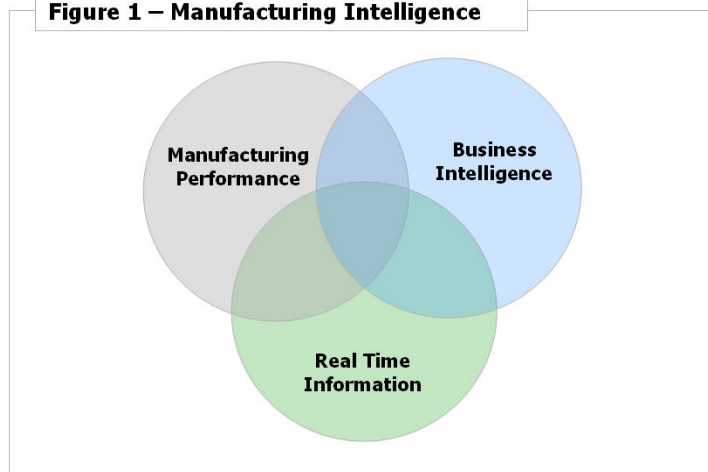
Operational decisions at all levels - corporate and plant - must be made with the most recent information, presented in the right context. Currently, what happens down in the factory floor and its implications at the corporate level are often not aligned. Corporate operational decisions are often made with outdated and incomplete information, usually because there is no adequate conduit between the corporate IT systems and the data residing in the plants. Similarly, plant decisions are made without consideration of their potential impact on other facilities in the supply chain.

Manufacturers need a comprehensive view of their operations at all times. They must be equipped with the most relevant information in the proper context so holistic decisions can be made appropriately.

Manufacturing Intelligence - A Union of Three Disciplines

Enter Manufacturing Intelligence! This is the synthesis of three key elements required for global manufacturers to compete in the current business environment.

Figure 1 – Manufacturing Intelligence



- **Manufacturing Performance:** Monitoring of production events and understanding production constraints are the best tools for evaluating the competence of a manufacturing organization.
- **Business Intelligence:** Insight into business operations are critical for decision making. Root cause analysis and drill down capabilities are required to uncover hidden improvement opportunities.
- **Real Time Information:** It is imperative that manufacturers use real-time information to make operational decisions. Weekly schedules and ERP runs are becoming a thing of the past.

Manufacturing Intelligence is the next generation of decision support capabilities for global manufacturers. It is about making real-time manufacturing information, with “drill anywhere” capabilities, available to manufacturing executives and plant staff so they can make the right decisions and improve their supply chain performance.

Business Benefits

When implemented correctly, Manufacturing Intelligence solutions stand to provide significant benefits to global manufacturers and their ecosystem:

- Strategic decision support platform allowing manufacturing and supply chain executives to make optimal supply chain level improvement decisions
- Real-time synthesis of production events with actionable information for the plant staff to continuously improve manufacturing efficiency
- Supply chain objectives such as inventory reduction, cost reduction, and capital avoidance can be achieved by actively managing shop floor production levers
- Modern IT architecture based on Web Services “future-proofs” factories from forthcoming projects

SUPPLY CHAIN STRATEGIES

Three supply chain strategies and their financial implications are discussed below:

- Inventory and Replenishment Management
- Production Efficiency and Cost Reduction
- Revenue Growth and Capital Investments

Inventory and Replenishment Management

Inventory and replenishment management policies are typically determined by planning models based on customer service levels and demand patterns constrained by supply chain and geographical limitations. While most companies are able to marginally adjust manufacturing capacity and replenishment schedules based on changing business conditions, increasing competition, product line proliferation, and a myriad of other factors provide pressure to be more nimble and agile.

Building in more flexibility and agility in the supply chain is paramount in today's manufacturing environment. Companies must focus on a high-performing supply chain and continuously strive to reduce inventory cost, reduce lead times, and improve service levels.

