

# Statistics and Metrics

## *The Dark Side of Management*

**LOOKING AT THE WAY  
MANAGERS THINK**

Victor W. Lowe, Jr.  
25 July 2003



© VICTOR W. LOWE, JR.

## What's Ahead

- ✓ Metaphor
- ✓ Parable
- ✓ Examples of complex problems managers create with simple thinking
  - goal setting
  - metrics / evaluations
  - performance evaluations
  - learning
  - politics
  - policy
- ✓ Summary

## Deming's System of Profound Knowledge

- ✓ Theory of Knowledge
- ✓ Theory of Variation
- ✓ Theory of a System
- ✓ Theory of Psychology

## Managing Knowledge

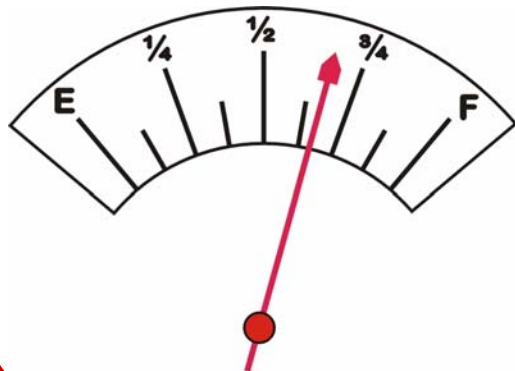
- ✓ An informal, irreverent handbook of the most important knowledge managers need to know (in manuscript)
- ✓ *Thesis*: management is / should be primarily a thinking / knowledge-based activity
  - ✓ What should management think about?
- ✓ To make their organizations better, managers must learn to think better (Deming's thesis)
- ✓ Einstein: "*The problems we face today cannot be solved at the same level of thought we were at when we created them.*"

## *Metaphor: Fuel Gauge*

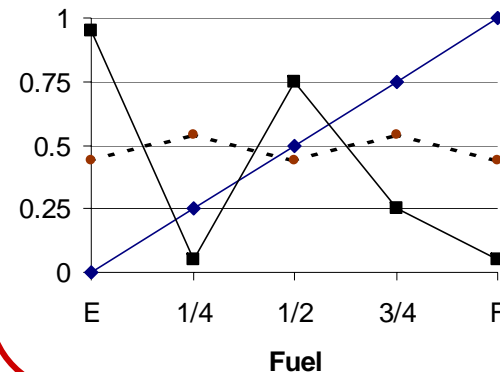
What performance characteristics must a fuel gauge (metric) possess before it is useful?

- Cost, ease of use, stability, reliability, etc.?
- Co-variability: metric and reality *must* vary together

### Fuel Gauge



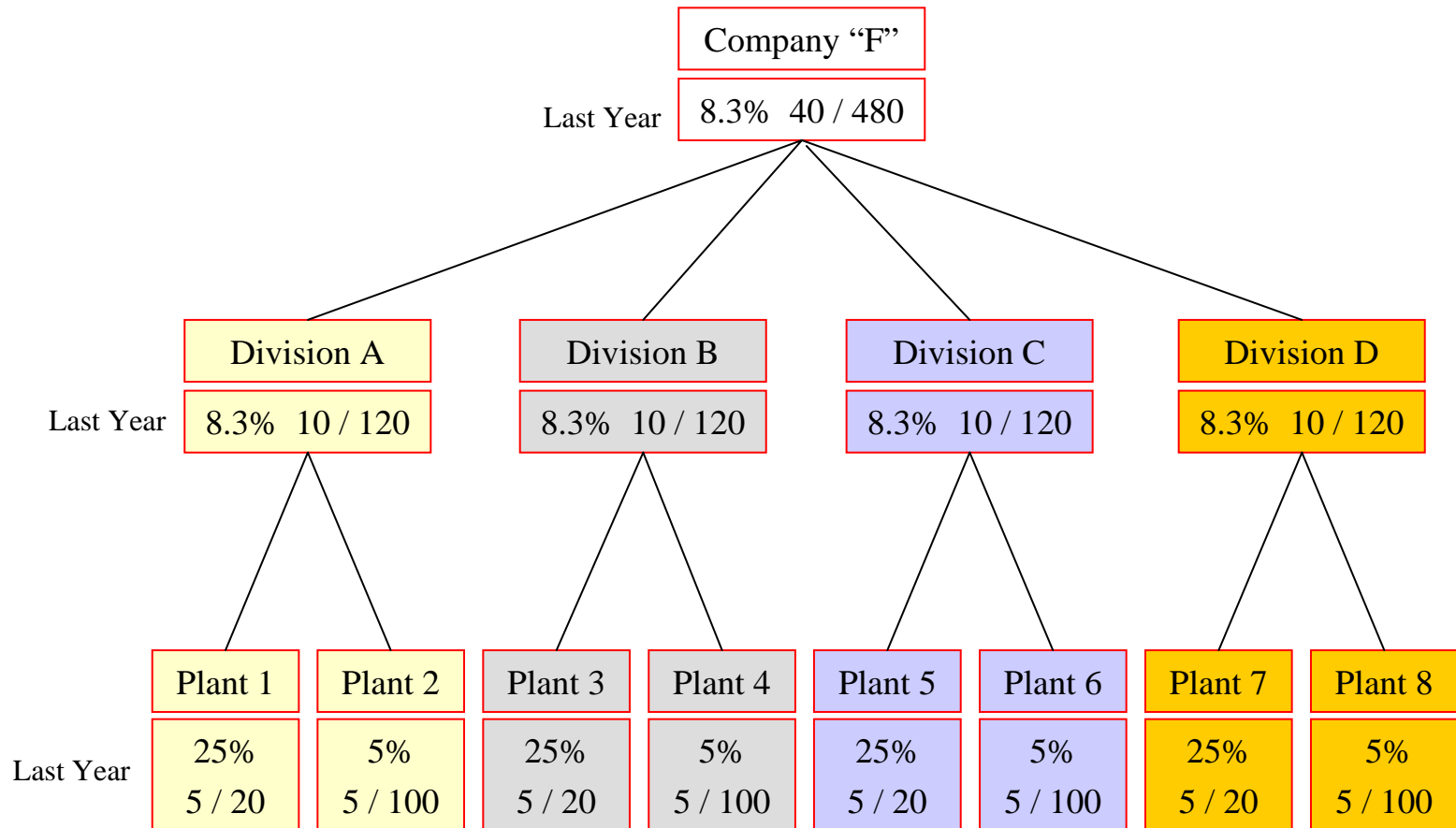
### Performance of Three Hypothetical Gauges



