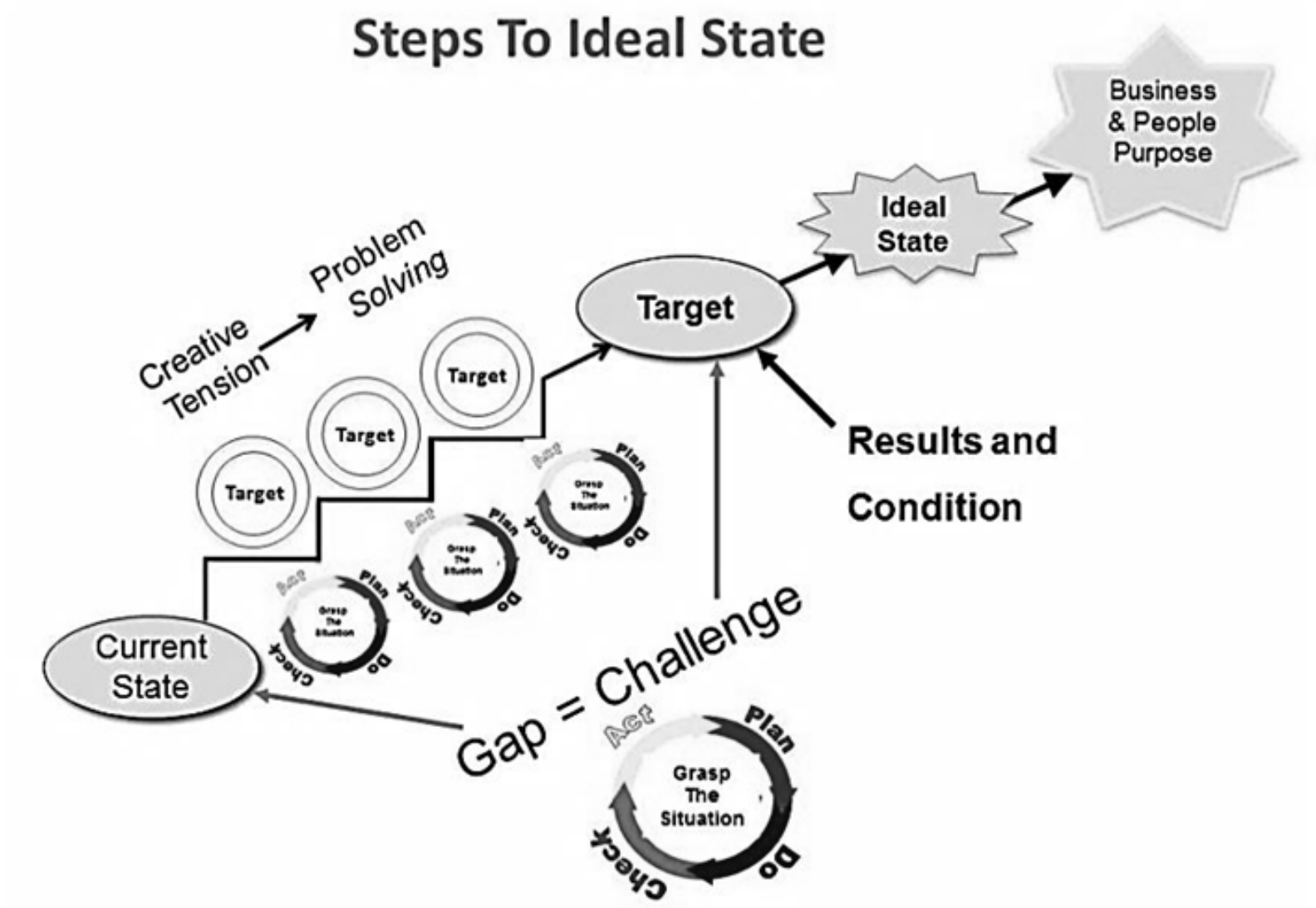
Developing Lean Leaders at all Levels: A Practical Guide

Chapter 2 Figures



Source: *The Toyota Way to Continuous Improvement*

Figure 2-1. Problem Solving your way toward an Ideal State

Figure 2-2. Plan-Do-Check-Act Cycle

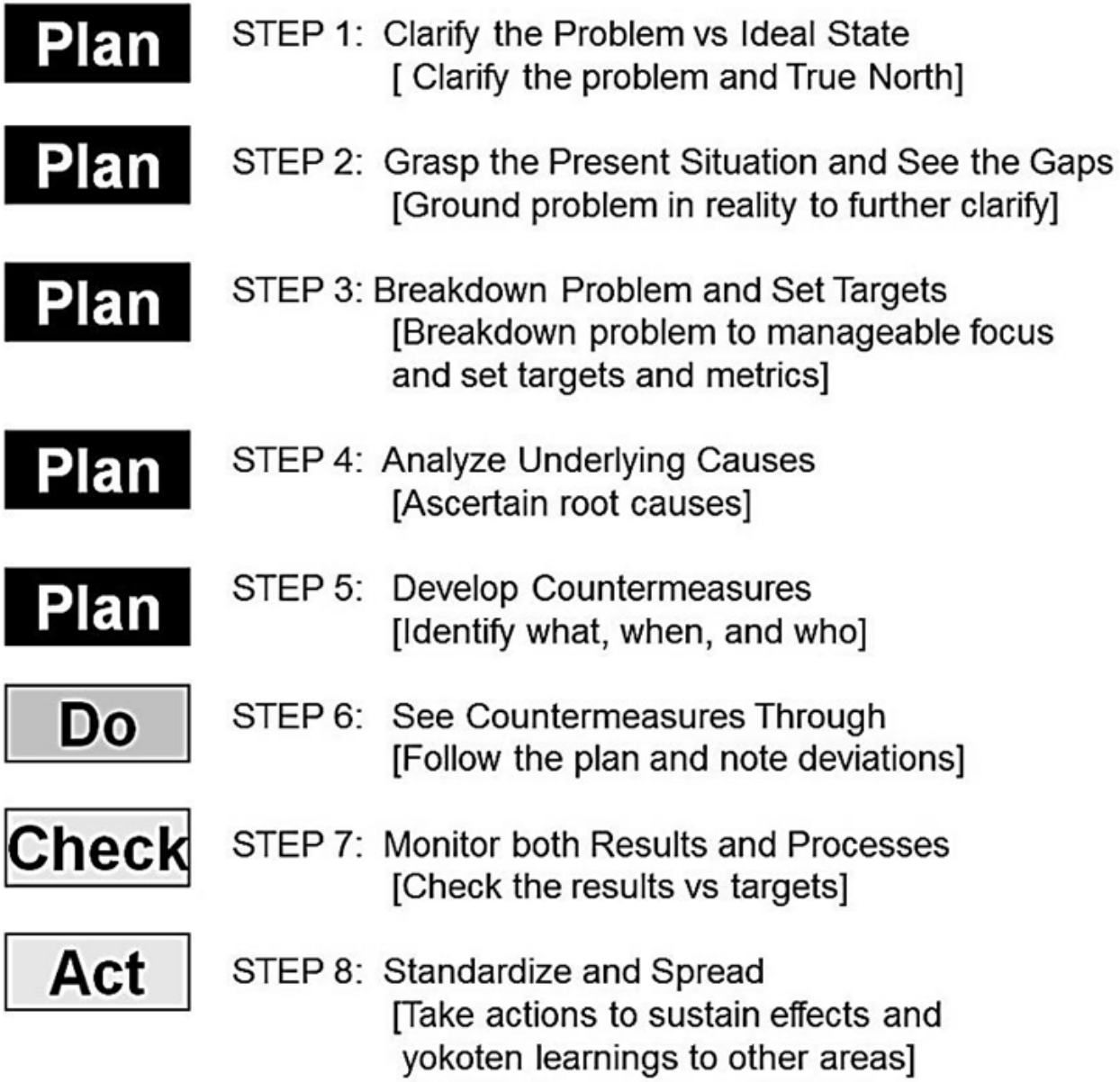


Figure 2-3. The Eight Steps involved in Toyota Business Practices (TBP)

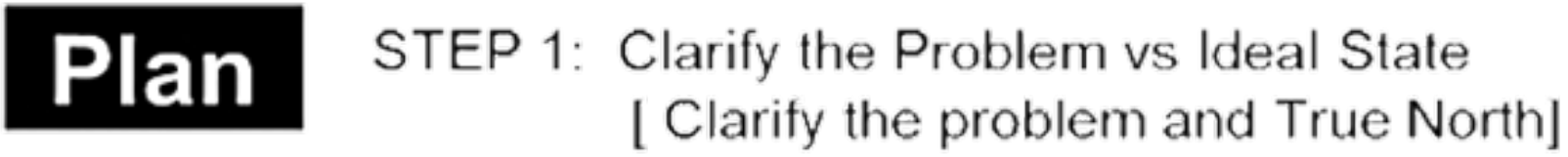


Figure 2-4. Plan Step 1

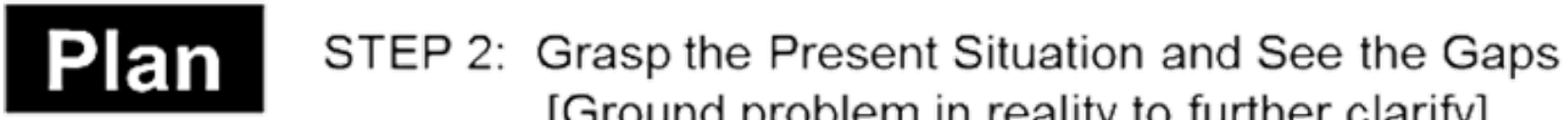


Figure 2-5. Plan Step 2

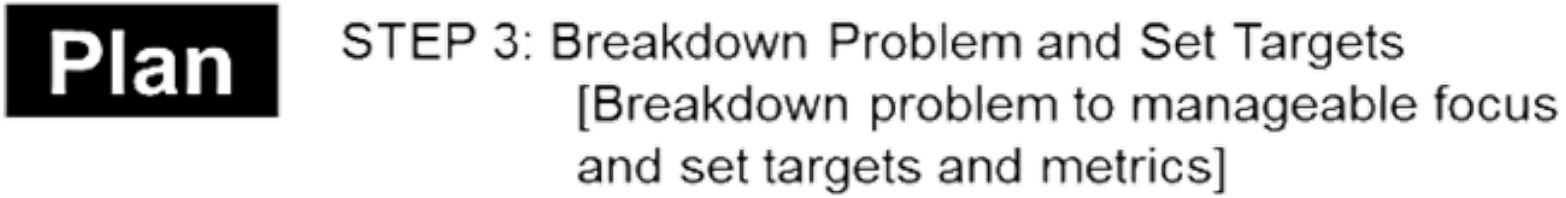


Figure 2-6. Plan Step 3

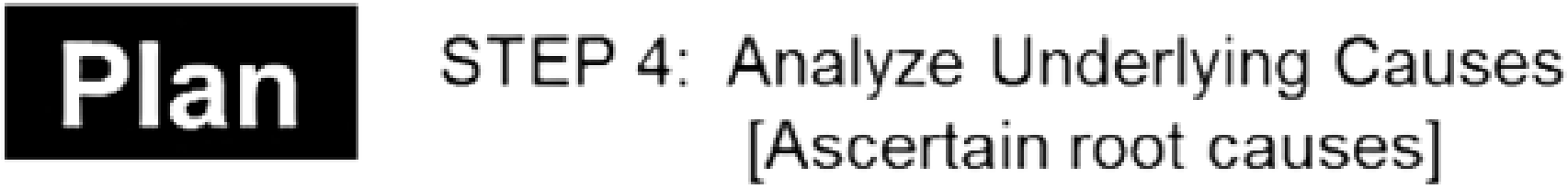


Figure 2-7. Plan Step 4

Figure 2-8. Plan Step 5

Figure 2-9. Grasp the Situation at the Center of PDCA

Ideal is customers who are completely satisfied. Currently some customers are inconvenienced by automotive problems.

