Are You In Control? -- Part 2

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In our first article we said that a company is in control when it is effectively utilizing IT – *Strategically, tactically, and operationally to optimize its current operations and to look inward, outward and across the entire organization (and the world) for new opportunities for improvement and growth.*

Please notice that the words "and the world" have been added to our original definition. The addition of these three words is deliberate: Today's companies operate in a global marketplace with a global economy. It is no longer good enough to use IT effectively in your organization to be competitive – *No, to survive -- Your company must be able to utilize IT to look outward and across the world!*

With this in mind, before you answer the question, you probably ought to review the types of organizational issues that exist in your company today. According to Post & Anderson, IT is categorized (and decisions are made) based on the following matrix:

Sector	Operational	Tactical	Strategic
Production	• Machine settings • Worker schedules • Maintenance schedules	• Rearrange work area • Schedule new products • Change inventory method	• New factory • New products • New industry
Accounting	• Categorize assets • Assign expenses • Produce reports	• Inventory valuation • Depreciation method • Finance short/long term	• New GL system • Debt vs. equity • International taxes
Marketing	• Reward salespeople • Survey customers • Monitor promotions	• Determine pricing • Promotional campaigns • Select marketing media	• Monitor competitors • New products • New markets

For example …

Let's look at the use of IT as it relates to business opportunities in production or manufacturing operations …

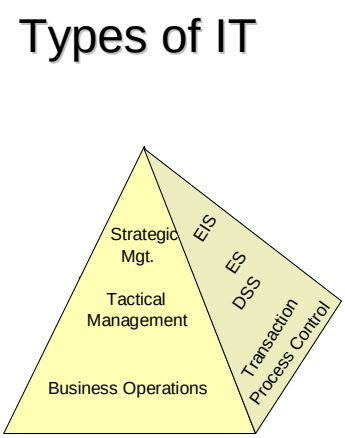
- Operational opportunities in this environment might range from providing automated machinery, (where microprocessors on a machine are actually programmed with specific machine settings), to developing automated product and maintenance schedules.

- Tactical issues might include re-engineering the work area, scheduling new products to market, or redefining the method or frequency of determining inventory.

- Strategic challenges in the production sector might include adding new products that can be made in an existing factory or adding a new factory with entirely new processes or the same processes.

It follows then that different types of IT are required to address the different types of problems and related decision-making efforts in a company.

Let's look at how these types of business problems relate to the types of IT that are available. Recall our previous diagram used to depict the types of IT.



Courtesy Post & Anderson

Operational IT

At the lowest level of the pyramid is IT that is used in day-to-day business operations and related operational decisions. Operational IT then typically includes data collection to perform well-defined computations such as transaction processing systems, process automation systems, and process control systems (which are a special class of transaction processing designed specifically for factory operations).

A transaction is an exchange between two parties. A transaction processing system records and collects transaction data for a company. Most of us quickly recognize that systems for accounts payable, accounts receivable, invoicing, and shipments, customer order processing and other business processes are examples of this type of operational IT.

Information technology (IT) is also used to automatically collect and record machine transactions too. A process automation system is a computerized method of automatically collecting production data from machines on the plant floor. A process control system is also a special type of transaction processing system.

Process control systems not only automatically collect production data from machines but are used to regulate process variables to achieve company-specific standards such that a steady-state process is achieved. Other day-to-day operations that are addressed by operational IT include everything from a clerk who scans an item at a POS (point-of-sale) terminal to a machine operator who scans an item used in the manufacture of a product, to the folks in accounting, marketing, or finance

who use spreadsheets and other office tools to collect and evaluate data that they receive on a daily basis.

- *Are you using IT to optimally run your day-to-day operations?*
- *Can you identify the most costly process in your operations?*
- *Is there anyway that IT can be used to make your operations more cost-effective?*

Tactical IT

Tactical decisions are usually more complex in nature and require making major changes to business processes without altering the existing organization. Tactical IT systems, such as decision support systems and expert systems are used by managers when making tactical decisions.

- A decision support system is a system that uses data from a transaction processing system to evaluate business models and assist managers in making tactical decisions
- An automated scheduling and planning system (APS) is an example of operational IT with a component for decision support that can be used to determine optimal run schedules or new product routings based on production data
- An expert system helps a novice to achieve the same result as an expert; certain diagnostic software is also included in the class of expert systems
- A process control system that automatically adjusts the process when process up-sets occur to maintain steady-state operations is a special class of expert system; automated maintenance management systems (such as DataStream's MP2) are examples of operational IT that often include diagnostic software and can be used for predictive maintenance, which is also in the expert system class.