*The **quality** / utility of a gauge / metric is determined by its performance, not by the intentions of the user designer*

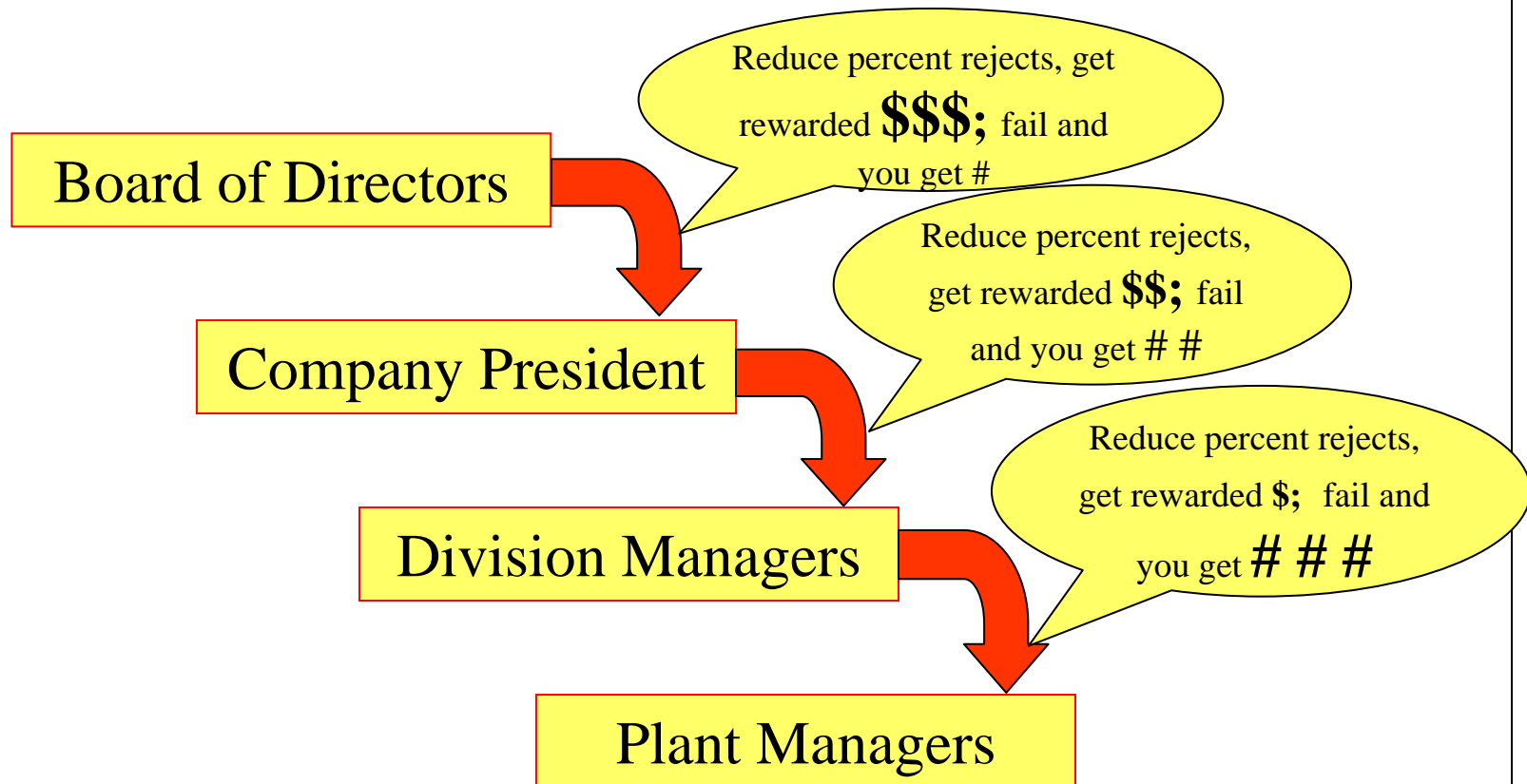
# The Parable of Company "F"