Figure 2-10. Plan Step 1: Clarifying the Problem as compared to the Ideal State

Too many customers are bringing in Toyota vehicles for warranty work which costs them time and satisfaction and costs Toyota money.

Figure 2-11. Plan Step 2: Grasping the Situation and Seeing the Gaps

Warranty problems originate in product development (e.g. poor error proofing), are contributed to in manufacturing (e.g. errors) and discovered in the field. Immediate focus will be on manufacturing through to customer feedback and response. Target=60% reduction.

Figure 2-12. Plan Step 3: Breaking down Problems and Setting Targets

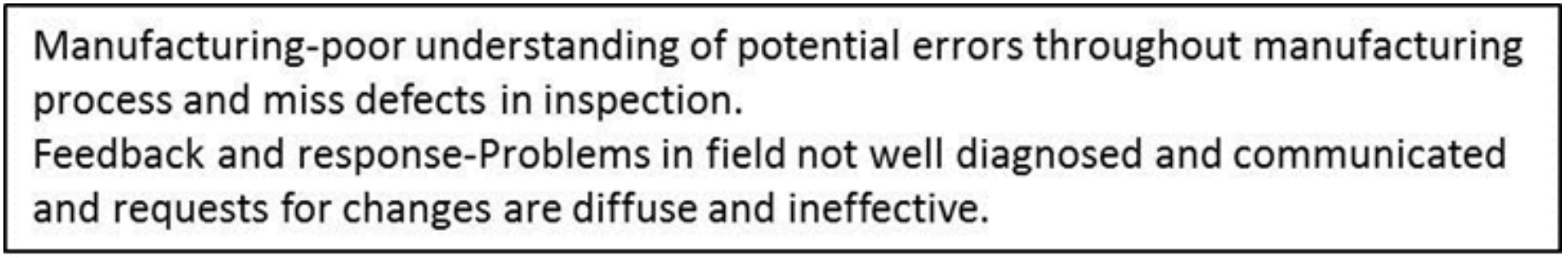


Figure 2-13. Plan Step 4: Analyzing the Underlying Causes

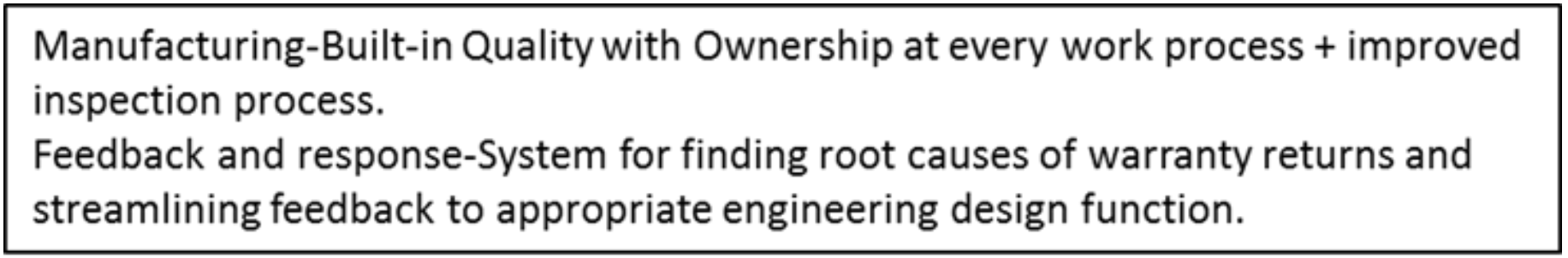


Figure 2-14. Plan Step 5: Developing Countermeasures

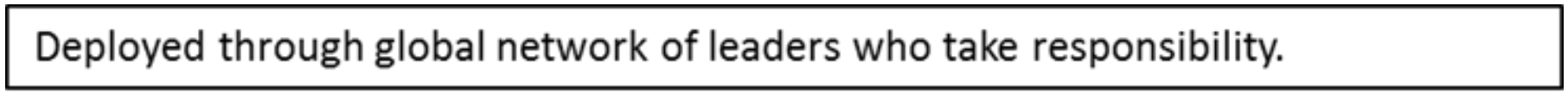


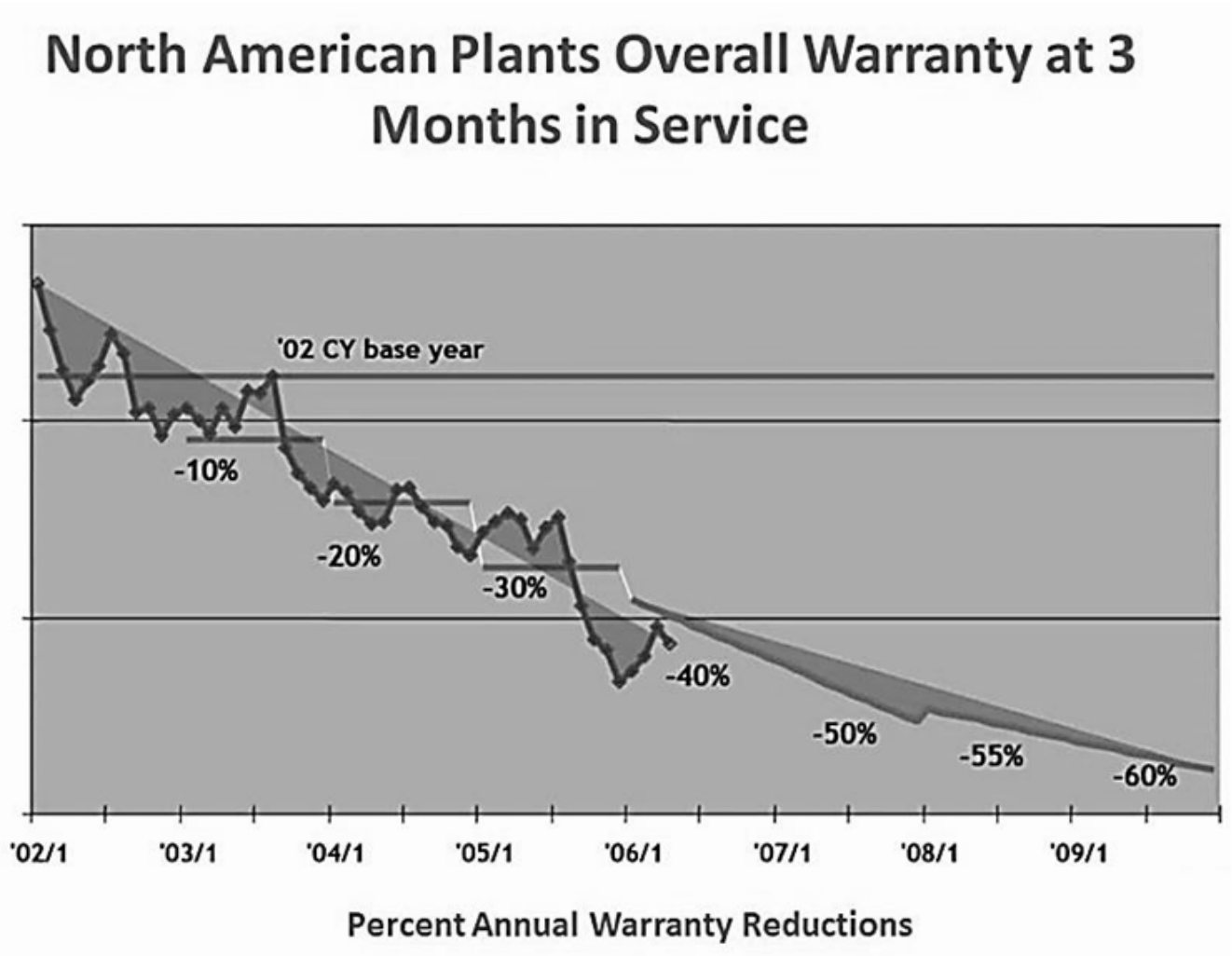
Figure 2-15. Do Step 6: Seeing the Countermeasures Through

Monitored closely over seven years with continual adjustment.

Figure 2-16. Check Step 7: Monitoring both Results and Processes

Many new processes were standardized in manufacturing, engineering and sales. Work progressed further on root cause: better training and development of engineers and standardization in engineering, built-in quality with ownership in manufacturing, and an improved warranty reporting system in sales.

Figure 2-17. Act Step 8: Standardizing and Spreading the Learnings



Source: Toyota Engineering and Manufacturing of America, Inc.

Figure 2-18. North American Plants Warranty at 3 Months in Service

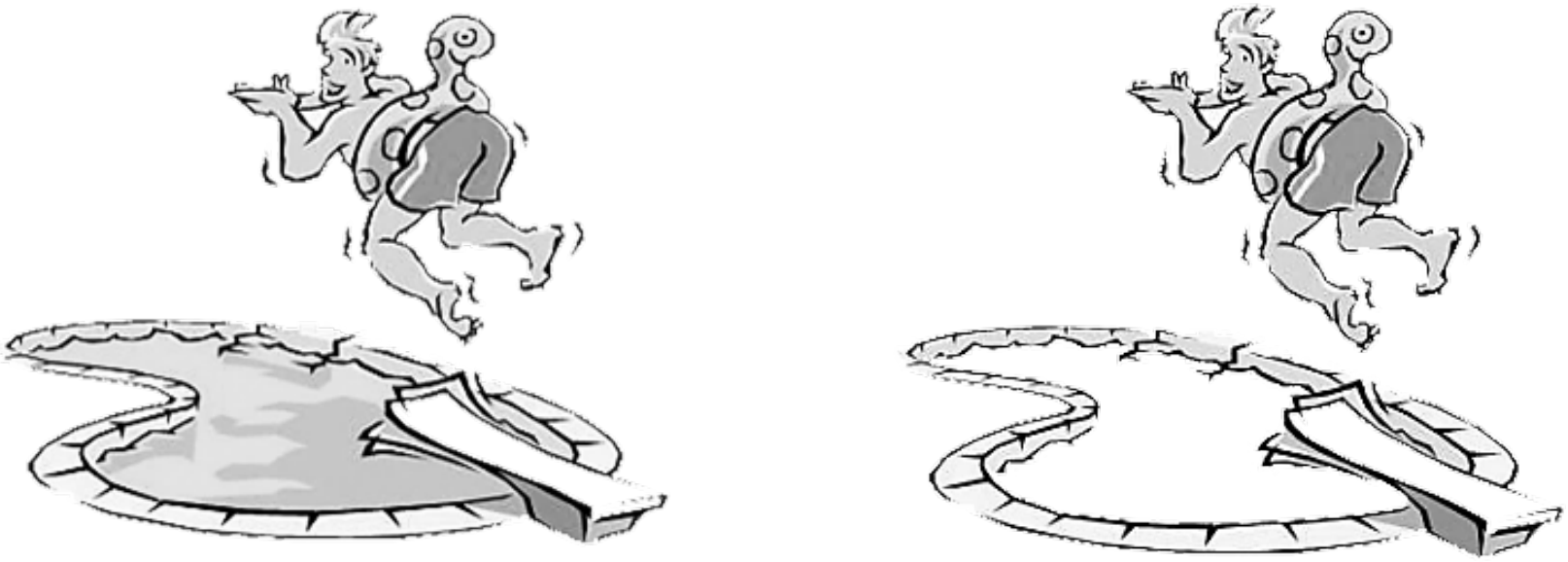


Figure 2-19: Man Jumping into a Pool with Water (left) and without Water (right)

