PETSM

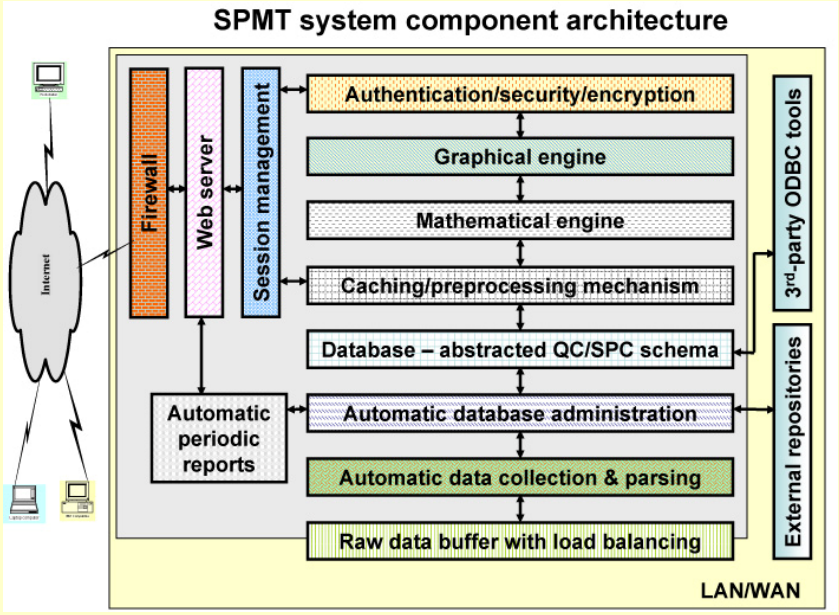
Pro-active.
Real-time.
Web-enabled.

When it comes to proactively managing globally dispersed enterprise quality control in real time and evaluating process performance, raw data is not enough. You need useful, actionable information – including metrics on both system performance and analytical process assessment. You need to establish process control baselines, identify potentially malicious areas that may have affected product yield and throughput, and inform an organization of defects and errors detected. Operations then can act quickly to identify and resolve process performance problems anywhere within the environment before those problems affect business productivity, the supply chain, and profitability.

Systematic Process Monitoring Techniques (SPMT)'s Process Evaluation Tool (PETSM) is delivering these capabilities through its industry-leading real-time process evaluation enterprise solution approach. The modular, scalable architecture consists of a custom data collection and buffering platform, database, intelligence and analytical layers, and a graphical engine to generate drill-down visual displays of the quantitative information – all working together as a seamless mission-critical system that provides *the first and only web-enabled pro-active* process performance analysis.

Technology

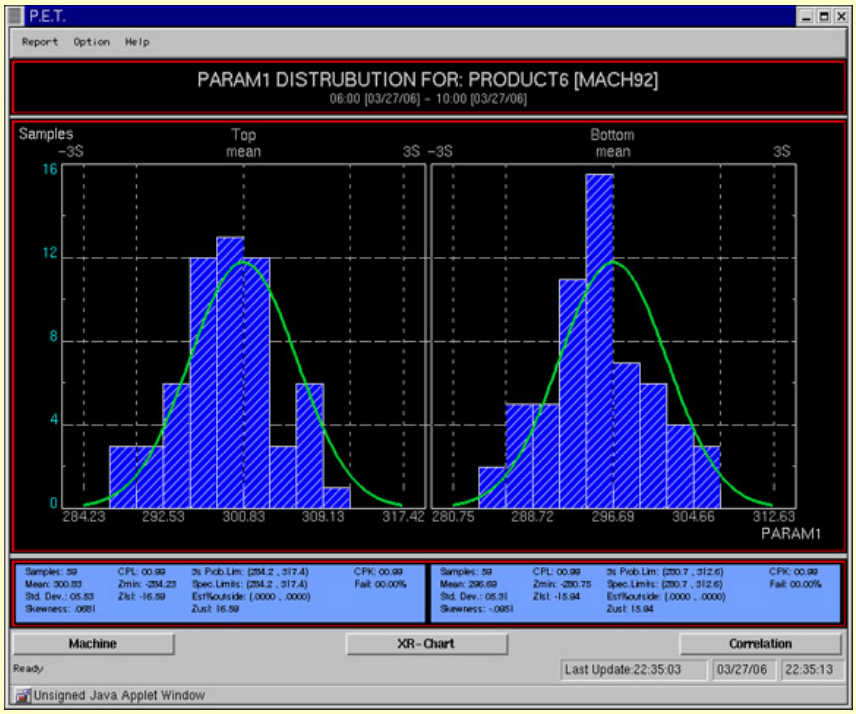
PETSM is industry-leading process/component-integrated mission-critical real-time yield management software for manufacturing. Unlike other software applications that require manual human involvement in shop floor data collection, PETSM automatically collects raw source data you have pre-selected, statistically processes it, and alerts your web-enabled devices (computers, PDAs) so that you can perform an instantaneous quantitative yield/defect analysis through interactive drill-down graphical displays.