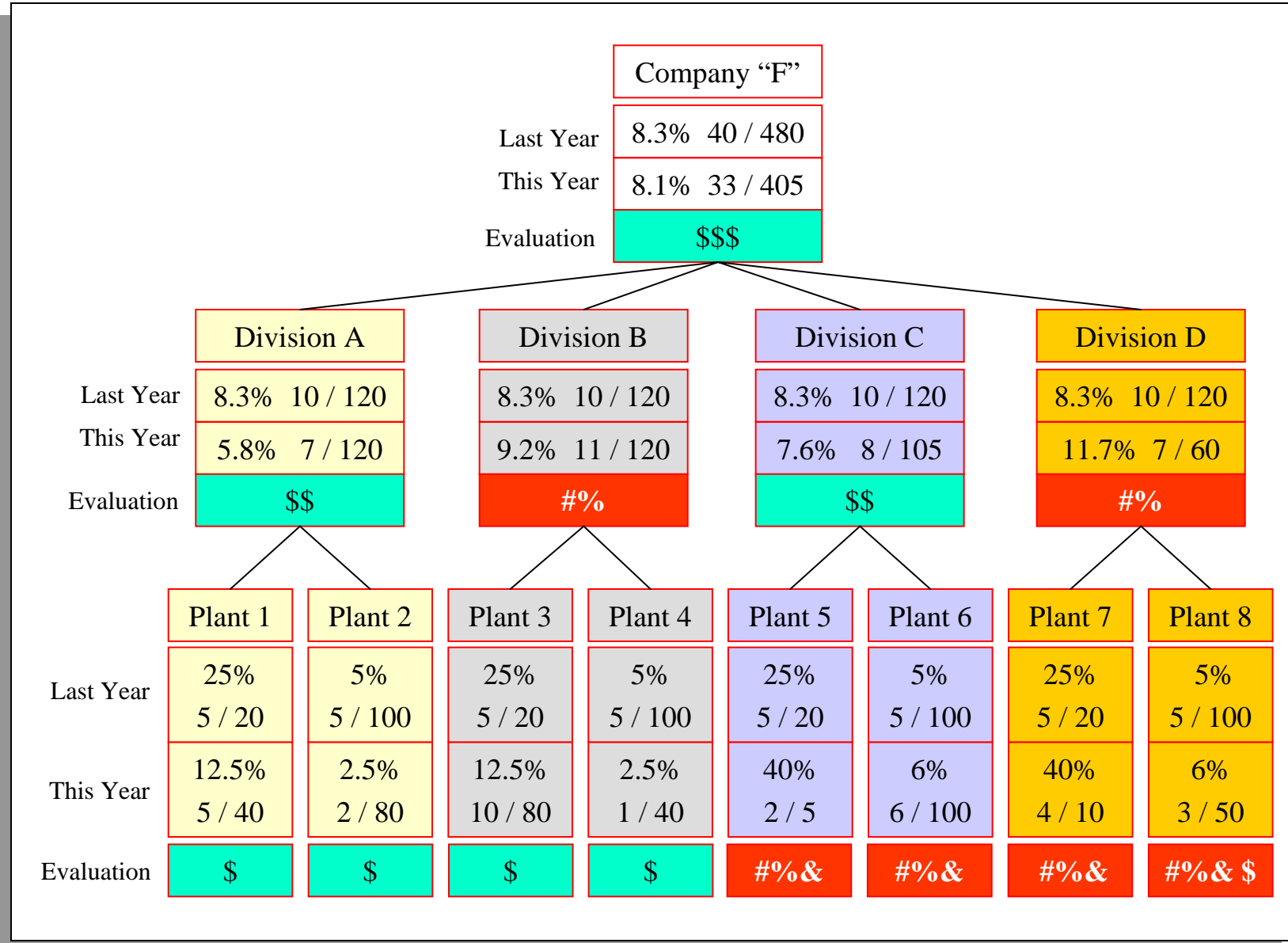
## Percent Defectives



Managing Knowledge

# Management Cascades a New Quality Strategy (with metric)

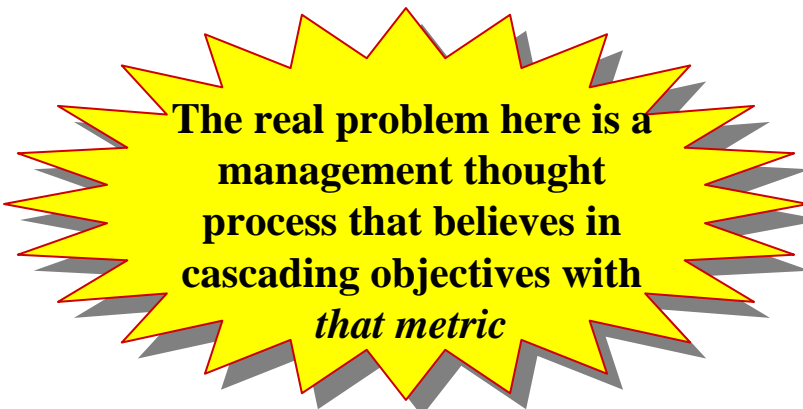




# Take-Aways from the Parable ...

## **... About Systems**

- ✓ Systems (even simple systems) are much more complicated than we think they are
- ✓ The whole / aggregated system is not the simple sum of its parts
  - ✓ Making the parts better does not necessarily make the whole better
  - ✓ Making the parts worse does not necessarily make the whole worse
  - ✓ Failure to recognize that can lead to disastrous results
- ✓ May need new terms / metrics for thinking about systems (Hint: ponder connection between functionals and optical illusions, ala certain works of Escher)



