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VISUAL OPERATIONS CONTROL IN ADMINISTRATIVE ENVIRONMENTS

Monty L. Carson
Lawrence O. Levine
Technology Planning and Analysis Center
Pacific Northwest Laboratory
Richland, Washington 99352

ABSTRACT

Visual control concepts provide simple, inexpensive, and flexible mechanisms for managing processes in work teams and continuous improvement administrative environments.

INTRODUCTION

When asked what comes to mind when they think of "controlling work" in the office, people may respond with "overbearing boss," "no autonomy," or "Theory X management." The idea of controlling work in white collar or administrative environments can have a negative connotation. However, office life is often chaotic and miserable precisely because the work processes are out of control, and managers must spend their time looking over people's shoulders and fighting fires.

While management styles and structures vary, the need for control of work processes does not. Workers in many environments are being reorganized into self-managed work teams. These teams are expected to manage their own work through increased autonomy and empowerment. However, even empowered work teams must manage their work processes because of process variation. The amount of incoming jobs vary with both expected (seasonal) and unexpected demand. The mixture of job types vary over time, changing the need for certain skills or knowledge. And illness and turnover affect the availability of workers with needed skills and knowledge. Clearly, there is still a need to control work, whether the authority for controlling work is vested in one person or many.

Fortunately, there are production systems principles, discovered and proven in manufacturing, that can be used to design mechanisms for controlling (or managing) operations in administrative environments. However, the mechanisms used in manufacturing should not be applied directly to administrative environments. A better approach is to understand the principles behind production system management in manufacturing environments, and then design effective production system mechanisms specifically for administrative environments.

One principle that has been proven in manufacturing is visual process control. Visual process control uses simple, visible indicators of work status to aid in work management decisions. Visual control, applicable in both the public and private sector, is especially appropriate in work teams where responsibility for managing work is shared among many people. This paper will explore when visual control is appropriate, some of the fundamental aspects of visual control, and give two scenarios demonstrating visual control in administrative environments.
MANAGING WORK PROCESSES

Work processes are no different than the hundreds of other processes we engage in every day—they must be managed. Whether we are driving a car, building a toolshed, or overseeing the completion of a multiple author report, management of a process consists of three steps: 1) establishing and communicating what needs to happen in the process, 2) getting feedback on what is actually happening, and 3) making adjustments. Work processes are unique in that they have three elements that must be controlled: 1) the staging of jobs in queues, 2) the assignment of jobs to employees, and 3) the tracking of job status. Any effort that attempts to manage a work process needs to account for these three elements.

The way that a process is managed depends on a number of factors. One factor is the uniqueness of the process. Most adults who drive cars “manage” that process with little conscious thought, since the process is not unique. Because of sheer repetition, most drivers use good driving practices (i.e., signalling before you turn, shifting gears at the appropriate time, etc.) automatically. However, for many people, building a toolshed is a unique process and requires close attention to all aspects of the process.

Another factor that affects the way that a process is managed is the complexity of the process. A process increases in complexity as:
• the number of jobs in the process increases
• the number of workers in the process increases
• the number of tasks in the process increases
• the time between tasks in the process increases
• the amount of variability allowed in the process decreases.

A third factor that affects process management is the physical proximity of employees in a multiple task process. Coordination (i.e., communication) among tasks and employees is a key part of process management. Processes must be managed differently when employees are not near each other.

There are three primary means of managing a work process: ad hoc, electronically, and visually. Ad hoc management is what people engage in every day to manage many processes in their personal lives. Ad hoc management happens when the process manager establishes a process, monitors the process through observation, and issues direction for adjustments to the process. Ad hoc management is effective when work processes are not complex and are physically close to each other, as shown in Figure 1.

Visual process management occurs when simple, visible indicators are used to communicate work status to those involved in the process. Visual process management takes advantage of the human ability to quickly receive and process visual information. By placing indicators of process status where everyone in the process can see them, employees and managers alike can make process adjustments quickly. Since visual process management requires that process information be easily seen by those in the process, it is appropriate when process tasks are fairly close to each other (see Figure 1).

Electronic process management occurs when data about the process are collected and analyzed electronically. Data can be collected manually and entered into a computer as part of the process. Or, data collection can be automatically accomplished through a variety of means, including bar code readers, scanners, and sensors. An algorithm of some type is used to determine the status of the process. Algorithms can range from simple (e.g., sorting jobs by due date) to complex (e.g., scheduling work based on job priority and availability of resources). Using this information, process managers can make adjustments to the
process. Electronic process management tools cover a wide range in both the method of data collection and the sophistication of the management algorithms. For example, many project management software packages must be loaded manually and offer little more than organizational help. On the other extreme are workflow automation packages that automatically route and track work. Electronic management works well when processes are complex or not physically close, as shown in Figure 1.