PETSM architecture integrates into a single server essential data processing components that are usually disparate within a traditional yield management environment. It resides at your designated premises, allowing you full control over the data acquisition subsystem.

The system core is an RDBMS that operates with an abstracted data schema supporting a QC-compliant user interface. The abstracted data approach allows monitoring indirect manufacturing processes that are usually slower, such as supply chain or cost analysis.

Easy Integration and Management



PET℠ application powers the inexpensive Linux/Solaris-based fully automated system with loosely-ended interfaces to the customer environment that get resolved at integration.

The most efficient scalability and performance results of PET℠'s deployment can be achieved for a group of plants forming a cluster within a particular LAN/WAN domain. This approach is more advantageous as compared to a centralized hosting requiring substantial maintenance effort. It provides better control on data flow considering parser adjustments related to fairly short product life cycle and process changes. This course of service also ensures high data availability and reliability providing flexibility for systems' downtime scheduling.

Initial installation requires little IT expertise while allowing real-time enterprise-grade performance and customization particular to each manufacturing facility. After that, it's maintenance-free.

PET℠ can be easily deployed in diverse industries while evolving vertically as well.

Features

PET℠ ensures that manufacturers achieve the highest product yield, increase in profitability, and minimization of losses through systematic process monitoring at levels of the production cycle.

Global analysis and Reporting

PET℠ solutions reach a broader community of industries, managers and production personnel by providing a detailed automatically updated live snapshot of production yield for any time interval. It delivers essential updated Quality Control information that helps companies improve process efficiency and team communications. Process yield status and SPC graphs/charts are delivered over the Internet, which is especially beneficial to manufacturers having dispersed and remote operations.

Valuable Insight

PET℠'s automatic process yield analyses correlate all valuable pieces of information for a clear overall picture of specific process areas contributing to yield losses so corrective actions can be taken to maximize profits.