**The real problem here is a management thought process that believes in cascading objectives with *that metric***

## **... About Other Topics**

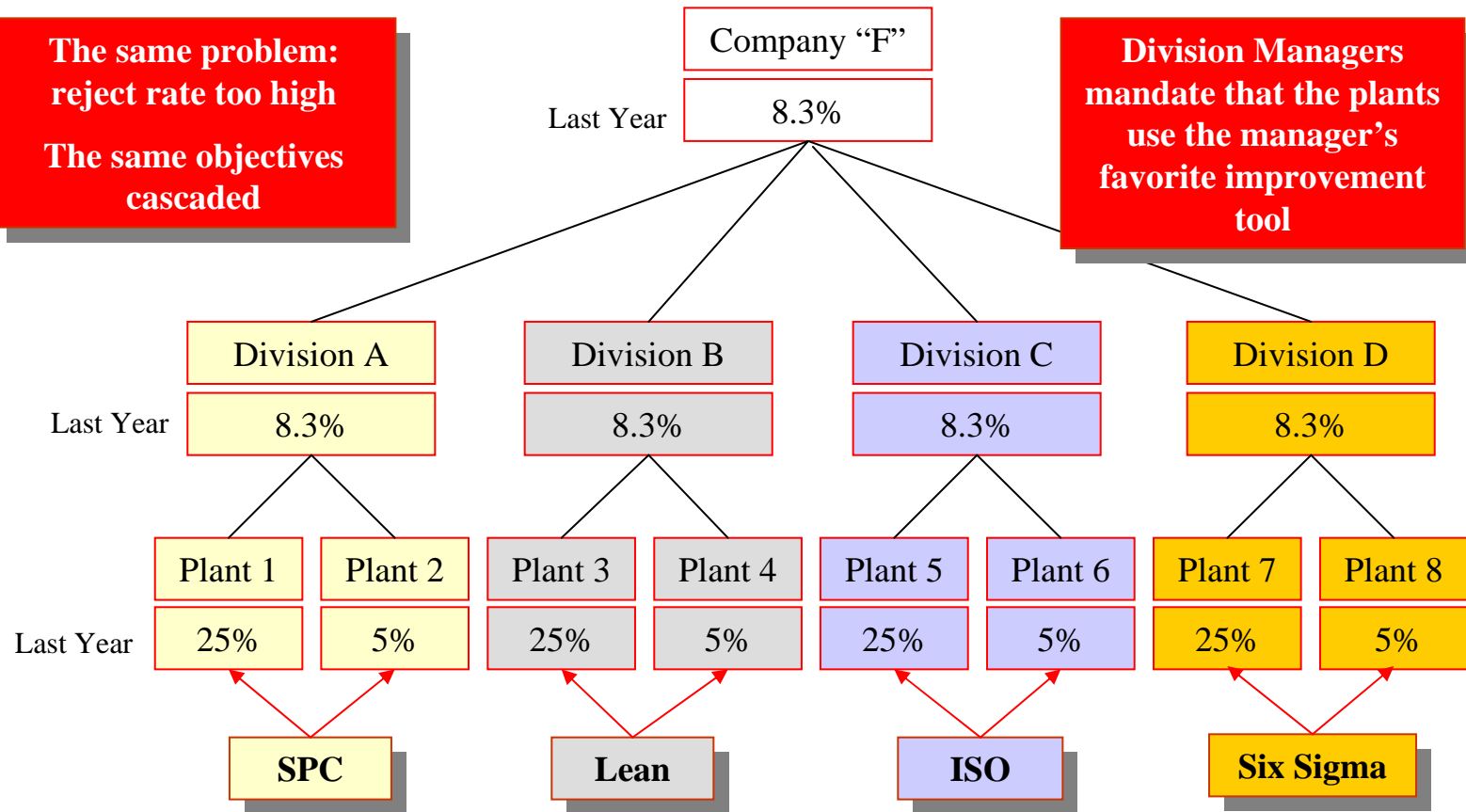
- ✓ Six-Sigma, ISO, Lean, etc. do not generally address the problem of bad management direction
- ✓ By failing to address the general class of problems (of which this is but one simple example), management creates many of its own problems

# The Parable of Company “F” Revisited

## *The Learning Experience*

The same problem:  
reject rate too high  
The same objectives  
cascaded

Division Managers  
mandate that the plants  
use the manager’s  
favorite improvement  
tool