Managing Inventory and Increasing Responsiveness via Manufacturing Intelligence

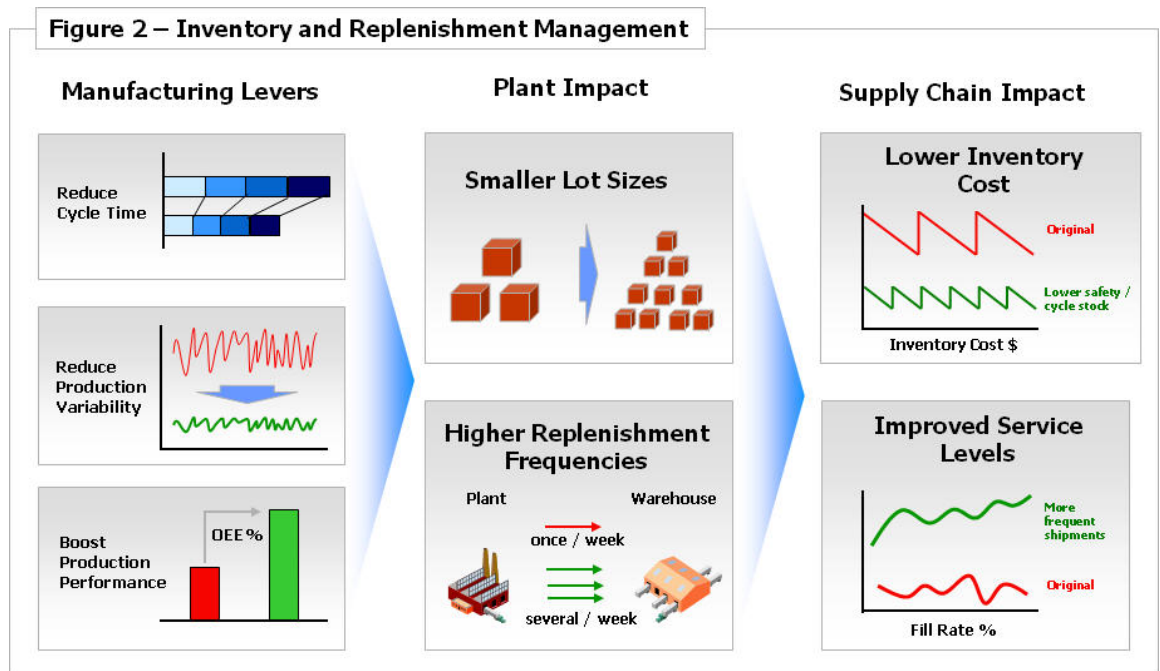
Business levers that are available at the plant level can be leveraged to boost supply chain performance. By understanding and managing critical shop floor levers, companies have the flexibility to adjust their production and replenishment strategy to better react to customer demand while minimizing overall cost.

Figure 2 depicts the causal relationship between factory level controls and their impact on the supply chain:

- **Manufacturing Levers:** Shop floor staff can actively manage the following parameters to improve performance.
 - *Cycle time:* Cycle time reduction leads to an accelerated manufacturing process. By removing downtime and sustaining a high production rate, throughput is increased.
 - *Production variability:* Variability introduces waste into the system – WIP, buffers, etc. By increasing production and equipment consistency, products flow through the factory floor faster and cost due to waste is reduced.
 - *Production Uptime:* High production availability is a hallmark of a high performing factory. Plant staff should institute improvement programs to reduce unnecessary downtime.
- **Plant Impact:** To lower inventory, there are two primary production tactics that need to be in place.
 - *Smaller batch sizes:* Running a few large batches during a production day is seemingly efficient. If you consider inventory

costs, however, holding large quantities of a single product may not be a good financial decision. High performing plants improve their production uptime by compressing cycle time and reducing variability so that they can accommodate more frequent changeover producing quantities that are sufficient to meet customer demand. The ability to do frequent adjustments in the plant also increases the flexibility a plant has to react to sudden changes in orders.