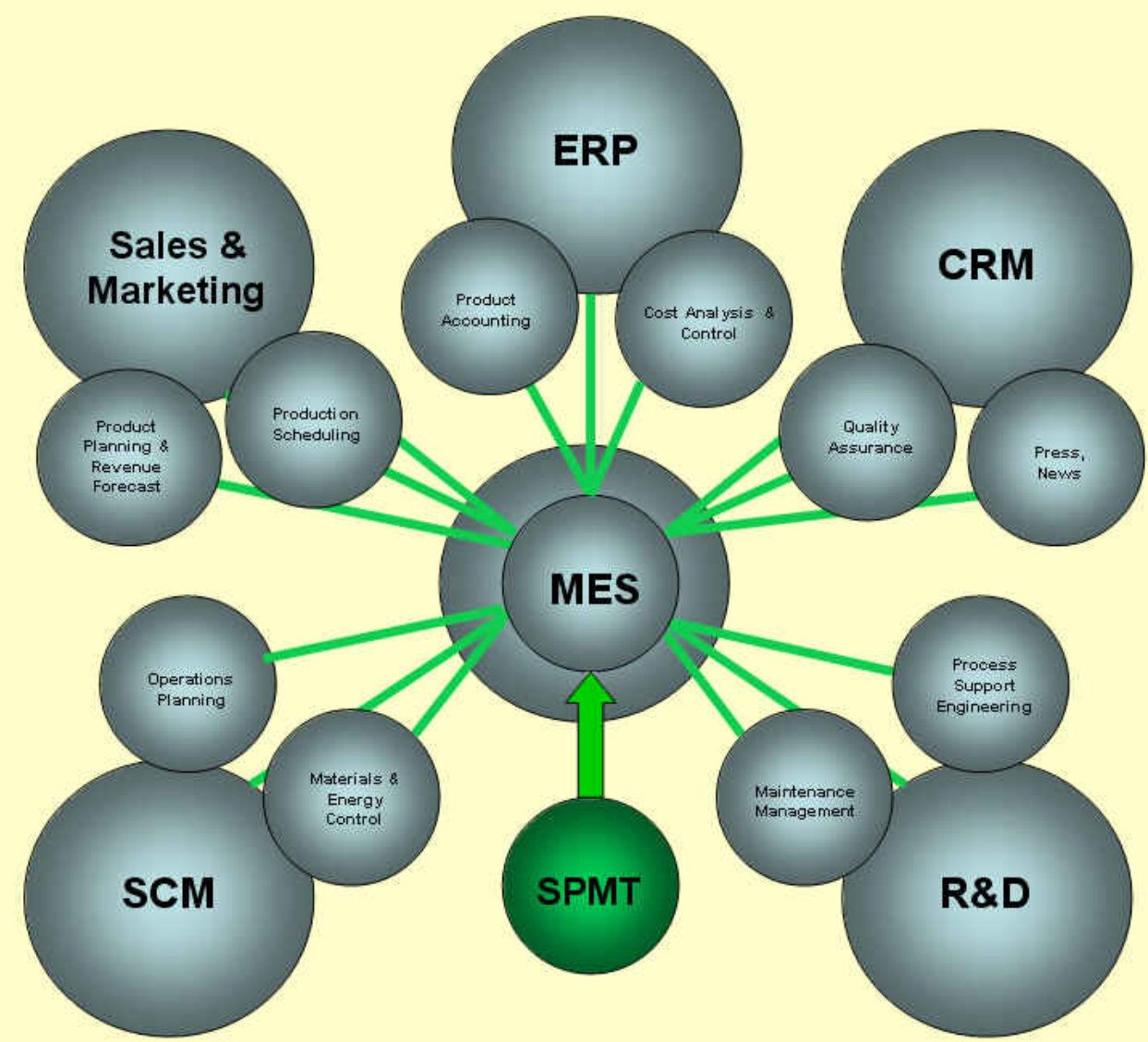
For companies operating under FDA regulations PET℠ provides a special user interface to enable regulatory features, such as audit trail and signing components (part 11 Sections 11.10 and 11.50) required to meet 21 CFR Part 11 requirements.

Enterprise-grade Performance

Focused on supporting product life cycle, PET℠'s database schema is designed to sustain high-volume of production without performance degradation.

Benefits

Systematic Process Monitoring Techniques, serving Manufacturing Execution System (MES), helps leverage and improve various components involved (as it is shown on a diagram).



With immediate Internet access to accurately processed data a user can:

- *Maintain consistent, timely product information across your enterprise.*
- *Speed products to market with paperless engineering change management.*
- *Improve manufacturing throughput by accurately assessing and controlling processes.*
- *Enhance profitability with accurate product costing.*

P.E.T. helps customers achieve and maintain high yields by:

- *Decreasing the time to correlate defects to yield loss*
- *Rapidly identifying "killer" defects*
- *Providing the ability to correlate equipment non-uniformity to parametric variation*
- *Reducing time for disposition of low-yield lots*
- *Providing yield impact data to operators, engineers, and management*
- *Filtering out spurious results from visual inspection (upon data availability)*
- *Providing automated monitoring to notify engineers of process deviations*

Enterprise-grade Security

PET℠ utilizes contemporary authentication and security layers preventing unauthorized use and data access. PET℠ authentication mechanism extends beyond the usual userid/password pair – it uses IT-supplied user credentials[1] combined with a customer-provided server-unique ID. Such an approach practically excludes hacker attacks and penetration of viruses.

PET℠ utilizes open source MindBright algorithms for the information encryption and uses SSL 128-bit cryptographic technologies for transporting it to prevent eavesdropping, tampering, and forgery. PET℠ allows all your facilities and corporate offices to share data in real-time.

[1] this technique, in conjunction with configurable users' permissions, is implemented to control authorization and access to charts containing the restricted information.