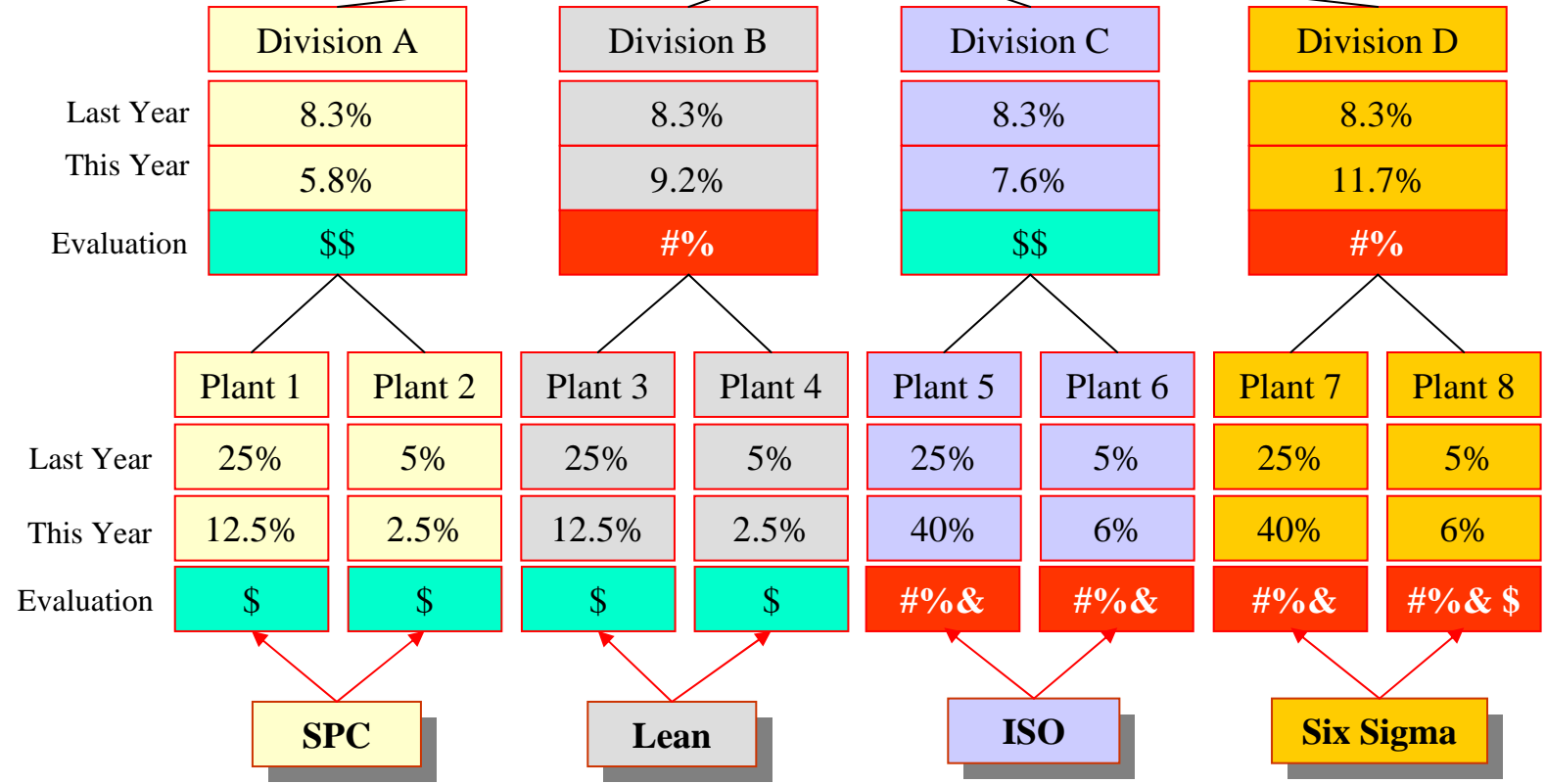
Managing Knowledge



**What lessons will the Division Managers take away for SPC, Lean, ISO, Six Sigma?**

Company "F"	
Last Year	8.3%
This Year	8.1%
Evaluation	\$\$\$

**What lessons should the Division Managers take away for SPC, Lean, ISO, Six Sigma?**



Managing Knowledge

# Federal Income Tax Policy

Adjusted Gross Income	1974			1975		
	Income	Tax	Tax Rate	Tax Rate	Income	Tax
under \$5,000	\$41,651,643	2,244,467	0.054	0.035	\$19,879,622	\$689,318
\$5,000 to \$9,999	\$146,400,740	\$13,646,348	0.093	0.072	\$122,853,315	\$8,819,461
\$10,000 to \$14,999	\$192,688,922	\$21,449,597	0.111	0.100	\$171,858,024	\$17,155,758
\$15,000 to \$99,999	\$470,010,790	\$75,038,230	0.160	0.159	\$865,037,814	\$137,860,951
\$100,000 or more	\$29,427,152	\$11,311,672	0.384	0.383	\$62,806,159	\$24,051,698
Total	\$880,179,247	\$123,690,314	///	///	\$1,242,434,934	\$188,577,186
Overall Tax Rate			0.141	0.152		

## Questions to Think About

- ✓ Is it more accurate to say the tax rate went up or went down?
- ✓ How might politicians in our two major political parties characterize the change in the tax rate for political purposes?
- ✓ When would such political statements concerning tax rates “become spin” and when would they become outright deceptions?
- ✓ As a taxpayer, exactly what information would you need to be “well informed”