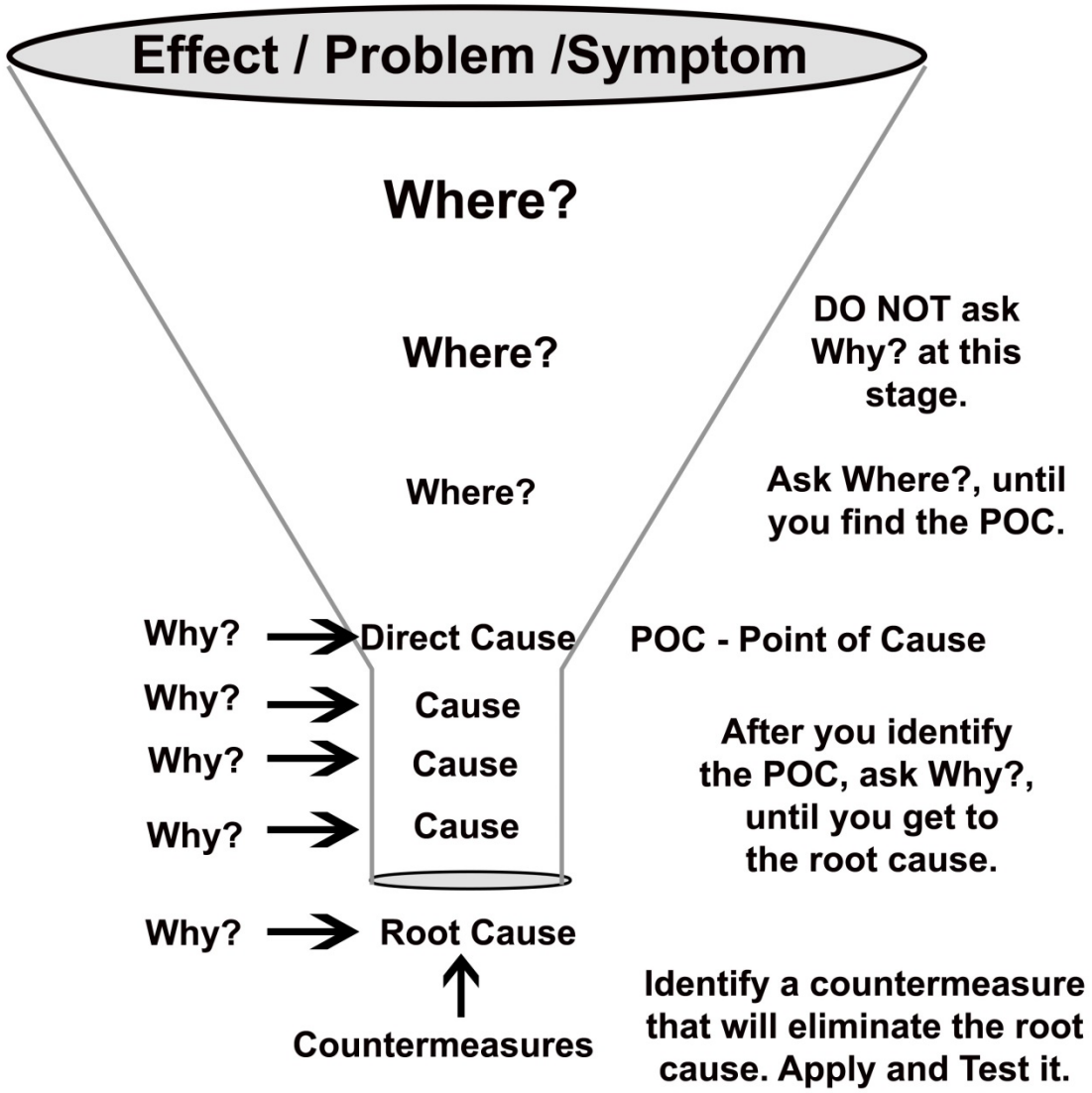


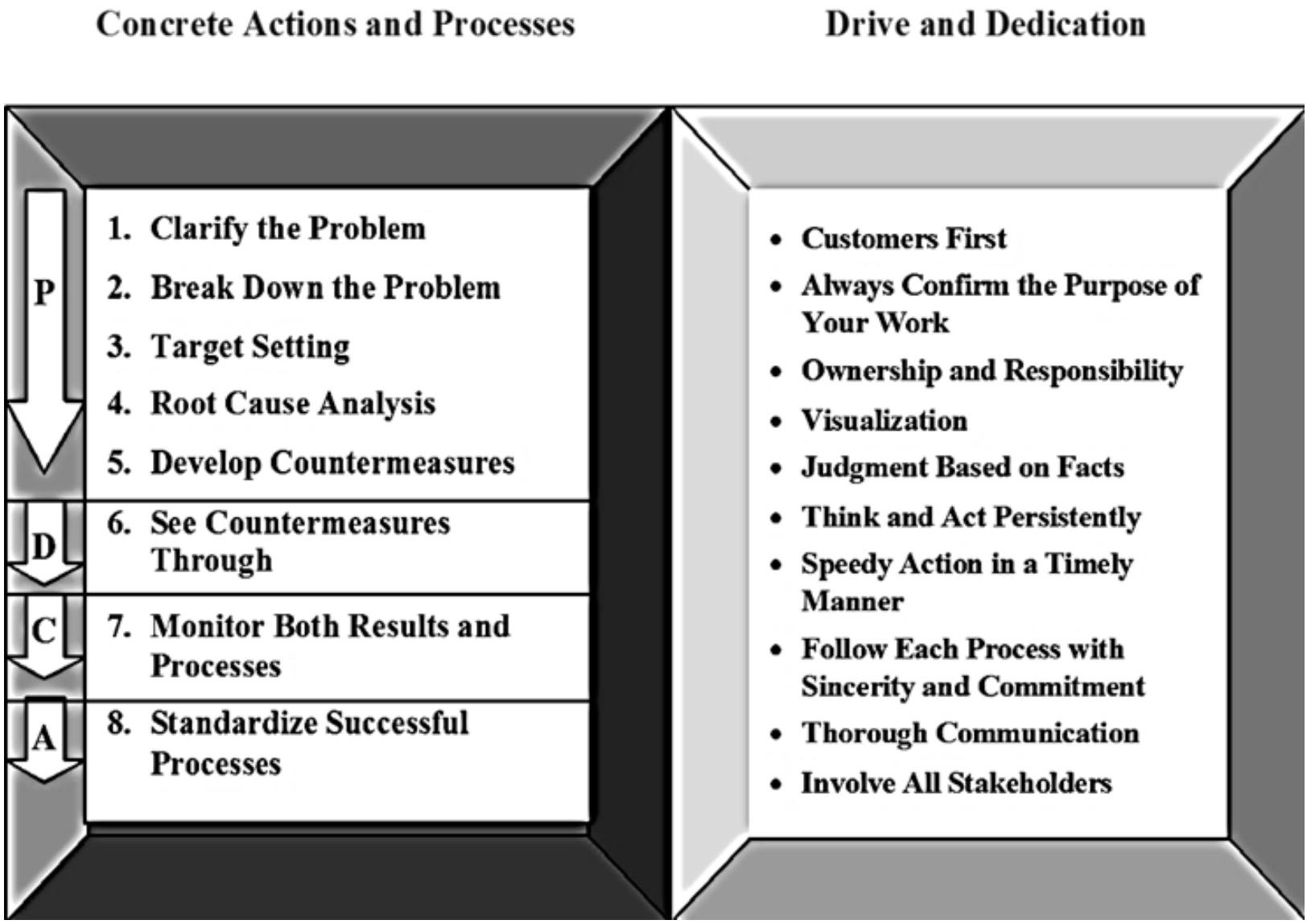
Figure 2-20. Narrowing the Focus

Figure 2-21. First Answer to the Question: Why are the parts *not* aligned correctly?

Problem Statement: The defect rate is over goal

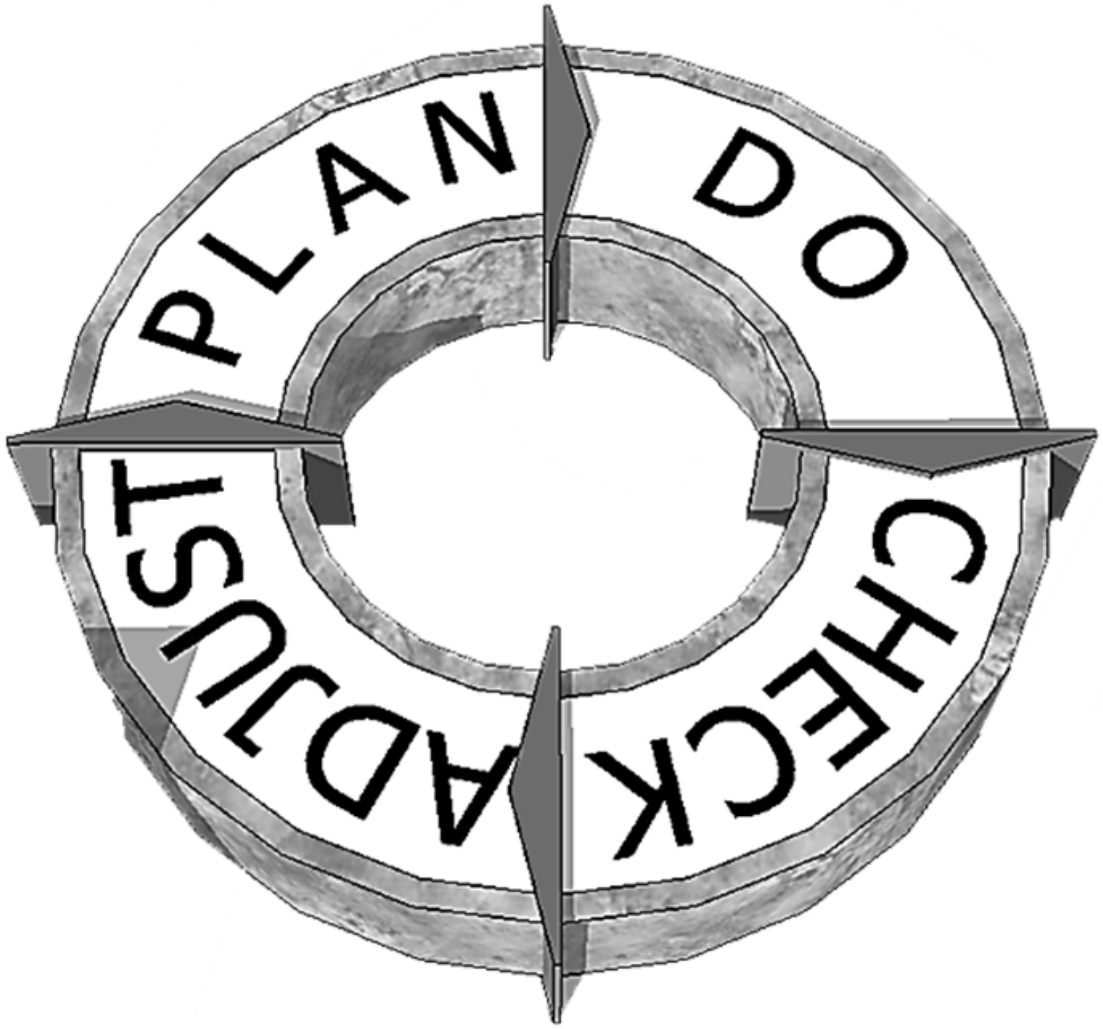
Figure 2-22. Answer to the Question: Why is the defect rate too high?