System Administration

PET℠ is self -configurable and –administering, requiring no additional personnel to sustain it. Internal system malfunctioning is self-recoverable and provides email/paging notifications to responsible parties. It automatically updates a production floor database as the equipment gets moved on the production floor.

Data acquisition and Chart Displays

PET℠ operates with customer data formats, comprising the data collection system that gets integrated through preset interfaces. The system parses customer raw data, stores it, statistically processes it, and then builds graphs and charts delivered to Internet users in real time. The displays generated for entities such as plant, product, machine type, work cell, step, operation, and part, where typical are:

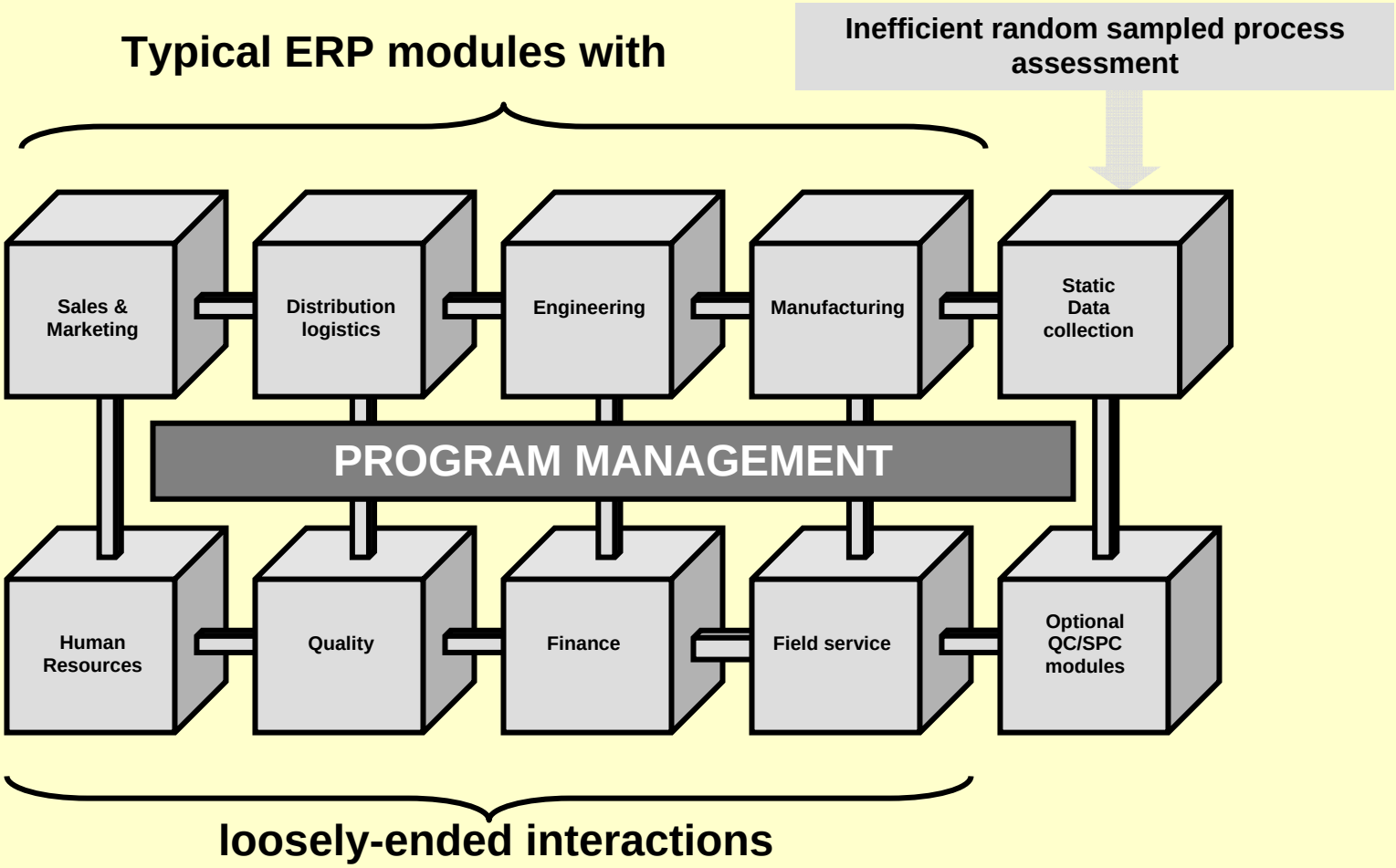
- Yield and throughput histograms (with SPC limit marks)
- Defect/Error Pareto analyses
- Normal distribution for each measured parameter
- Parameter correlation with another parameter
- Equipment/Product trend within work cell
- Lot defect histogram
- $\bar{X}$ R charts
- Surface defect distribution and defect counts
- Equipment utilization
- Last 20-unit status
- Box plot
- Alarm table depicting last 30 parts that violated SPC rules (per product)
- Overlapped 2-hour/shift/day/week/month yield/SPC reports (HTML and pdf)