- *Higher replenishment frequencies:* A plant that produces a high product mix rapidly is able to support a more frequent replenishment schedule to the warehouses.
- **Supply Chain Impact:**
 - *Lower inventory cost:* Smaller batch sizes and frequent replenishments allow companies to lower safety stock levels. The ordering point and the cycle stock required are also reduced. These factors translate into lower inventory cost.
 - *Higher customer service level:* A higher customer service level is attained with high fill rates. By constantly restocking various products, companies lower their exposure to stock-outs. With an accelerated supply chain with smaller batches, sustaining a high service level is no longer synonymous to maintaining high inventory levels.



Simply put, boosting overall plant level performance allows plants to be more flexible and able to accommodate supply chain strategies that ultimately lower inventory management cost and improve customer service level.

Informance Manufacturing Intelligence Solution

The Informance Manufacturing Intelligence Solution for inventory and replenishment management empowers manufacturers to accelerate the supply chain while limiting their inventory exposure. Insight into reducing cycle time, increasing production stability, and boosting customer service levels allows companies to implement tangible strategies that lower inventory costs.

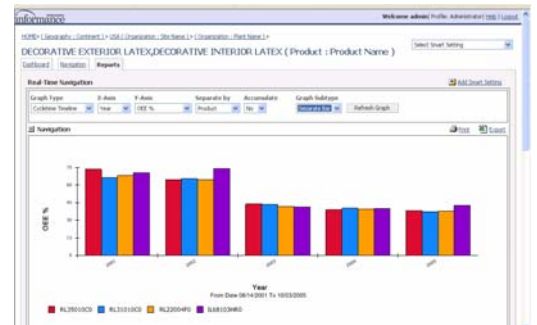
The three key manufacturing levers mentioned previously - cycle time, production efficiency, and production variability - can be actively managed via Informance.

Manufacturing Levers	Informance Impact Areas
Cycle Time	<ul style="list-style-type: none"> Reduce operational downtime Reduce changeover time Reduce expected waiting time
Production Variability	<ul style="list-style-type: none"> Improve production consistency Improve equipment reliability Improve manufacturing visibility
Production Performance	<ul style="list-style-type: none"> Increase equipment availability Increase and sustain production rate Reduce rework and defects

Informance empowers supply chain teams to zero in on cycle time reduction opportunities and ways to minimize production variance across the entire plant network. Real time notifications alert line managers of impending production issues and customer service representatives of fulfillment issues that may disrupt customer supply.



Addressing major loss categories across entire plant networks increases supply chain responsiveness



Aggregated view of production volume across plants provides quick view of potential supply exposures

Production Efficiency and Cost Reduction

Today every manufacturer must relentlessly pursue cost reduction to remain competitive. Streamlining production and taking cost out of processes are concrete actions that manufacturers should master. Companies are accustomed to tackling improvements on a plant by plant basis. Areas such as manufacturing performance, cost of labor, production efficiency, etc. are all potential targets for improvement. Plant level improvements are tangible, often with quick and visible payback, but they tend to be tactical. Although important, the impact of plant level improvements remains small compared to a corporate wide initiatives. A better strategy is to identify common problem areas pertinent across multiple plants and set up initiatives to tackle these. Companies stand to gain significantly from improvement opportunities that span the entire plant network. The objective is to identify cross-plant improvement opportunities that lead to significant cost savings across the supply chain.

Supply Chain Cost Savings via Manufacturing Intelligence

Manufacturers often allow plants to manage production issues, and the associated improvement programs, within factory confines. While there are clear advantages to plants being autonomous, higher performing manufacturers are complementing factory decisions with improvement initiatives that yield better results.