Figure 2-23. Second Answer to the Question: Why are the parts *not* aligned correctly?



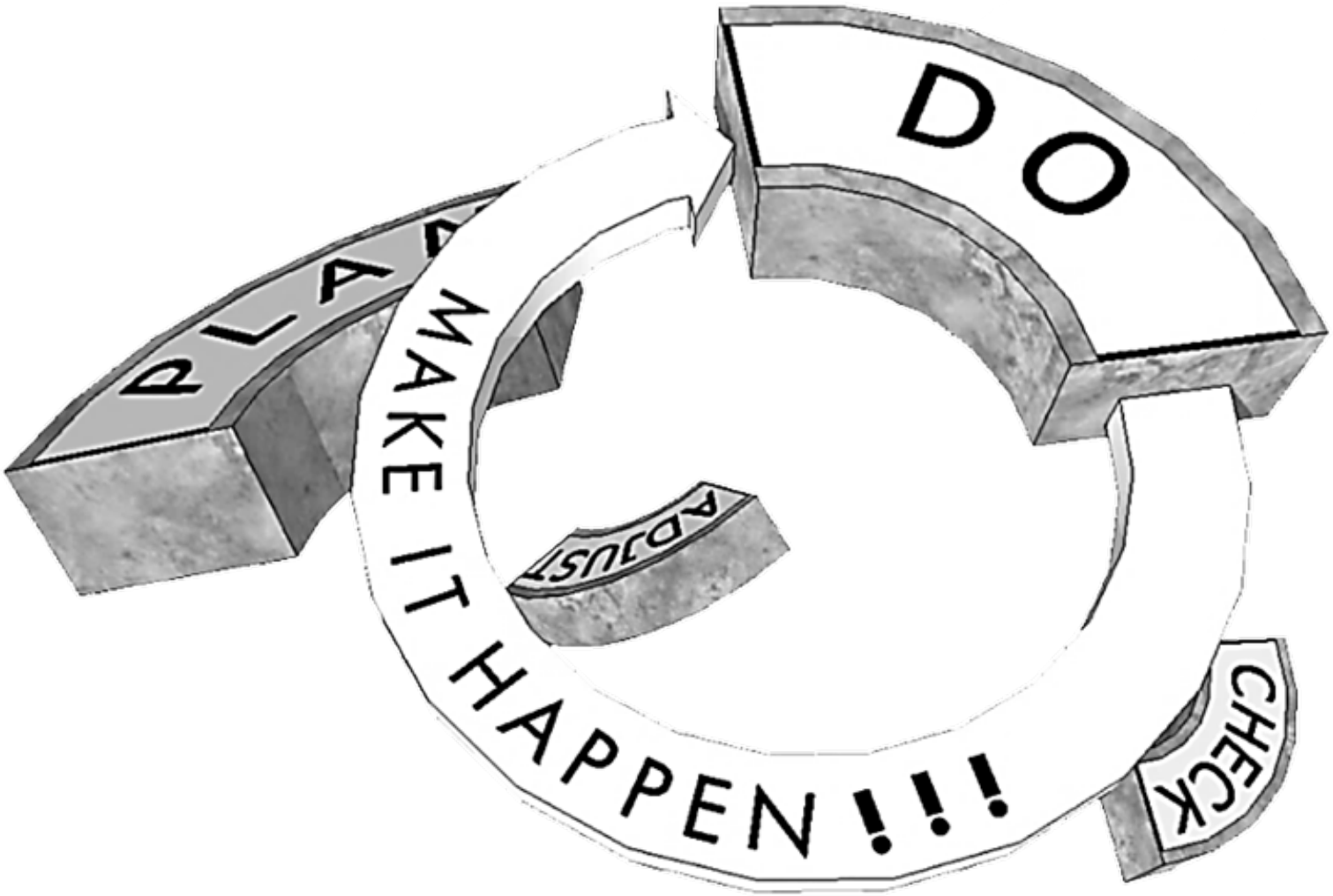
Source: Toyota

Figure 2-24. Toyota Business Practices - centered on a problem solving process.



Source: *Toyota Way to Continuous Improvement*

Figure 2-25. PDCA (Plan – Do – Check – Act or Adjust) Wheel or Deming Wheel

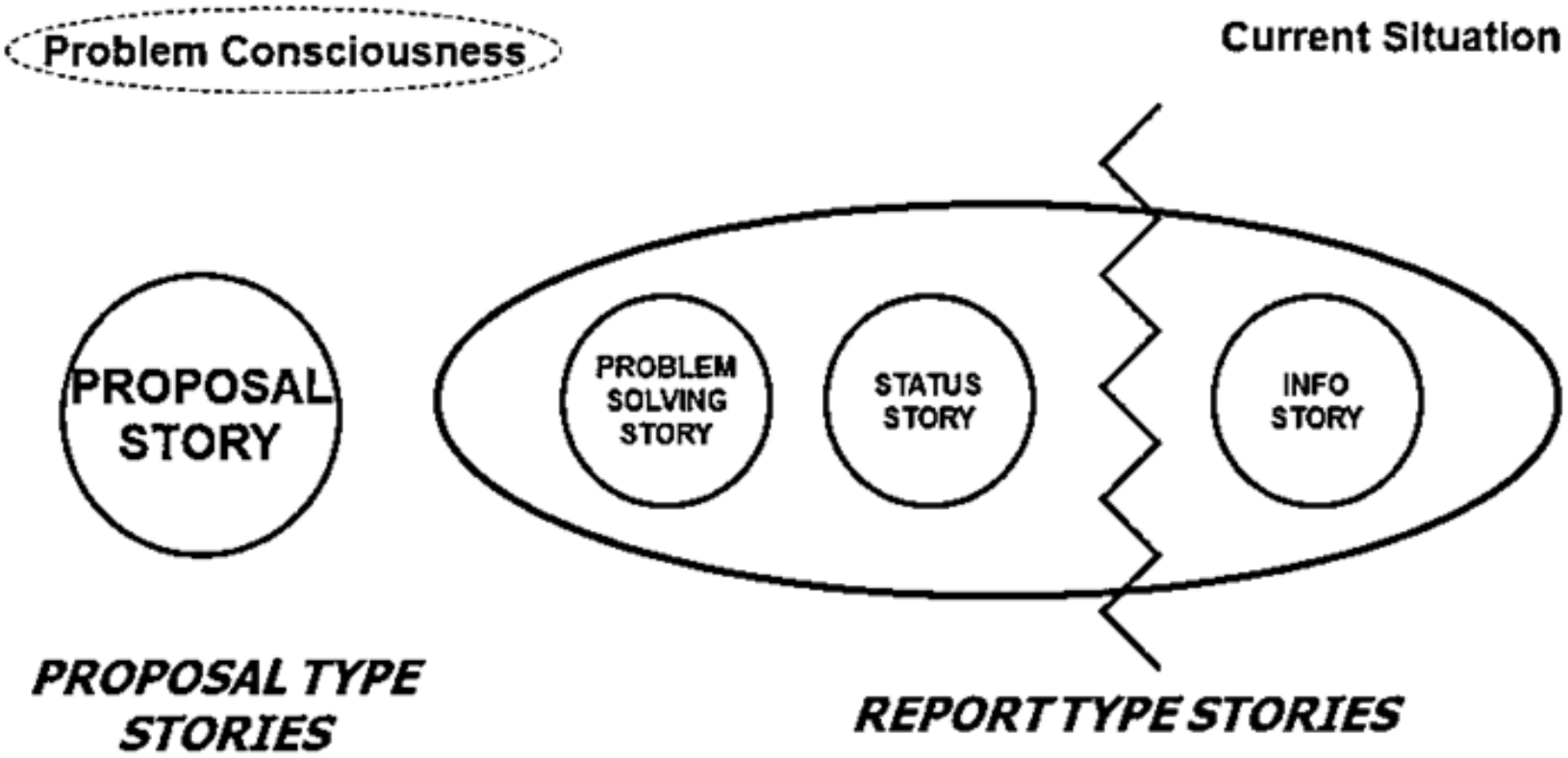


Source: *Toyota Way to Continuous Improvement*

Figure 2-26. PDCA Wheel with only Do – Make it Happen!