Some advanced features include:

- Independent data buffering with load-balancing mechanism that unties production from analytical processing
- Full data flow control and data type validation
- Integration with electronic devices and equipment protocols (SECS, GEM)
- Real-time alarms, warnings, notification
- Equipment calibration
- Securely signed data files to avoid tampering
- A non-editable audit trail recording file operations
- Preservation of raw data
- Date and time stamping

ERP system Enhancement

PET℠ system can significantly enhance a typical ERP by replacing Data Collection and SPC components with its efficient dynamic capabilities (next page diagram). While the ERP database continues collecting various information, some may be imported into PET to display combined graphs, for example, cost analysis, taken from the finance component can be combined with yield assessment, etc.



Serving customers

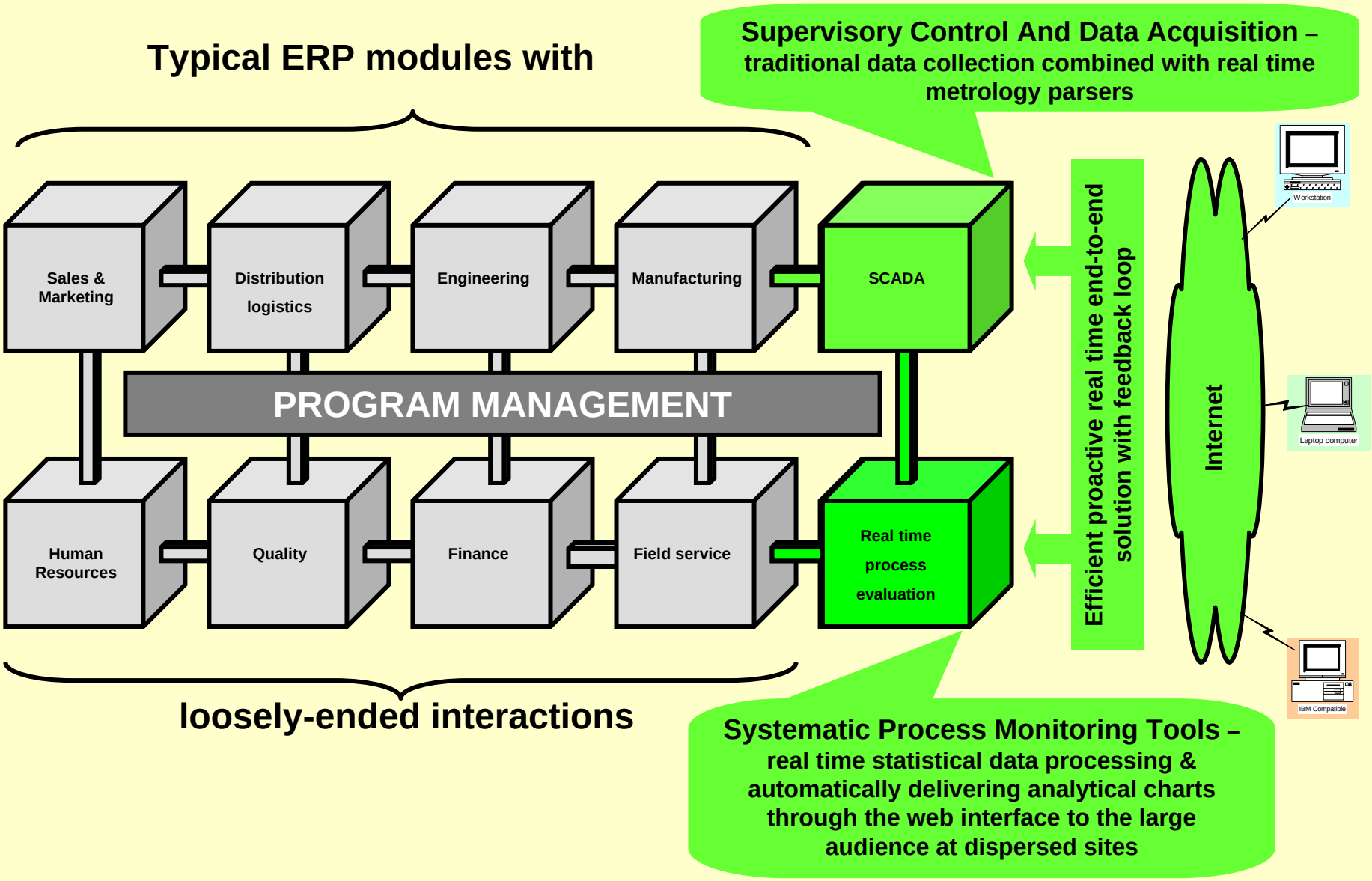
SPMT has developed PET℠ in response to customer demand for an enterprise-wide quality control solution. Large manufacturers need to pre-select, share, and analyze metrology results across facilities and production stages in real-time to spot efficiencies and manage quality at the enterprise level. PET℠ empowers smaller manufacturers to take advantage of real-time process SPC as a quick in-house solution, providing an accurate, uniform approach with a new company-wide quality culture. Supply chain managers are also key users of the software as suppliers make their quality data available.