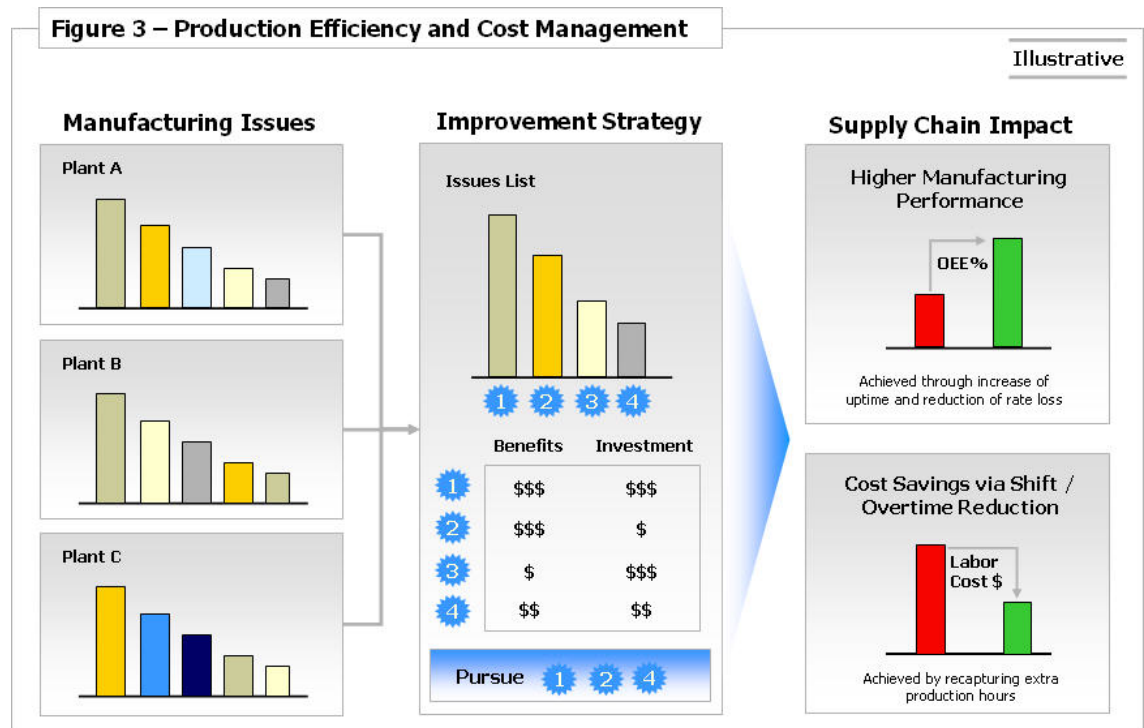


Figure 3 illustrates efficiencies attained by addressing common issues that may cut across multiple plants. An issue that may be minor for a single plant could become a major issue when considered holistically (Example: Issue 3 and 4). Note also that when investing in a solution, the ability to leverage a single investment into multiple plants can represent significant cost savings. Finally,

visibility into details that exist across plants allows for the transfer of “best practices” across the plant network.

Informance Manufacturing Intelligence Solution

The Informance Manufacturing Intelligence Solution enables manufacturers to significantly increase production efficiency while reducing cost by tackling issues that cut across the entire plant network. Details on specific problem areas allow users to understand and formulate effective improvement strategies.

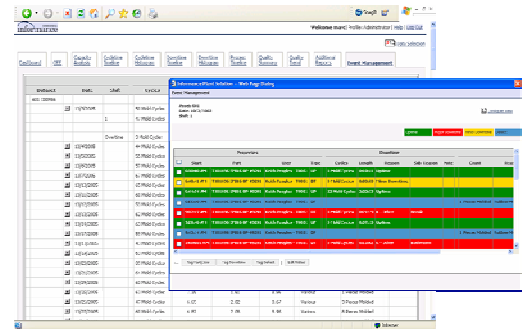
It is important to note that improvement levers for these cross-plant initiatives originate within the “4 walls of the plant”. This makes synchronization between plant-level data and enterprise-level data even more crucial. Both the Enterprise Solution Module and the Plant Solution Module share a common Web Services-based platform making data integrity and consistency of analytics a guarantee.

The Enterprise Solution Module is a strategic decision support system for corporate supply chain and manufacturing executives to discover, analyze, and act on opportunities that impact the entire plant network. Analysis of data spanning multiple plants, product lines, and asset types often reveals common issues that can lead to transformational improvement opportunities with significant ROI.

The Plant Solution Module empowers plant staff with real-time tracking of key operational metrics. Data collection technology and intuitive operator interfaces keep operator involvement and the fidelity of the data capture high. Powerful analytics identifies ongoing improvement opportunities that can be readily addressed resulting in a quick and positive impact.