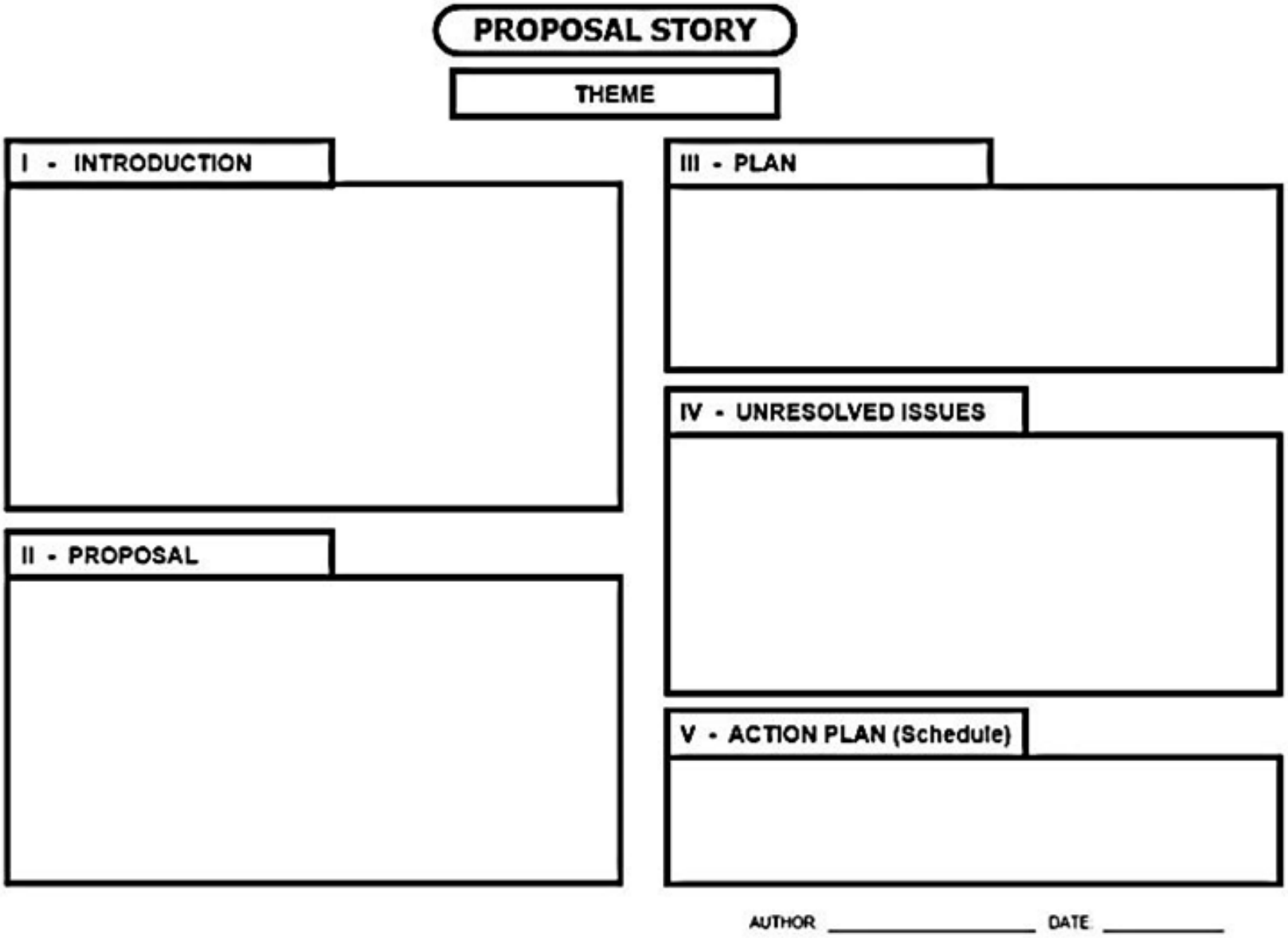
Source: Toyota Georgetown Plant

Figure 2-27. Visual Management Board



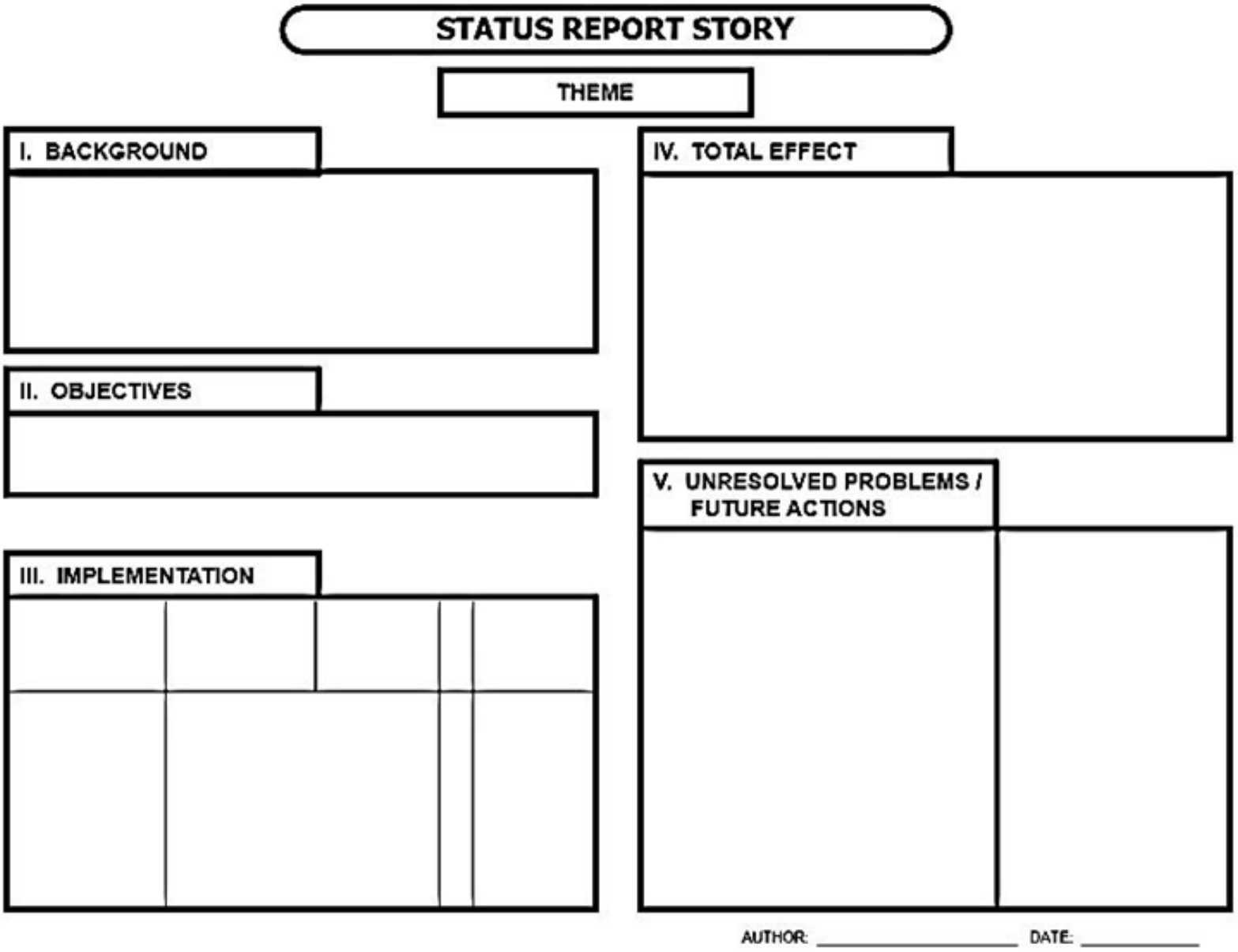
Source: Toyota Technical Center

Figure 2-28. Four types of A3 Stories



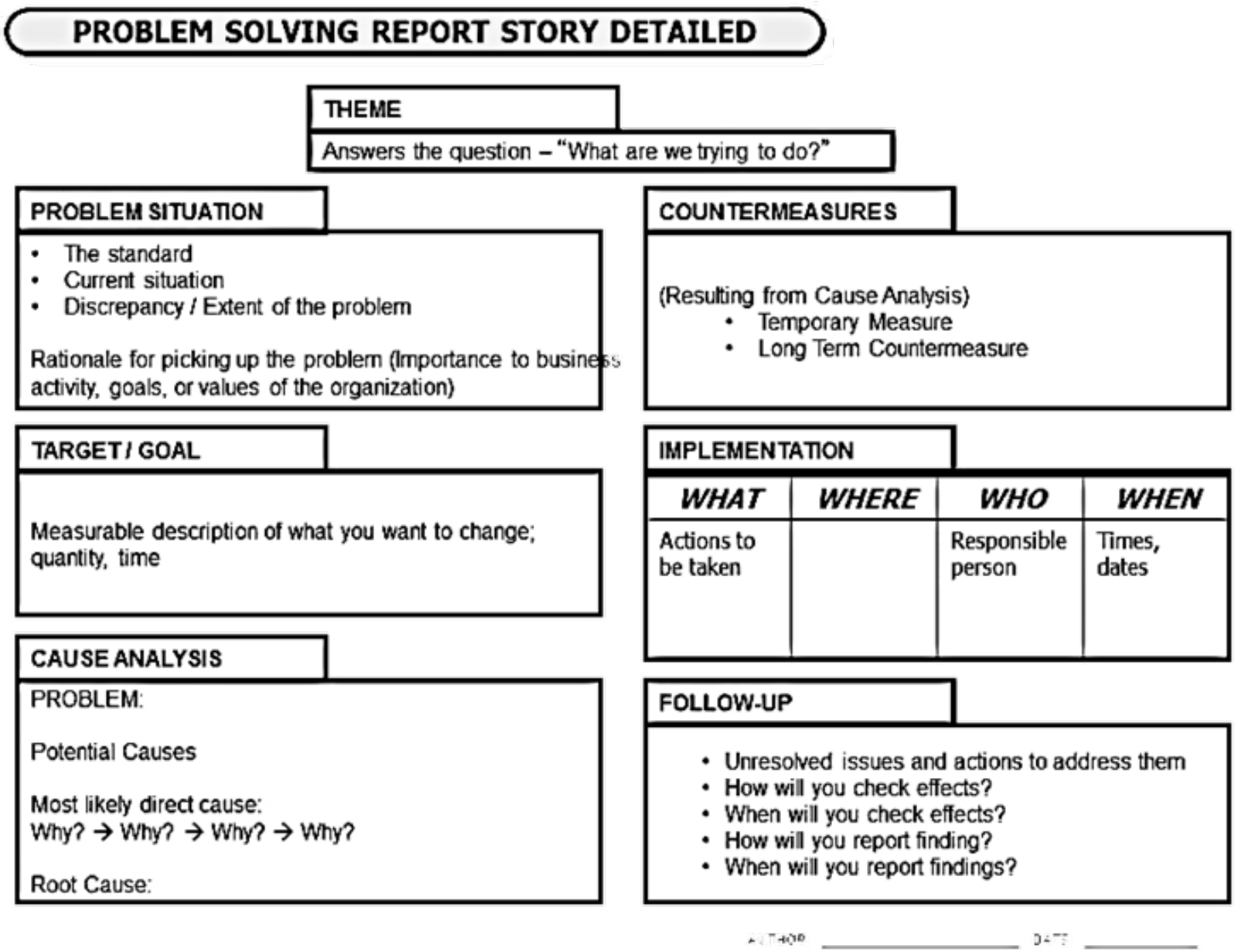
Source: Toyota Technical Center

Figure 2-29. The Proposal Type A3 Story



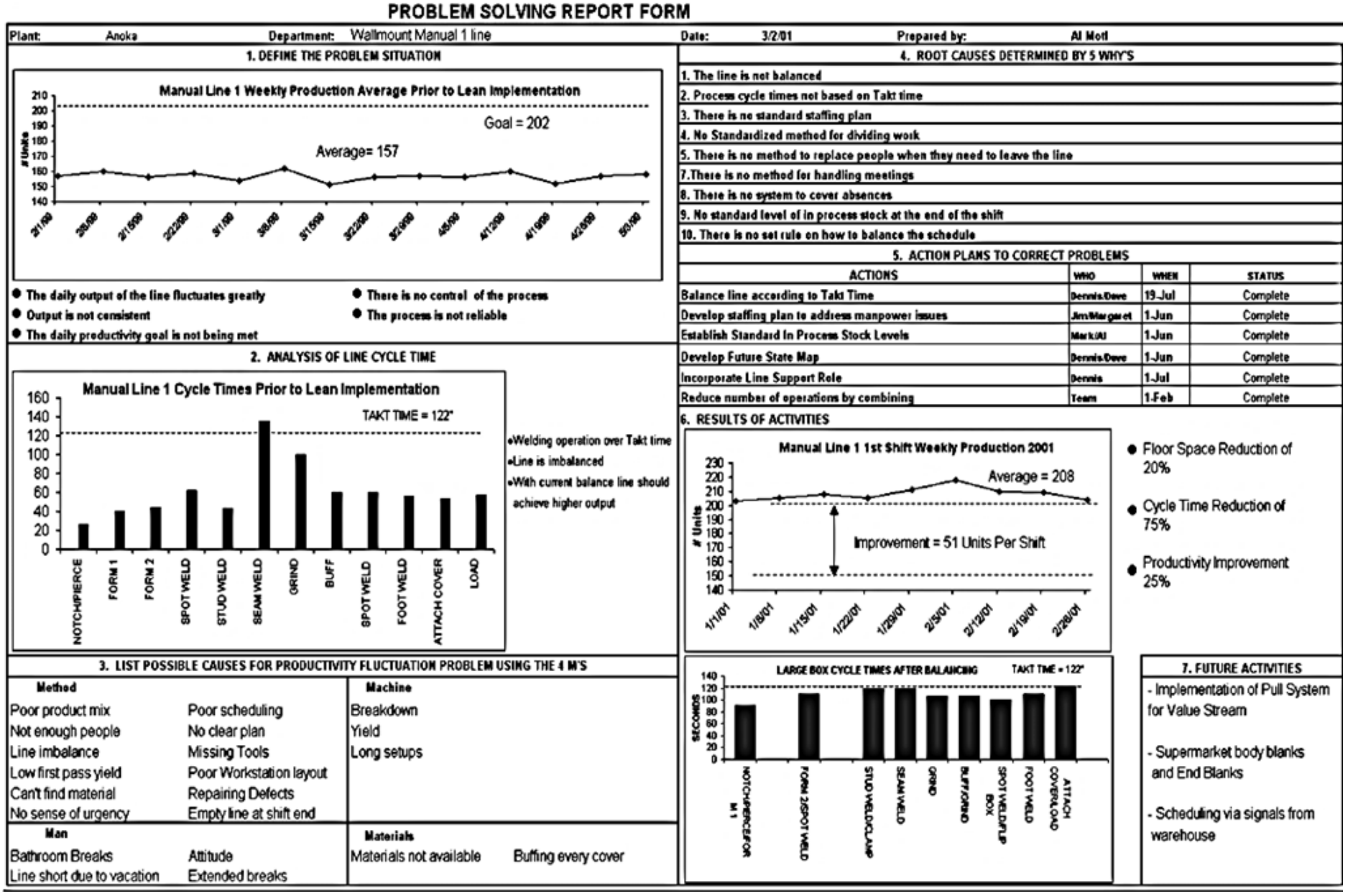
Source: Toyota Technical Center

Figure 2-30. The Status Type A3 Story



Source: Toyota Technical Center

Figure 2-31. The Problem Solving Report Story - Detailed



Source: David Meier

Figure 2-32. A3 Problem Solving Story – A Manufacturing Story

Purchasing Card Implementation

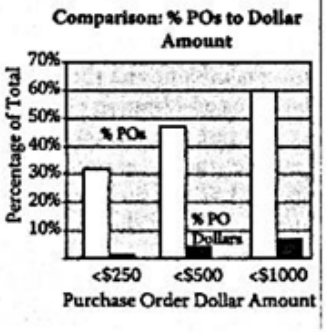
CURRENT SITUATION

Processing costs (labor and material)