**EFFECTIVE VISUAL PROCESS CONTROL**

Visual control indicators vary widely and must be adapted to each process. However, successful visual control indicators usually have several characteristics:

- **Highly** - Visual control indicators must be easily seen by everyone so that process adjustments can be made. Indicators should be large, easy to read, and in an open, well-lit area.

- **Understandable** - Many types of information can be communicated more easily in formats other than text, such as color coded (red stickers for jobs that are behind schedule), graphical (pictures instead of words), and comparative (bar graphs, milestones, and progress indicators).

- **Simple** - Visual control indicators need not be fancy to be effective. Only the critical information that indicates process status needs to be communicated.

- **Adaptable** - Most processes change over time. Unless control indicators can be easily changed, they will become obsolete and unused.

- **Inexpensive** - Low cost visual control indicators encourage innovation and immediate implementation. Time can be spent on experimentation rather than trying to justify capital expenditures.

An example from the service sector demonstrates the applicability and simplicity of visual process control. Several retail stores have a policy of opening a new check-out lane if more than three people are in line. The policy is clearly advertised to customers with large signs in the store. Employees need not wait for a manager’s approval to open a new check-out line; they are authorized to do so when they see the need. This demonstrates the three fundamental rules for visual control:

1. Goals and rules are unambiguous and known by all employees
2. Situations are visible to everyone
3. All employees participate and know what to do.

**SCENARIO 1: GOVERNMENT OVERSIGHT OFFICE**

A government office at a large federal facility oversees the security operations taken by the contractor. Most tasks in the office revolve around receiving, reviewing, and producing formal documents from either the contractor or higher ups. Problems in the office include misplaced documents, lost actions on requests for information, poor distribution of work among employees, and long lead times.

A visual control solution is developed. The major processes in the office are studied and five classifications that describe the status of any assigned action in the office are identified. Action cards are created that hold the vital information of any action, including references to corresponding documents. The cards are used with an action tracking board, as shown in Figure 2.

![Fig. 2. Action Tracking Board](image-url)
action card is filled out and put in an employee's "Assigned" slot. When the employee is able to start working on the action, he or she moves the action card to the "Processing" slot. If the employee needs to transfer the action to a co-worker for completion, the card is updated and placed in the co-worker's "Assigned" slot. The action card remains on the board, moving through its different classifications, until it is completed.

The action tracking board allows quick assessment of the status of any action. Since the due and suspense dates are clearly written on the top of the action card, it is easy to scan the board and see which actions are priority for completion. Managers are able to quickly assess the workload of the employees and redistribute workload when needed.

**SCENARIO 2: ACCOUNTS PAYABLE OFFICE**

An accounts payable office receives invoices, verifies payment authorization, and enters payment data. Invoices are opened and sorted by a clerk, who puts them in the specialist's in-box for authorization and data entry. The situation is difficult, since specialists are swamped, frustrated, and are having trouble paying problem invoices on time.

A key aspect of the solution to this situation is visual control. Rather than putting all new invoices in the specialist's in-box, the clerk sorts them into folders in a central area. Each specialist has their own set of folders. Invoices are sorted by the day they arrive and by their potential for a discount if paid early (see Figure 3). Specialists only take one day's worth of invoices to their desk at a time. This leaves the backlog, normally at two or three days, clearly visible, and allows the specialists to balance the workload among themselves when the backlog gets too large.

![Figure 3. Visual Control in Accounts Payable](image)

**CONCLUSION**

Visual control uses simple, easy to understand mechanisms to indicate the status of a work process. Visual control facilitates empowered work teams by providing immediate feedback on the process performance. Because it is low cost and adaptable, visual control is hard to beat when used in the appropriate environment.
FURTHER READING


BIOGRAPHICAL SKETCH

Monty L. Carson is a Research Engineer with the Technology Planning and Analysis Center of Pacific Northwest Laboratory (a) in Richland, Washington. He is working on projects in a variety of areas, including manufacturing and business systems modernization, process redesign, and knowledge-based systems. He holds M.S. and B.S. degrees in Industrial Engineering from Arizona State University. He is a member of the Institute of Industrial Engineers.

Lawrence O. Levine joined Pacific Northwest Laboratory (a) in 1983. His professional experience has included management systems assessment, application software design and development, technology assessment, and R&D planning and assessment. At PNL, his recent focus has been on ways to improve operational effectiveness, especially as it relates to reducing cycle time in administrative processes, and implementing TQM in R&D organizations. Mr. Levine has a B.S. in Engineering from the University of Michigan and an M.S. in Industrial Administration from Carnegie Mellon University. He is a member of the Institute of Industrial Engineering, Association for Manufacturing Excellence, American Production and Inventory Control Society, and National Council of Systems Engineering.

(a) Pacific Northwest Laboratory is operated for the U.S. Department of Energy by Battelle Memorial Institute under Contract DE-AC06-76RL01830.