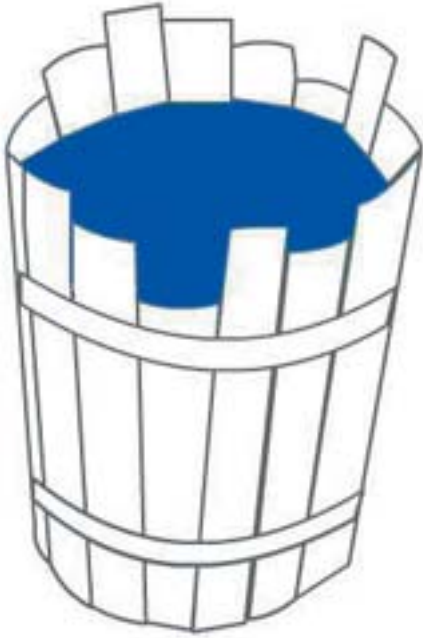


# The Minimum Factor



## Step 1 Identify Critical Components

By focusing on the minimum factor, the shortest stave, or weakest point, it is possible to maximize energy and at the same time exploit the stronger components for the company's advantage.

Focus means knowing where to place one's attention. So the first task is to identify components in your organization that possess critical functions and then apply energies towards positive change.

## Examples

In order to focus on the minimum factor in any given repair station it is important to first identify those departments (components) that perform critical operations. When effort, time, money and energy are devoted to components that do not perform critical functions there is a diminishing return or benefit.

One repair station may depend upon their inspection department to "inspect out" the mistakes made by an inferior service department. Another repair station's focus may be a PMA business, so purchasing and sales may play a critical role in the business.

Still yet, another repair station may exist for the sole purpose of repairing the parent company's products. In this situation sales and purchasing may not be critical components.

Criticality in the repair business varies from one repair station to the next. In order to improve the capability of the repair station it is necessary to identify components of the station's business that performs critical functions.

Once critical components of the repair station are identified focus your attention on the department with least capability the department that continually falls short during the production cycle.

## Step 2 Ask WHY? 5 times

# WHY?

Analyze the identified minimum factor, perform a simple “root cause analysis by asking “why” 5 times.

# H

### THE FIVE WHY'S PERSPECTIVE

# WHY?

It's mid-afternoon, a hour before the shift change at a manufacturing plant and I'm the foreman. I'm walking through the plant, giving a tour to a friend who happens to be a systems thinker. Suddenly I see a pool of oil on the floor. So I grab the nearest member of the assembly line crew: “Hey! There's oil on the floor! For Pete's sake, somebody could slip in that ! Clean it up!”

# H ?

# WHY?

# ?

When I'm finished, my systems thinking friend breaks in with a quiet question: “Why is there oil on the floor?” “Yeah,” I repeat to the crew member. “How did oil get on the floor?” The crew member replies, “Well the gabungie's leaking.” All of us automatically look up. Sure enough, there's a visible leak up there in the gabungie. “Oh, okay,” I sigh. “Well, clean up the oil and get the gabungie fixed right away.”

My friend pulls me aside and murmurs, “But why is the gabungie broken?”

I say, “Yeah, well the ga-----” and turn to the crew member. “Why is the gabungie broken?”

“The gaskets are defective,” is the reply.

“Oh, well then look,” I say. “Here clean the oil up, fix the gabungie, and, uh, do something about the gaskets!” My friend adds: “And why are the gaskets defective?”

“Yeah,” I say. “Just out of curiosity, how come we got defective gaskets in the gabungie?”

The shop floor crew member says, “Well we were told that purchasing got a great deal on those gaskets.” I can see my friend start to open his mouth, but this time I get there first. “Why did purchasing get such a great deal?” “How should I know?” says the crew member wandering off to find a mop and bucket.

My friend and I go back to the office and make some phone calls. It turns out that we have a two year old policy in the company that encourages purchasing at the lowest price. Hence the defective gaskets - of which there is a five year supply - along with the leaking gabungie and the pool of oil. In addition, this policy is probably causing other problems throughout the organization, not closely related in time or space to the root “cause”.

## STEP 1

Pick the symptom where you wish to start; the thread which you hope you can pull on to unravel the knot. Ask the first why of the group: “Why is such and such taking place?” You will probably end up with three or four answers. Put them on the wall, with plenty of room around them.

## STEP 2, 3, 4, 5: THE SUCCESSIVE WHYS

Repeat the process for every statement on the wall, asking “Why?” about each one. Post each answer near its “parent.” Follow up all the answers that seem likely. You will probably find them converging; a dozen separate symptoms may be traceable back to two or three system sources.

## STEP 2, 3, 4, 5: THE SUCCESSIVE WHYS *continued*

As you trace the Whys back to their root cause, you will find yourself tangling with issues that not only affect the gabungie (whatever that may be), but the entire organization. The policy to get the lowest price on supplies might have been caused by a battle in the finance office. It might result from a purchasing strategy, or from under investment in maintenance. The problem is not that the original policy was “wrong - headed,” but that its long-term and far-flung effects remained unseen.

### AVOIDING THE “FIXATION ON EVENTS”

To be effective, your answers to the *Five Whys* should steer away from blaming individuals. For example, in answer to the question: “Why is there oil on the floor?” someone may say:

“Because the maintenance crew did not clean it up.”

“Why didn’t they clean it up?”