	PO	Invoice
Purchasing dept.	$37	--
Finance dept.	$39	$27
Technical dept.	$27	$27
Total	$103	$54

2005 volumes

	≤$250	≤$500	≤$1,000
# Purchases	813	1200	1525
# Invoices	2316	2740	3026
Time req'd (hrs.)	5525	7148	8489



- Company anticipates growth through the next 5–10 years; administrative overhead will also increase without efficiency gains.
- Current paper-based system for processing purchase orders (POs) does not take advantage of new financial technologies.
- Emergency and spot transactions are currently burdensome and time consuming.
- All purchases are treated the same, regardless of dollar amount.

PROPOSAL

Implement use of purchasing credit cards for purchases =<$500 to incur the following savings, and Increases in efficiency:

- Labor hours saved, Tech groups, Purchasing, APD
- Labor and Material Cost savings
- Reduced P.O., RFP, Expense Reports, Invoice paperwork
- Customer Service to T/A's through reduction of time spent on paperwork.
- Ease of performing spot transactions, Test Trips, Emergency transactions, Etc.
- Helps to maintain existing ADM & APD headcount while TTC grows over 5-10 yrs.
- Reallocated time used on higher ticket buys, priority projects, Etc.

LABOR COST & TIME ANALYSIS

		PO	Invoice
Labor and material cost savings			
	Current cost per transaction	$103	$54
	Est. purchasing card costs	$20	$20
	Savings per transaction	$83	$34
	Potential annual cost savings	$99,600	$93,160
Time savings (hours)			
	Current PO system	3,300	3,900
	Est. purchasing card	650	1500
	Potential annual time savings*	2,650	2,350

*Approx. 1/3 of time savings is to Tech Groups

PLAN

- Dept. manager determines which associates are issued cards for specific dept. purchases.
- Purchasing is issued cards.
- Acceptable business-related purchases using card:

Small tools	Seminars	Photo processing and film
Auto supplies	Office supplies	Postage
Minor equipment repairs	Printer services	Copy services
Electrical supplies	Safety supplies	Building maint. supplies
Catering	Florists	Coffee services
Hardware	Signage	

- Unacceptable uses of card (blocked):

Personal user	Cash advance	Travel & entertainment
Computer hardware	Capital purchases	Indep. contract services
Jewelry, furriers		

- All card users required to sign a purchasing card agreement stating that all use of the card will be for business purposes and within the procedures set forth.

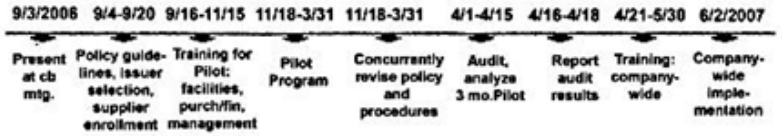
IMPLEMENTATION

1. Card user obtains approval from dept. manager for each purchase.
2. Card user contacts vendor, places orders, and provides vendor with appropriate information.
3. Goods shipped as specified and labeled "Purchasing Card"– cardholder name.
4. Goods received per standard receiving procedure with the following exception: packing list and receipt is forwarded to card user.
5. All packing lists and receipts are retained by requestors and matched against monthly statement.
6. Card user reviews statement, attaches appropriate packing lists and receipts, records JRM #'s, signs and forwards to dept. manager.
7. Dept. manager reviews statement for accuracy and initials and dates statement.
8. Dept. manager forwards to finance dept. Finance audits statement and supporting documents for compliance, sales tax, 1099.
9. Finance dept. pays from master Invoice received directly from the purchasing card bank.

CONTROLS

- Monthly dollar limits per card
- $500 single transaction limit
- Limited number of transactions per card per day
- Merchant category blocking (i.e., cash advances, jewelry stores, appliances, etc.)

TIMELINE



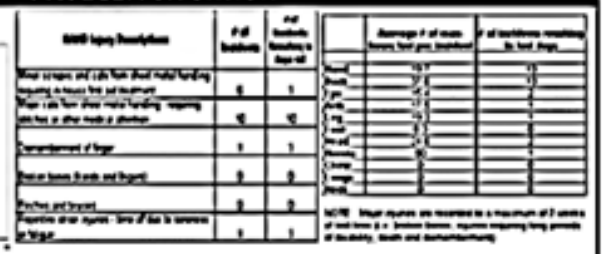
Source: Toyota Technical Center

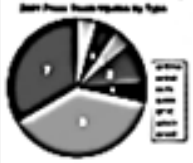
Figure 2-33. A3 Problem Solving Story – A Purchasing Card Implementation

REDUCE INJURIES DUE TO CUTS DURING THE HANDLING OF SHEET METAL

TO:_____

PROBLEM SITUATION





Total (plant-wide) lost man-hours due to injury for 2001 is unacceptable → 1550 hrs
Company objective is to reduce total by 50%. (1550 hrs → 775 hrs)

Significant hand injuries (requiring days off) are primarily from handling materials in an unsafe manner. Most injuries are occurring in Press/Fab/Assy areas where material handling is required as part of the job.

360 hrs of lost time were recorded in 2001 due to hand injuries. Hand injuries costs Goliath an estimated $14,200 per year in lost man-hours.

Employee safety is one of Goliath's key company values and must be addressed.

TARGET/GOAL

Reduce sheet metal handling injury frequency by 50% over the next 12 months.

CAUSE ANALYSIS

PROBLEM: Employees are receiving cuts, scrapes, and abrasions while handling sheet metal.
MOST LIKELY CAUSE: Employees are not following "gloves required" policy when handling sheet metal parts or blanks.

WHY? For small or quick jobs when gloves are not handy, employees would rather risk getting a cut then expending the required effort to find a set of gloves to put on.
WHY? Lack of discipline to company policy
WHY? Human nature to take the easy route – perceived benefits outweighs the risk
WHY? No motivation to follow rules when it is not convenient to do so
WHY? Penalties for breaking rules are not being enforced AND/OR lack of sufficient reward for adherence to policy

ROOT CAUSE: Motivational issue → Employees are not motivated enough to expend the required effort to follow basic shop safety requirements when it is inconvenient to do so.

COUNTERMEASURES

Clarify definitions and conditions for applying shop safety rules with Union representatives and shop supervisors. Rules may need to be reworded and reworked to reflect practical shop floor application.

Reward system will be implemented as a first step in lieu of increasing employee disciplinary action for failing to follow company safety rules.

Raffle consisting of a cash prize (suggested value of at least $2,000) will be held at the end of the year. To maintain eligibility, shop floor members must:

- Maintain a clean personal injury record
- Not be caught failing to follow shop material handling and eye protection safety requirements

Employees would be encouraged to inform and watch out for each other throughout the workday. Once or twice a week, a randomly selected member of the supervisory staff would perform a 'shop patrol' walk to look for employee non-conformances.
Eliminated employees would be given the option to buy back into the raffle by making a minimum cash donation to a charity (to be determined).

Subsequent safety infractions after being removed from raffle eligibility may result in an employee write up.

IMPLEMENTATION

To be implemented as a company safety initiative in conjunction with Union Plant Safety Committee Tracking is to begin for the abbreviated year, starting in March 2002.

ACTION REQ'D	*RESPONSIBILITY*	*DUE BY*
Project approval	President (Lowery)	Feb 8
Communicate A3 plan to Union Safety Committee for review, discussion, and roll out strategy	HR Employee Relations (Elzerman)	Feb 18
Clarify shop safety rules	Goliath-Union Safety Subcommittee	Feb 25
Roll out details to Goliath managers and supervisors + shop employees (through team meetings)	Goliath Safety Representative (Ganci)	Feb 28

VERIFICATION and FOLLOW UP ACTIVITIES

Progress to be tracked monthly during Quality Systems Team meetings measurables tracking (Compare 2002 progress with 99 / 00 / 01 YTD safety data)

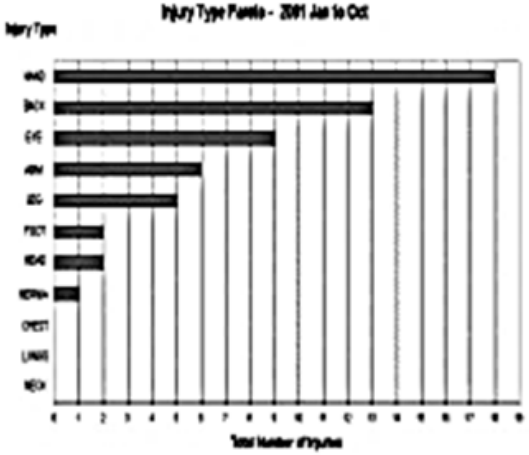
Informal survey of shop supervisory and managerial staff on a quarterly basis regarding shop safety improvement and compliance to shop safety rules.

AUTHOR: _____
DATE: _____

Figure 2-34. A3 Problem Solving Story – Another Manufacturing Story

REDUCE INJURIES DUE TO CUTS DURING THE HANDLING OF SHEET METAL

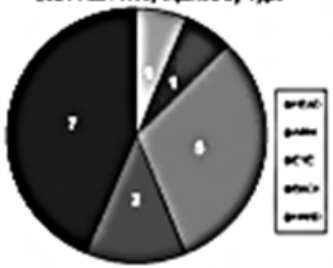
PROBLEM SITUATION



NAMI Injury Description	# of Incidents	# of Incidents Resulting in Days Off
Minor scrapes and cuts from sheet metal handling requiring in-house first aid treatment	6	1
Major cuts from sheet metal handling - requiring stitches or other medical attention	10	10
Dismemberment of finger	1	1
Broken bones (fingers and fingers)	0	0
Pinches and bruises	0	0
Repetitive strain injuries - time off due to soreness or fatigue	1	1

	Average # of man-hours lost per incident	# of incidents resulting in lost days
Hand	19.7	13
Back	37.6	13
Eye	15.4	2
Arm	17.5	1
Leg	19.3	1
Foot	8.3	0
Head	43.6	2
Hernia	80	1
Chest	0	0
Lungs	0	0
Neck	0	0

NOTE: Major injuries are recorded to a maximum of 2 weeks of lost time (i.e. broken bones, injuries requiring long periods of disability, death and dismemberment)



Total (plant-wide) lost man-hours due to injury for 2001 is unacceptable → 1550 hrs
Company objective is to reduce total by 50%. (1550 hrs → 775 hrs)

Significant hand injuries (requiring days off) are primarily from handling materials in an unsafe manner. Most injuries are occurring in Press/Fab/Assy areas where material handling is required as part of the job.