SPMT customizes our fundamental framework to customers' needs to help them gain the best results with our unparalleled pro-active, problem-solving technology. Contact us today.

Market position

The tables, shown on next pages, clearly show SPMT's substantial lead over its competitors.

Enhancing functionality of a typical ERP system



SPMT compared with shrink-wrap & hosted products

feature	spmt	infinityqs	winspc | statit | nwasoft	spmt advantage
Process analysis techniques	Real-time data collection, chart building/delivery	Limited real-time data collection manual data retrieval, charting	Spontaneous, reactive sampling	Proactive
Analysis/decision making	Quick	Slow	Very slow	Fastest
Scalability/Extensibility	Multithreading (LWT)	Farming – additional servers	Not scalable	Cheaper
Custom raw data acquisition	Unlimited real time source network parsers[1]	Limited device hard-wired multiplexers	Static files & pre-populated databases	Unlimited
System reliability	Buffering with load balancing cannot affect production	Can stop production at malfunctioning	N/A	Continuous production
Data storage	Embedded Oracle EE [2]	External repositories (farms)	External repositories & flat files	QC/SPC-focused
Data retrieval mechanism	Real time SPC-focused abstracted dataset & 3rd party data mining tools	Inefficient manually issued requests via ODBC layers	Legacy file formats, spreadsheets, ODBC drivers	Automatic
Graphical engine	Event-driven Java applet & scripts	Manually executed WEB scripts	Static GUI - MFC/C++	Automatic
User interface	Device independent browser	Internet browser	Microsoft windows	Pervasive
Process monitored	Multiple users & processes		One process at a time	Comprehensive
Chart/reports construction methods	Proactive retrieval/formatting/refresh	Manual request for graph construction	Manually configured graph construction	Automatic
Interactive chart/graph drill-down capability	Interactive drill-down displays/objects instant updates	Not interactive	Not interactive	Comprehensive
Quantitative information delay/availability	Proactive – no delays/real time, automatic delivery	Reactive - delayed for hours	Reactive – delayed for hours/days	Automatic
Authentication/security modules	Efficient embedded algorithms	Inefficient distributed host/service layers	Not required	Faster
Alarms/notifications	Generated upon SPC-rule violation		Can be identified at chart interpretation	Automatic
Architecture	Server-centric multi-threaded	Group of application & database servers	Personal computer	Efficient
Embedded mathematical analytical engine	Fundamental QC/SPC analysis	Advanced on-demand analytics	On-demand analytics	Automatic
Platform	Inexpensive Linux/Solaris server	Set of various ODBC servers	Microsoft Windows [3]	Cheaper
Administration	Fault tolerant, self-administering	Additional admin system & personnel	Regular IT support	Staffless

[1] custom engineering per raw data source format
[2] Customer preference
[3] Selected flavors

Yield Management landscape