" … It is important to note that the transactions that are processed via operational IT usually provide the data that is used in tactical IT …"

This statement or should I say observation is very important for both IT and corporate managers. You see, as a company invests in IT to automate and facilitate its ability to immediately capture all of its business transactions accurately, it also ensures that any tactical IT (used in tactical decision-making) is more accurate and that better visibility of its total operations will be obtained.

Other examples of tactical IT in manufacturing might include using the "what-if-analysis" component of an APS to determine if changing the workflow for a specific product will reduce costs and labor, or using RF scanners instead of hand-held scanners to improve data accuracy and reduce the cost associated with product tracking. In marketing, a decision might be made to use a web-based customer portal that can be accessed via the Internet to provide customer order status in lieu of a telephone based customer order inquiry.

- *Are you using tactical IT in your company?*
- *Are all of your processes in control?*
- *Can you think of areas where decision support systems or expert systems could be used to assist in the tactical decision-making process?*

Strategic IT

Finally, strategic decisions result in changes to the overall structure of the business; these decisions are typically made to gain an advantage over the company's competition. Examples of strategic IT include the enterprise information system or the executive information system.

An executive information system collects, analyzes, and presents business information in a format that is intuitive and easy to use by top management; the information is usually based on a graphical model of the entire company. Strategic IT may involve the use of new technology, new software, or may involve utilizing information from existing operational and tactical IT systems to aid company executives by gathering, analyzing, and displaying data on rivals, customers, suppliers, etc.

If company management has visibility to order fulfillment, sales ranking, customer and product ranking, product quality, production, shipment, order, and invoice data at the touch of a single key or the click of a mouse, you are probably well on your way to the effective use of strategic IT.

- Are you using IT to stay abreast of your market share and market space?
- Are you using IT to reduce the cost of doing business with both customers and suppliers?
- Who are your largest customers?
- Who are your competitors?
- Who gets the largest percentage of sales from your top customers?
- Is it you? If not, do you know what the competition offers that you don't?
- How can you use IT to beat the competition -- In customer satisfaction, in order fulfillment and on-time delivery, in cost, in quality?
- Who are your largest suppliers?
- Can you think of any way that you might use strategic IT to aid you in remaining competitive?

If you know the answers to all of the questions that have been posed in the above, you are ready to answer the question: Are you in control?

If you find that you are unable to answer some of these questions, stay tuned. In the next article we will explore the types of IT investments that are typically made by companies.

IT in Practice

Suppose a clerk must schedule goods from one step of the process to the next. Currently the goods are scheduled via a piece of hand-written paper, which is carried to each location. At each location the information from the paper is transposed to another piece of paper which is kept in a file cabinet in that department; the production information relative to this next step of the process is added to the paper and carried to the next department.

This process is repeated until all of the process steps have been completed and production data has been gathered for each process step. The clerk enters information about the end-product (at each processing step) into a data entry screen provided on the traditional Information Systems (IS) computer which accumulates production totals by product, by shift in a summary report on some batch basis.

The manual and computing processes described above are examples of transaction data processing, where data is collected and displayed to produce basic reports. While data about the products produced is available in each department, information about overall product performance – product quality, production rates, machine efficiencies, out-of-control conditions, etc. -- is only available after the process step is completed and the data is analyzed. Furthermore, suppose folks outside of the production area must wait until the data is available via a batch reporting process from the IS department -- a process which may take hours or days depending on reporting priority.

As an example of operational IT, suppose we use information technology (IT) to design an information system that automates this entire process. The first IT component we will use is a computer. We may be able to upgrade the existing production computer or we may have to purchase a new computer that will provide additional processing power. The next IT component needed is software; the IT department will develop a computerized on-line production reporting/scheduling system. The next IT component needed is hardware.

The clerk in the example above would use a personal computer (PC) or thin client to access the software for data entry, allowing him/her to queue up the products, which are scheduled to be run in each step of the process. Another IT hardware component that would be used is a printer; this device would be placed at each step of the process for product identification, for example a barcode label. In addition, operations personnel would be provided with a barcode scanner for production data input. Production data would be entered into the system either by the operator via data entry or automatically via computer to machine communications (if the machinery is equipped with a microprocessor which can be interfaced to the computer).