“Because their supervisor didn’t tell them to.”

“Why didn’t he do that?”

“Because the crew didn’t tell him about it.”

“Why didn’t they tell him?”

“Because he didn’t ask?”

Blaming individual people leaves you with no option except to punish them: there’s no chance for substantive change. One of the benefits of the *Five Whys* exercise is that it trains people to recognize the difference between an event-oriented explanation and a system explanation. The systemic explanations are the ones which, as you trace them back, lead to the reasons *why* they didn’t clean it up, or he didn’t tell them to, or they didn’t ask. (Maybe, for example poor training of maintenance people contributed to the oil puddle problem; but even the best trained, hardest working custodians in the world could not stop the gasket from leaking.”

(The Fifth Disciple Fieldbook)

Asking Why five times from a group of people is an excellent way to co-create and pull other concerned individuals into the mix about the minimum factors at your particular place of work.

## Step 3 Determine controls necessary to produce change and extend capability of the minimum factor.

One way to increase proficiency, efficiency and increase capability is through the implementation of intervention controls.

There are three major types of intervention controls:

1. Engineering - Improve equipment design, work conditions etc.
2. Administrative - Improve performance and control risk through processes, standards and supervision.
3. Personnel - Improve human performance through training.

### Engineering

Engineering focuses on building fail safe systems, designing error out of equipment. It is impossible to engineer every hazard out even though designs are constantly improving.

### Administrative

Policies, processes, manual updates and changes in organization structures are designed to legislate rules to keep employees headed in the right direction, but they often lack the power necessary to produce compliance because they reside only in the cognitive domain.

### Personnel

Failure to adhere to training is a real problem. The training moment comes and goes, but for training to stick there must be motivation.

Typically intervention strategies have focused on error prevention. By combining error reduction and human performance enhancement we address the human component. By addressing the human condition, we impact the precious, most sensitive and most flexible part of the system.

Implementing engineering controls in this way links design-manufacturing equipment and best practices together.

Administrative controls that address both the activities of operations and physiological / psychological aspects of the human worker capitalizes on the most important aspect of any process, namely the human component.

Personnel control strategies should address the intangible components associated with tasks, namely the human factors involved. By addressing this core component, we deal with motivation, environmental issues as well as the common routine training goals.

## Step 4 Evaluate the potential impact on the organization as a whole.

If there is one single advantage to implementing change within a system it is helping people to embrace change. People in a systemic environment react more quickly when things change because they know how to anticipate changes that are going to occur (which is different from trying to predict the future.)

Creating change within an organization is not difficult, the tighter knit the organization the more pronounced the change. However, implementing change is not for the novice. It is extremely important to consider the impact across the entire system. Surprises irrupts into nervousness. However, well thought out changes that predictably ripples through the organization instills confidence in leadership.

Here is the problem, if you don't anticipate changes that impact other parts of your organization, then you may amplify other existing problems (that are tacit).

Examples:

Imagine an organization where sales soars! The Service Department is stretched thin by lack of experienced workers. Inspection is accustom to "inspecting out" deficiencies in the service part of the organization. Cranking up sales only escalates existing problems in service and puts excessive pressure on inspection. Inspection irrupts with massive rejections or corrective actions. While sales puts more in the pipeline, the customer suffers in the long run . . . and so does the organization. Both service and inspection hemorrhage.

Another company that has a problem with keeping employees in the service end of their business develops processes and procedures to break down their service into small steps. Maintenance employees come and go . . . but the business goes on. Maintenance workers are relegated to the task of inserting a bolt into a seat frame and then tightening the nut and passing the part on down line. A new well meaning Accountable Manager comes on board . . . his goal is to beef up the service end of the company, by increasing employee pay and benefits. More is demanded of employees, training is impacted, and inspection becomes more complex. Processes must be rewritten to match the reality of the changes. If all of these changes are anticipated they are managed well. If not, then leadership looks like a deer staring into the headlights of an oncoming vehicle.

The rule to anticipating change is simple. Identify collateral departments that are sensitive to change and evaluate how the overall change impacts them. Sensitive departments includes those that have complexity of operations, critically in their functions or are short staffed.

## Step 5 Apply the art of skillful steering.



Surfs up dude!

Skillful steering is no more natural than jumping up on to a surfboard for the first time, curling your toes around the edge and snaking through the pipe!

Skill is acquired through practice. It is especially difficult when tweaking systems, because a little bit of steering is multiplied many times over. It is like getting inside a high performance flight simulator for the first time. A little stick movement and then you wind up in an overcorrection mode and it is difficult to get back to a stable place.

The surfer makes wise use of the power of the wave. Using the principle of energy transformation the surfer makes minimal adjustments through the shifting of his weight and the leaning of his body to ride the energy.

A change in a process requiring receiving inspection to check for manual currency when articles arrive may be the difference between meeting a deadline or disappointing a customer. Over reaction activities would be last minute ordering of updated manuals, or increase in technician overtime to compensate for delays while upgrades in manuals are completed.

Shifting from an OP Spec to a capability list allows a company to self audit and add to its' capability. This simple self audit feature enables the company to move into new areas of business quickly with very little effort. There is no wait time for approval from the local FAA office.

Many of the small tweaks in a system like revising a process or supplying additional training are often minor, but results in significant gain of capability. As these are applied to minimum factors the organization realizes an overall increase in proficiency and efficiency of operation.