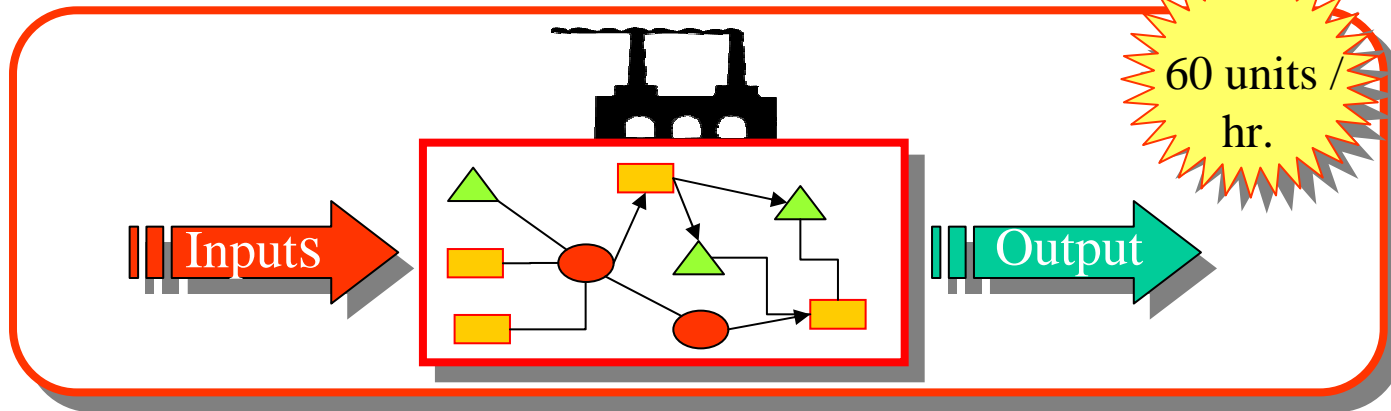
# Comparing Death Rates in Oncology Wards of Two Hospitals

Adjusted Gross Income	Hospital A			Hospital B		
	Patients	Deaths	Death Rate	Death Rate	Patients	Deaths
Cancer 1	416	22	0.053	0.030	198	6
Cancer 2	146	13	0.089	0.066	122	8
Cancer 3	192	21	0.109	0.099	171	17
Cancer 4	470	75	0.160	0.158	865	137
Cancer 5	294	11	0.037	0.032	628	20
Total	1518	142	///	///	1984	188
Overall Death Rate			0.094	0.095		

## Questions to Think About

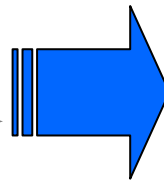
- ✓ Which hospital has the **better** record?
- ✓ If you had Cancer 2, would you rather be treated in Hospital A or B?
- ✓ If you knew you had cancer but did not know which type of cancer it was, which hospital would you rather go to?
- ✓ Suppose a “patients rights” group wanted to provide the public with a ranking of hospitals. How might they fairly rank these two hospitals so that the public would know which hospital was the better of the two?