350 hrs of lost time were recorded in 2001 due to hand injuries. Hand injuries costs Goliath an estimated $14,200 per year in lost man-hours.

Employee safety is one of Goliath's key company values and must be addressed.

Figure 2-35. Reduced Hand Injury Report – Problem Situation

TARGET/GOAL

Reduce sheet metal handling injury frequency by 90% over the next 12 months.

CAUSE ANALYSIS

PROBLEM: Employees are receiving cuts, scrapes, and abrasions while handling sheet metal.
MOST LIKELY CAUSE: Employees are not following "gloves required" policy when handling sheet metal parts or blanks.

WHY? For small or quick jobs when gloves are not handy, employees would rather risk getting a cut then expending the required effort to find a set of gloves to put on.
WHY? Lack of discipline to company policy
WHY? Human nature to take the easy route – perceived benefits outweighs the risk
WHY? No motivation to follow rules when it is not convenient to do so
WHY? Penalties for breaking rules are not being enforced AND/OR lack of sufficient reward for adherence to policy

ROOT CAUSE: Motivational issue → Employees are not motivated enough to expend the required effort to follow basic shop safety requirements when it is inconvenient to do so.

Figure 2-36. Hand Injury Target/Goal and Cause Analysis

COUNTERMEASURES

Clarify definitions and conditions for applying shop safety rules with Union representatives and shop supervisors. Rules may need to be reworded and reworked to reflect practical shop floor application.

Reward system will be implemented as a first step in lieu of increasing employee disciplinary action for failing to follow company safety rules.

Raffle consisting of a cash prize (suggested value of at least $2,000) will be held at the end of the year. To maintain eligibility, shop floor members must:

- Maintain a clean personal injury record
- Not be caught failing to follow shop material handling and eye protection safety requirements

Employees would be encouraged to inform and watch out for each other throughout the workday. Once or twice a week, a randomly selected member of the supervisory staff would perform a 'shop patrol' walk to look for employee non-conformances.
Eliminated employees would be given the option to buy back into the raffle by making a minimum cash donation to a charity (to be determined).

Subsequent safety infractions after being removed from raffle eligibility may result in an employee write up.

Figure 2-37. Hand Injury Countermeasures

IMPLEMENTATION

To be implemented as a company safety initiative in conjunction with Union Plant Safety Committee Tracking is to begin for the abbreviated year, starting in March 2002.

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Project approval	President (Lowery)	Feb 8
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VERIFICATION and FOLLOW UP ACTIVITIES

Progress to be tracked monthly during Quality Systems Team meetings measurables tracking (Compare 2002 progress with '99 / '00 / '01 YTD safety data)

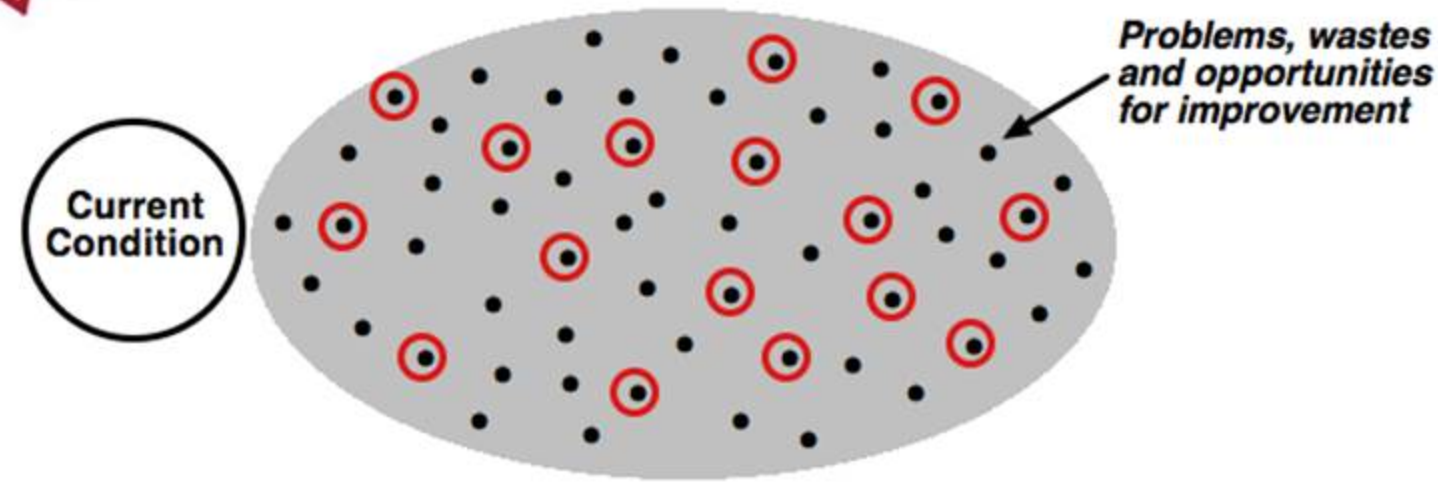
Informal survey of shop supervisory and managerial staff on a quarterly basis regarding shop safety improvement and compliance to shop safety rules.

Figure 2-38. Hand Injury Countermeasure Implementation, Verification and Follow-up

Old Way

HOW DO WE TEND TO TRY TO IMPROVE?

We hunt for wastes or react to problems, and try to eliminate them



Like Stopping a Leaking Dam by putting your finger into one hole at a time

Source: Mike Rother

FIGURE 2-39: Hunting for wastes and reacting to problems is a losing battle

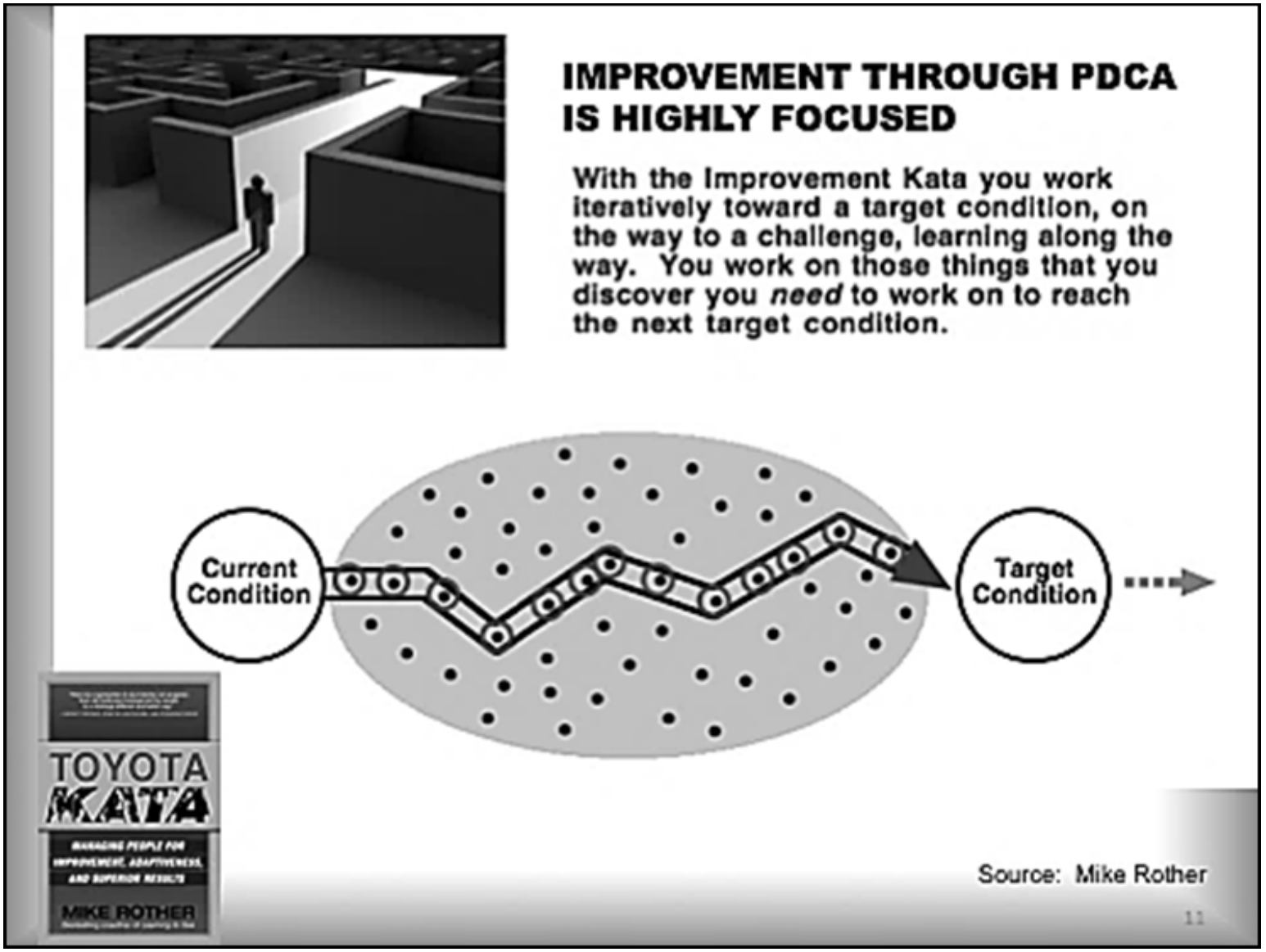
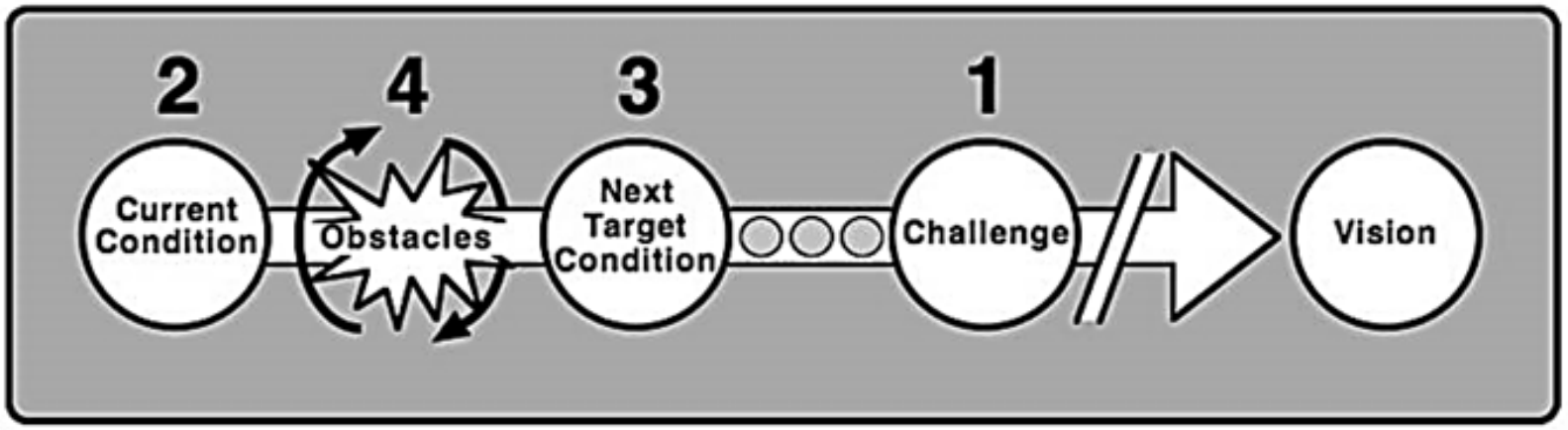


Figure 2-40: The Improvement Kata is focused Experimentation toward a defined target condition

THE STEPS OF THE IMPROVEMENT KATA



Step 1: In consideration of a direction or challenge...