The application software for this automated process would automatically capture, accumulate, report, and store this information on an event driven basis -- either real-time or near-real-time -- so that information or each transaction about the product is readily available at each step of the process.

When the operator (or the machine) tells the system that this step of the process has been completed, the system would automatically begin processing the next product to be run at this process step from the previously defined queue.

This operational IT system could be extended to include the automatic download of machine setup parameters by product to further reduce the data entry process. A bar-coded ticket could be automatically printed at the completion of each process step as a "tag" (or a radio frequency identification (RFID) tag could be updated) for tracking product throughout the production processes. And this automated process of production data collection and job queuing could be utilized at each phase of the process until end-product manufacture is complete. The production computer system's software would include validity checks to improve data accuracy and reduce errors in the data entry processes for both the floor operator and the clerk.

Information from this system could be used to provide real-time inventory, to trigger orders in an automatic raw material replenishment system, to flag inefficient production processes in an APS, and/or to flag machine repair in a predictive maintenance management system. These examples of tactical IT (decision support and expert systems) are possible because of the collection of production data via the use of the operational IT described above.

The operational and tactical IT used in the process above included a computer, in-house developed or purchased software for real-time production data collection and reporting, a printer for printing barcode labels, a scanner for barcode and/or RFID tag input, a CRT or PC for data entry and on-line display of information, communications software for machine and RFID and/or barcode scanner and tag interface, and a local area communications network that includes the computer and all of the peripheral devices (including CRT's or PC's, printers, RFID antennae and controllers, routers, switches, etc.).

A wide area network could be developed to allow user access across the enterprise and at remote locations by using the Internet and additional IT components for communications. The network could be used to facilitate access to the company's information from the plant floor to the boardroom, for use in an executive or enterprise information system (strategic IT), or by customers via a web-based customer portal.

What are the Benefits?

The three immediate benefits associated with this IT implementation are productivity, visibility, and control. The clerk who once spent hours on the plant floor chasing production data that is already old when it is retrieved would be able to constantly monitor the status of the products at any given process step via a PC. They would remain at a desk – Utilizing the computer to optimally schedule many different products on different machines via operational and tactical IT. They would also maintain constant communications with department personnel so that adjustments in the schedule due to equipment malfunctions, operators, etc., are accurately entered into the system to reflect real-time processing problems at the plant floor.

This clerk's job would not be eliminated; however, the process automation provided by the computerized production system would significantly improve the clerk's productivity by providing the ability to perform his/her job more efficiently.

By using operational and tactical IT, the data collection and reporting process has been transformed into an information system that provides visibility throughout the company. Each department head could be provided with a PC or thin client for access to the production system; real-time information on efficiencies, operator performance, downtime, quality, etc., could all be integrated into the system and available on demand, allowing them to respond quickly to any out-of-control conditions that exist on a more real-time basis … And, by extending the applications to include the automatic downloading of machine set-up parameters at the completion of each process step, the production system provides better control of the manufacturing processes at that plant.

In addition, by effectively using IT, information management has been automated. On some period basis, the production system's disk drives could be utilized to archive historical data for each product by process step. The real-time and historical production information could be uploaded across the wide area network to a data warehouse, the corporate ERP (enterprise resource planning) database or to the IT corporate servers for use in cost or other financial/business systems. And because this plant's production system would be connected to these servers via the network, which provides a bridge for access to this facility's production system and all of the other computer systems at facilities company-wide, the information can be made accessible to all authorized users.

Information about the product would be provided as the product moves through each processing step and from one location/facility to the next allowing each facility to have better visibility -- advance notice of any special processing requirements before the product enters the facility rather than after processing has begun – resulting in better control of the operations.

Finally, the company would be able to use strategic IT, such as an executive information system or an enterprise information system to analyze the possibilities. These systems could be automatically updated with data from the operational and tactical IT systems to provide corporate management with more real-time visibility of the state of the entire company. Via easily accessible inquiries, trends and graphical displays, management would be able to use this system to strategically analyze and plan for the future of this company.

Questions or comments pertaining to this article are welcome, and can be forwarded by e-mail to:

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