## Company “F’s” Electronic Division Needed to Build 5 New Greenfield Plants



### Plant Management

*The key to increasing production is to increase utilization!*



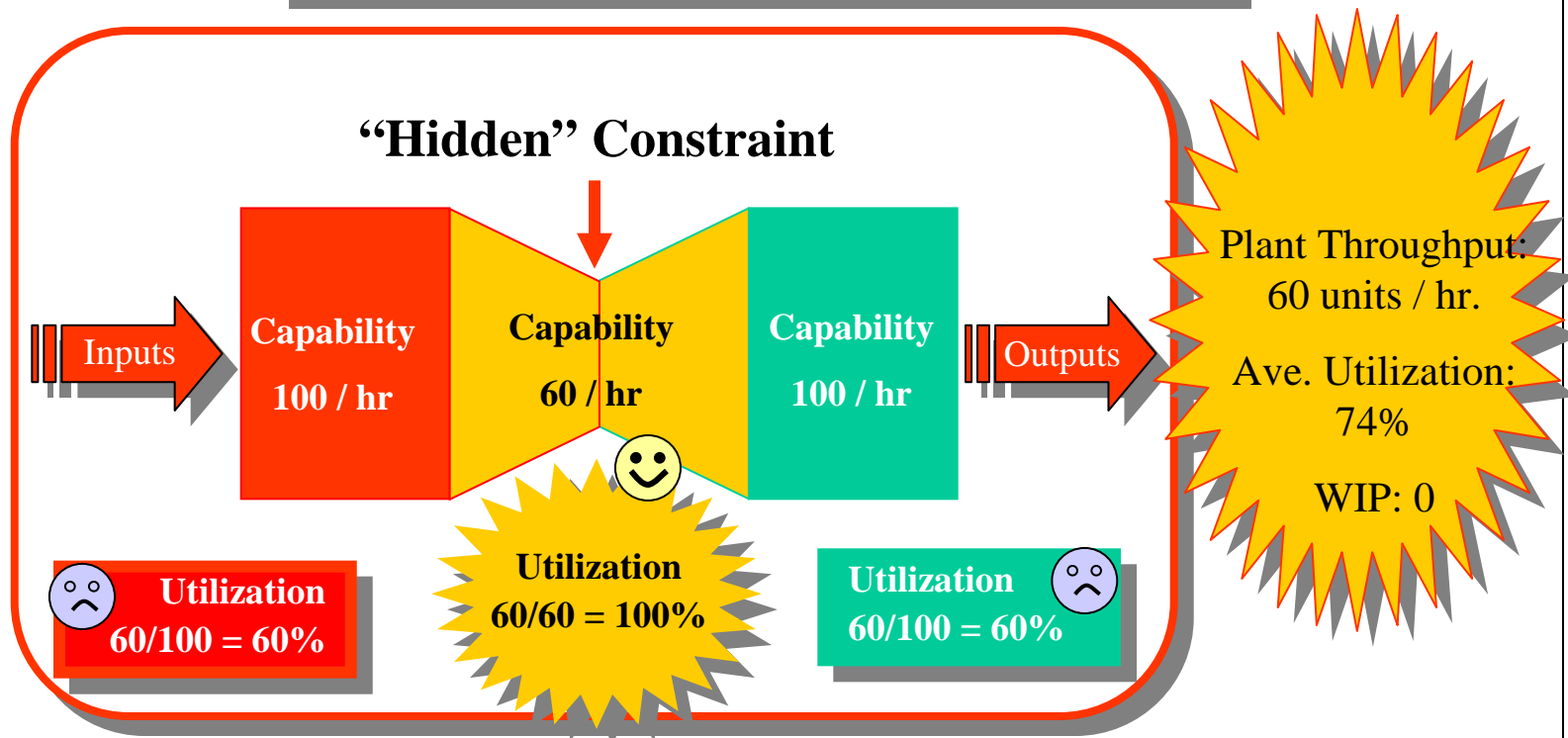
*Attention  
All Area Managers*

*Increase utilization,  
or else!*

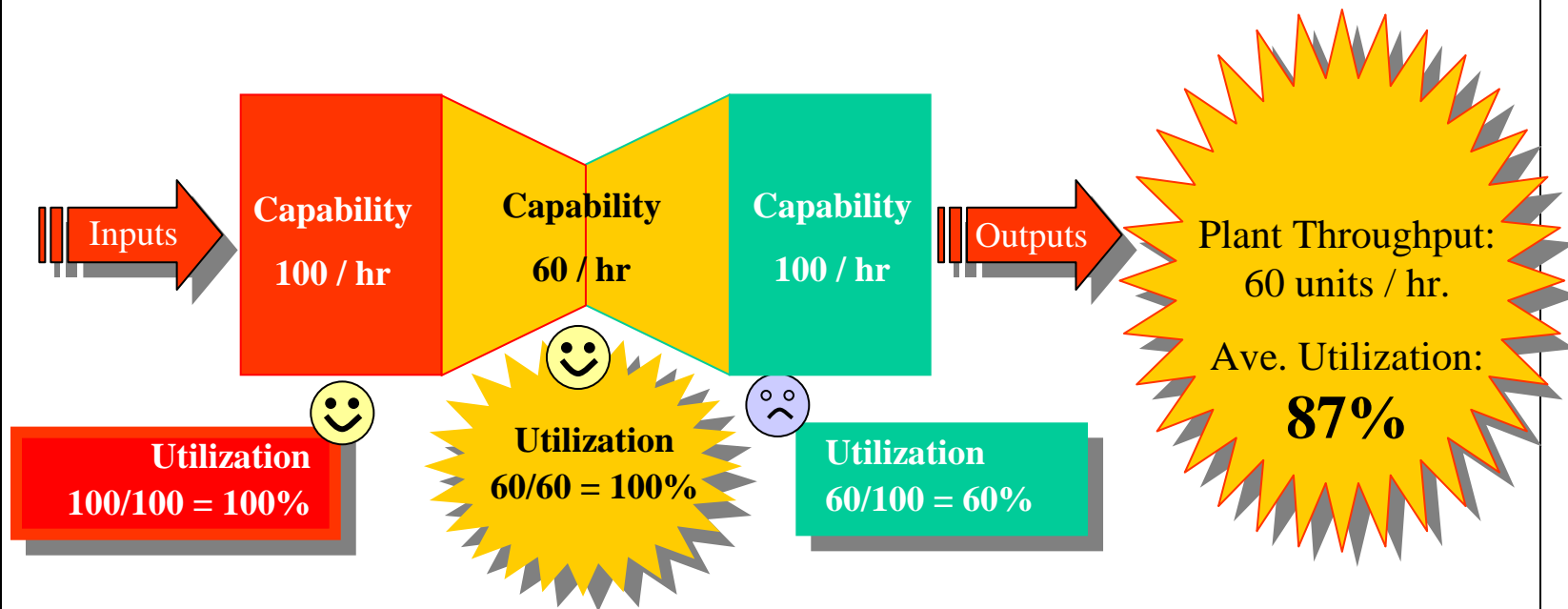
# Company “F’s” Canadian Plant Before the Edict

Goldratt’s First Principle: Overall plant throughput determined by constraints (which are usually non-obvious)