The Enterprise Solution Module’s dashboard delivers maximum visual impact in a format optimized for quick absorption



The Plant Solution Module provides transaction level details of issues pertinent to a single plant

Revenue Growth and Capital Investments

Most corporate supply chain initiatives target the cost component of the operation. While cost cutting initiatives are important, companies are often rewarded much more through revenue growth and margin improvements. Companies running close to capacity often resort to large capital investments to boost production. Some companies have chosen to outsource additional production to contract manufacturers. Both approaches erode company profitability.

Revenue growth and fulfilling customer demand are success factors for any profit-seeking manufacturer. The objective is to capture additional revenues while curbing or eliminating the need for capital investments. It is a seemingly elusive goal, but many companies have found ways to achieve this goal.

Growing by Avoiding Capital Expenditures via Manufacturing Intelligence

To avoid expensive capital expenditures, companies facing rising customer demand must increase overall manufacturing efficiency. By re-capturing manufacturing capacity currently lost due to waste, significant opportunities exist for boosting production. Companies must learn how to identify improvement opportunities so they can unlock capacity for increased revenue.

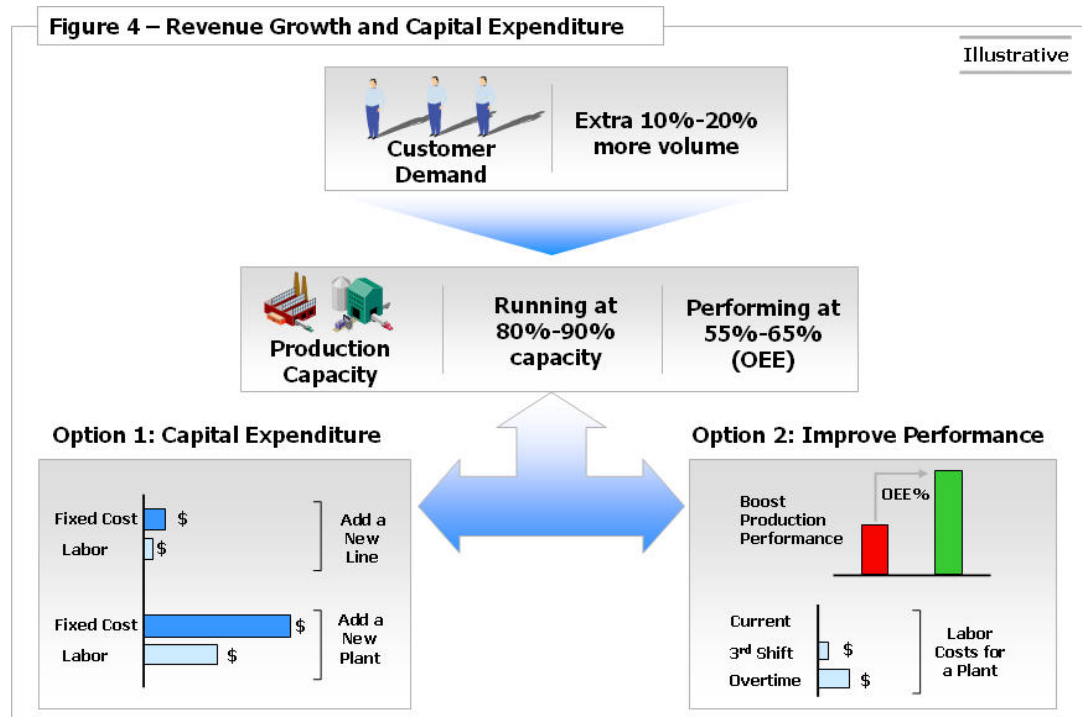


Figure 4 illustrates a hypothetical case in which a company is facing increased customer demand. At first glance, the company's plants are running close to capacity. Upon further investigation, one uncovers that the plants are actually performing at 55%-65% OEE levels. Traditionally, companies have made investments to add lines or even new facilities to fulfill demand. Understanding that significant opportunities exist in improving manufacturing operations, costly infrastructural investments can be reduced or even avoided in many cases.