Step 2: Grasp the current condition.

Step 3: Define the next target condition.

Step 4: Move toward that target condition iteratively, which uncovers obstacles that need to be worked on.

Figure 2-41: The Four Steps of the Improvement Kata

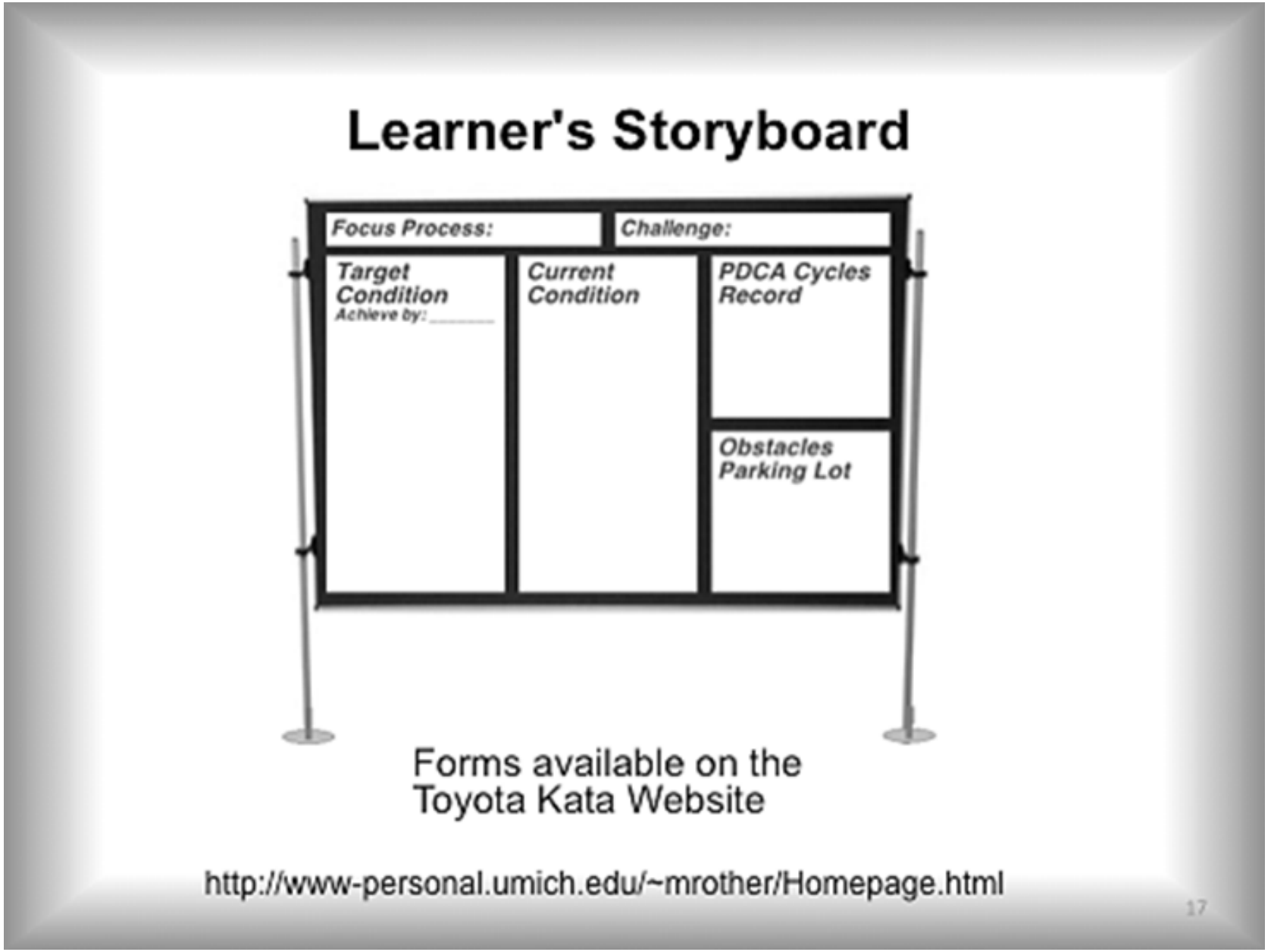
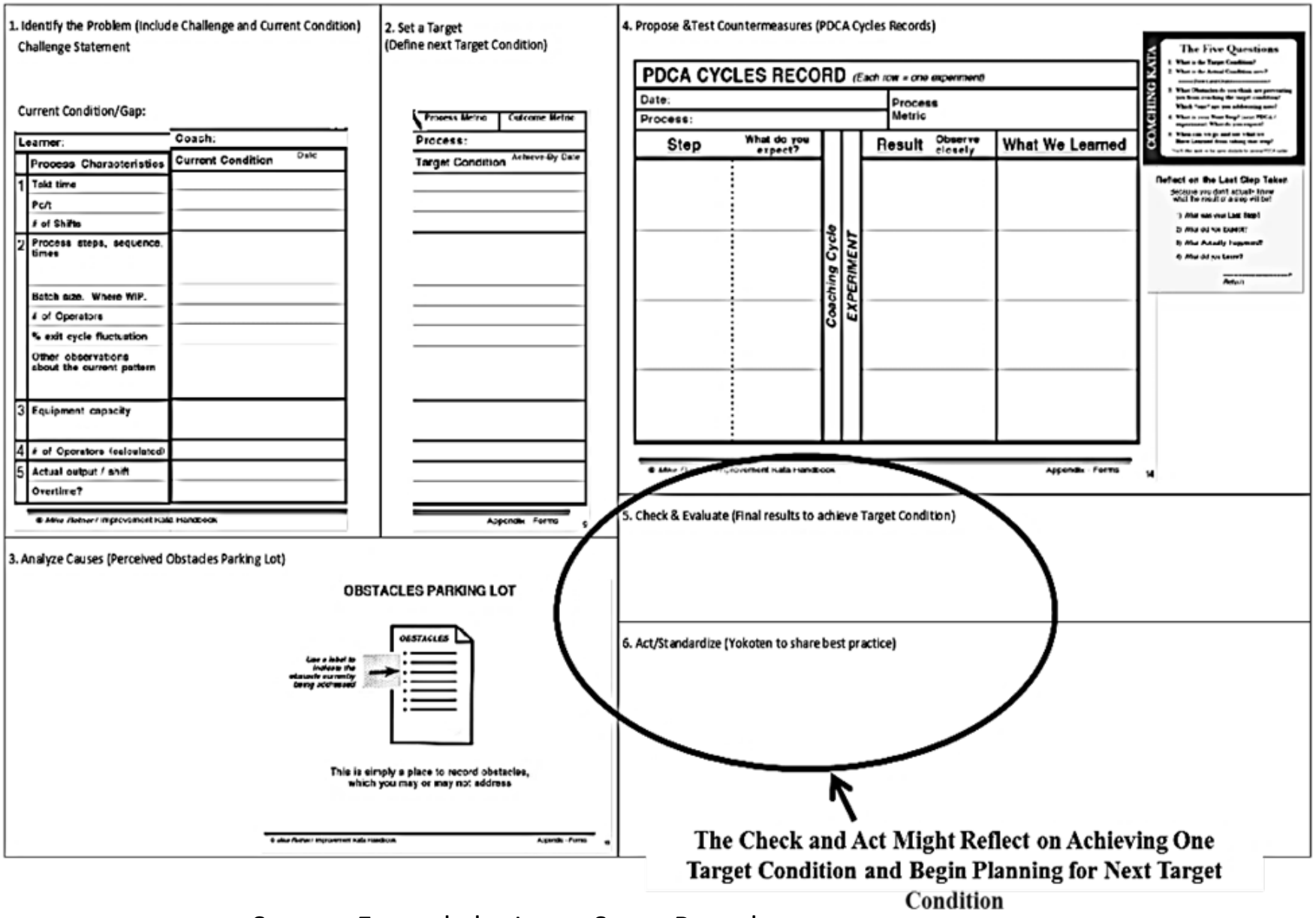
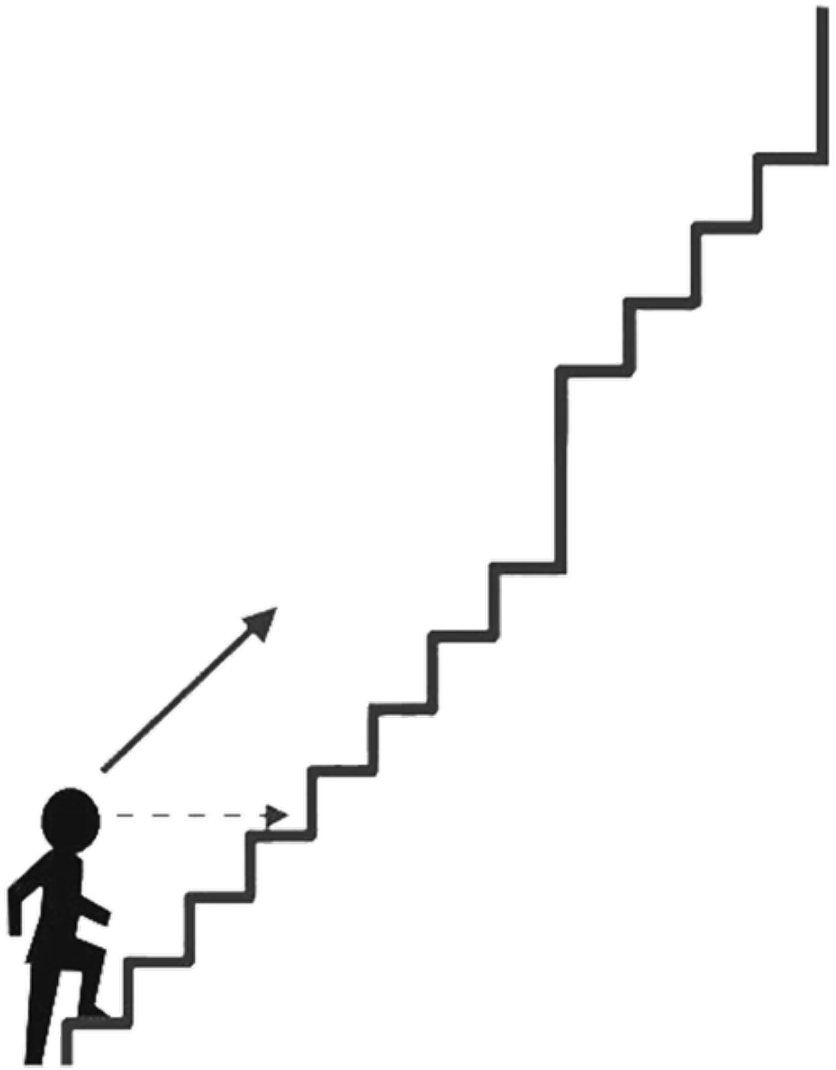


Figure 2-42: The Storyboard for Coaching the Learner of the Improvement Kata



Source: Example by Jenny Snow-Boscolo

Figure 2-43: The A3 and the Improvement *Kata* can work together



Source*:* *The Toyota Way Fieldbook*

Figure 2-44. Climbing the Stairs Daily