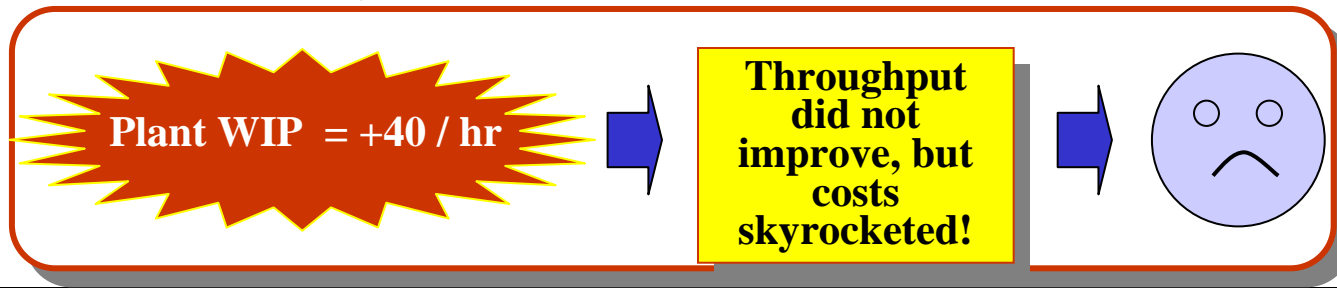
Managing Knowledge



# Same Plant After Edict Went Into Effect



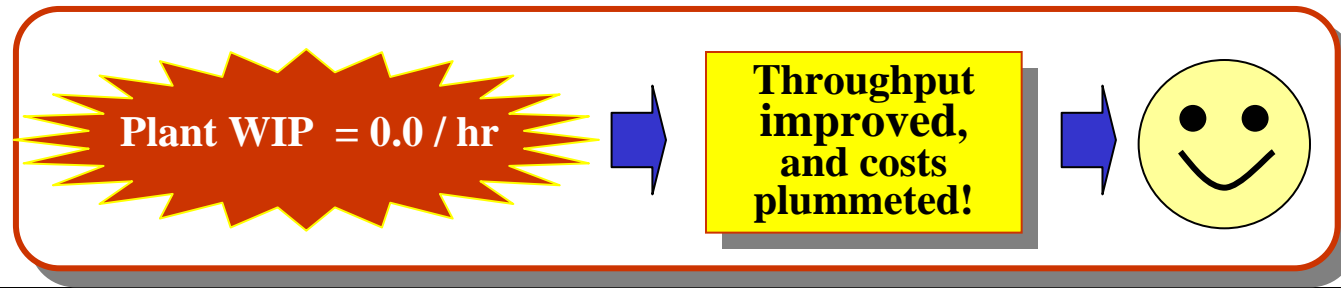
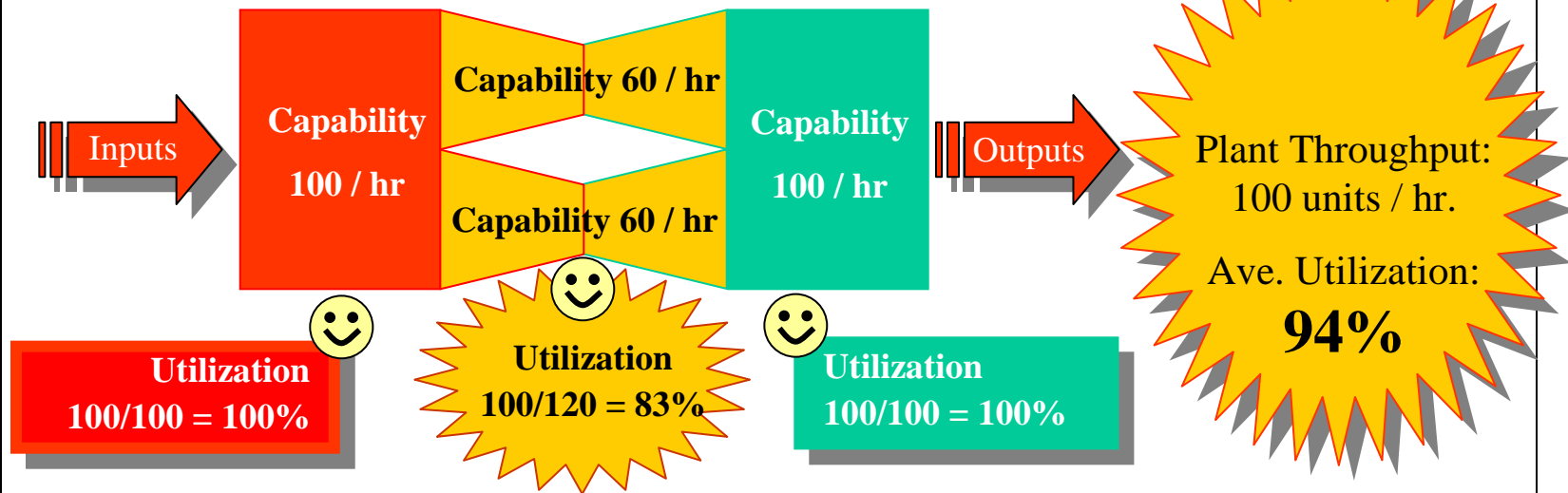
Managing Knowledge



# The Solution

## Add a Stand-by Machine

Goldratt's Second Principle: Overall plant throughput is important; component throughput is not



# Take-Aways

## Company “F’s” Electronic Division Example

- ✓ Policy of Company F, as articulated by its Finance Manual, specifically Prohibited the step that **doubled** the plant throughput)
  - ✓ The Finance Manual dictated all equipment have a certain minimum level of utilization.
- ✓ Company President, deliberately and knowingly, created two sets of accounting records
  - ✓ The “official set” with false data that satisfied the Finance Manual requirements
  - ✓ The “real” data for what was going on
  - ✓ He created an “invisible company” outside of upper management’s control
  - ✓ He cheerfully admitted everything after the “experiment” turned out to be a success
- ✓ Major implication: Value of a component to the system is **not determined** by its utilization rate
  - ✓ Grading and ranking of components / team members / employees



# Summary and Other Examples to Think About

## Summary

- ✓ Behavior of the system is not necessarily the same as the behavior of the components
- ✓ Improving components may degrade system; degrading components may improve system
- ✓ Well-managed components do not necessarily add up to a well managed system
- ✓ Failure to understand the behavior of a system can lead to catastrophic consequences (i.e. a company policy that reduces plant throughput by half)

## Other Examples

- ✓ Setting targets for reducing cost, weight, defects, head count, warranty, etc.
- ✓ Strategy of wanting every worker fully employed (no one available for walk-in customers, problems, etc.)
- ✓ Using “best practices” everywhere in the organization
- ✓ Force Effectiveness calculations
  - ✓ Possible to win every engagement, yet lose the war, and conversely

# Finis

*Systems are not always what they seem to be*