When companies boost their performance (OEE %), additional run hours are freed. These in turn translate into extra production volume. High performing companies can make this a competitive weapon: achieving revenue expansion while curtailing cost.

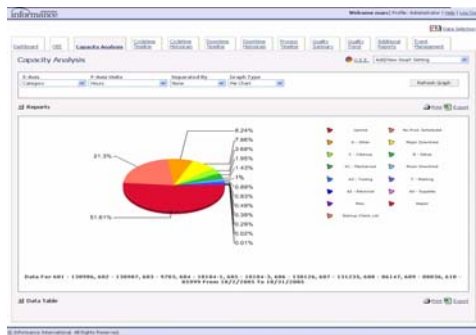
Informance Manufacturing Intelligence Solution

The Informance Manufacturing Intelligence Solution enables manufacturers to boost production without capital investments or turning to outsourcing. Insight into reducing unplanned downtime and increasing production consistency for the entire plant network allows companies to implement achievable volume enhancing strategies.

Similar to the Inventory Management case, having a tight handle on key operating levers will provide the leverage required to unlock extra capacity.

Manufacturing Levers	Informance Impact Areas
Production and Equipment Availability	<ul style="list-style-type: none"> • Reduce operational downtime • Reduce equipment downtime • Reduce expected waiting time
Production Performance	<ul style="list-style-type: none"> • Reduce cycle time and sustain production rate • Reduce minor stops and maintain production reliability • Improve equipment reliability
Quality and Defects	<ul style="list-style-type: none"> • Reduce rework and churn • Increase First Time Right percentages • Alert impending quality issues

Supply chain and finance teams can use Informance to track utilization levels across the plant network in real-time. Potential improvement areas at specific plants can be pinpointed. The team can then formulate a plan to re-allocate orders to sites that are most likely to fulfill them – all while minimizing capital investments.



Addressing major loss categories across entire plant network recaptures manufacturing capacity



Tracking of production volumes by geography empowers executives to maximize sales opportunities

CONCLUSION

Manufacturing Intelligence is the logical next step for global manufacturers if they aspire to remain competitive. By bringing together manufacturing performance and business intelligence capabilities on top of a real-time platform, companies can make better operational decisions – strategic or tactical – up and down the supply chain.

Critical supply chain strategies including inventory management, cost reduction, and revenue growth while curbing capital expenditures can be successfully implemented via Manufacturing Intelligence solutions.

The Informance Advantage

Informance constantly strives to make its solution more relevant with more powerful analytics based on real-time information while streamlining solution rollout

- **Real-time Manufacturing Intelligence**
Informance provides up to the second information on all plants and manufacturing processes. At the plant level, more than 700 interactive packaged reports are available. At the enterprise level, Discovery Analytics™ presents valuable insight to corporate users. Personalized dashboards deliver maximum visual impact in a format optimized for quick absorption.
- **Web Services-based Hub and Node Architecture**
Informance's technical foundation is based on open standard Web Services and the Microsoft .Net framework. A unique "Hub-and-Node" architecture accelerates multi-site enterprise deployment by requiring only lightweight software footprint at different plant locations. The result is a uniform deployment model across all sites that lowers overall installation and ongoing maintenance costs.

About Informance

Informance International, Inc. is a leading provider of Manufacturing Intelligence solutions. By combining best-of-breed software capabilities with advisory services, Informance delivers a comprehensive solution enabling enterprises to achieve a higher level of supply chain performance and strengthen their Lean, TPM, or Six Sigma programs with real time visibility and valuable insights of their operations. Since its founding in 1995, Informance has been focused on improving performance of manufacturing organization. Informance customers include Fortune 500 companies in the Consumer Packaged Goods, Pharmaceuticals, High-Tech, Automotive, Industrials verticals. Informance is privately held with investments from leading Silicon Valley venture firms Mayfield and New Enterprise Associates as well as corporate investor Cargill Ventures. Informance is headquartered in Northbrook, IL with offices in Redwood Shores, CA and Jaipur, India. For more information please visit the company website at www.informance.com or call (847) 498-1844.