v 8.1

Improvement Kata Handbook

Introduction:

Getting Started: Learning New Skills

The Improvement Kata:

1. Understand the Direction

2. Grasp the Current Condition

3. Establish the Next Target Condition

4. PDCA Toward the Target Condition

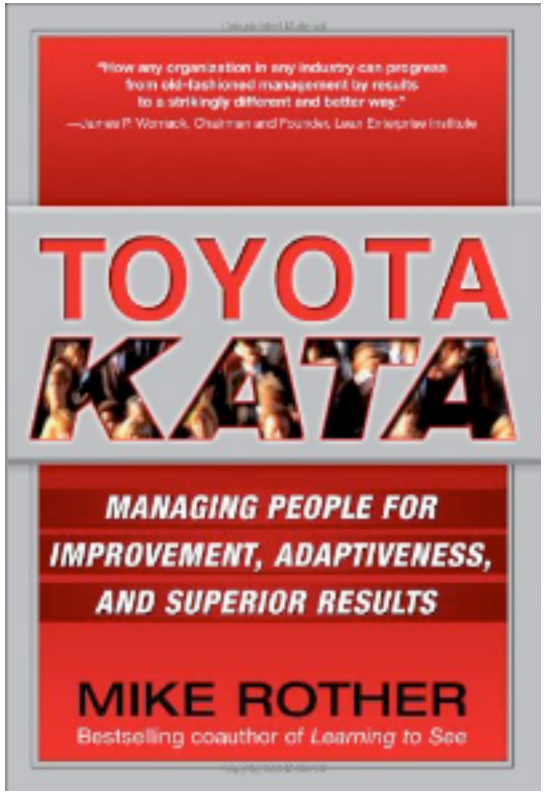
The Coaching Kata:

5. Coaching Cycles (to teach the improvement kata)

Appendix:

Useful Forms

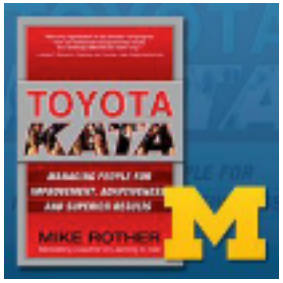
A COMPANION TO *TOYOTA KATA*



The Improvement Kata Handbook is a companion to the book *Toyota Kata*.

The handbook is a set of practice routines, training materials and a reference guide for developing improvement kata skills.

The handbook is used in teaching the University of Michigan 3-day TK course.



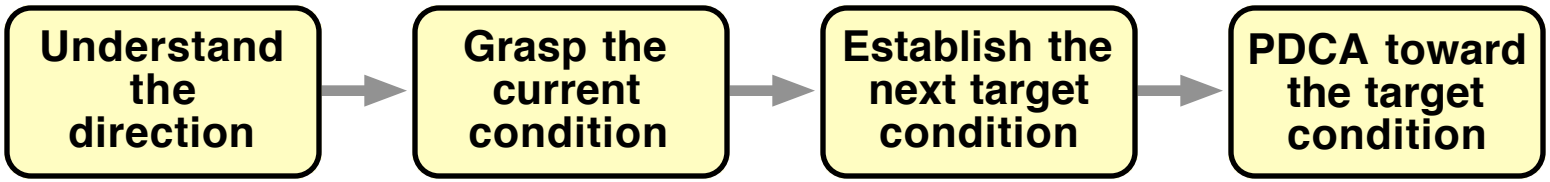
INTRODUCTION

The improvement kata is a systematic approach that teams use to:

- Overcome obstacles and meet challenges or lean objectives
- Commonize how they improve, adapt and innovate
- Generate continuous improvement
- Handle evolution and change

The improvement kata is a skill -- a way of thinking and acting -- and we know how you learn a skill: By practicing a little bit every day.

The improvement kata can be broken into the following four elements. Parts 1-4 of this handbook show you how to apply these elements step by step.



The coaching kata makes up Part 5 of this handbook. It shows you how to conduct coaching cycles, a routine for teaching the improvement kata every day.

HANDBOOK OBJECTIVE

Develop improvement-kata coaching competency as quickly and effectively as possible, so you can teach the improvement kata in your organization with minimal reliance on outside expertise.

The goal is to codify the the improvement kata enough that it can be reduced to practice; to turn improvement, adaptation and innovation into a pattern that a manager can use and teach.

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TWO SIDES OF A COIN

The handbook has two main topics, which work together

People Development

The Coaching Kata

5. Coaching Cycles, to teach the improvement kata

Process Improvement

The Improvement Kata

1. Understand the Direction
2. Grasp the Current Condition
3. Establish the Next Target Condition
4. PDCA Toward the Target Condition

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GETTING STARTED:
Learning New Skills

WHAT IS CONTINUOUS IMPROVEMENT?

Continuous improvement is not just periodic improvement conducted by a few specialists. It means improving every process every day.

***Toyota Kata* and this handbook show you how to do that.**

CONDITIONS ARE DYNAMIC AND UNPREDICTABLE

- Conditions are always changing
- It's impossible to know how they will develop
- If you fall behind it can be difficult to catch up

We can train ourselves to execute successfully in these conditions.

Challenge yourself to become skillful in using the improvement kata.

WHAT IS A KATA?

A kata is a routine used for preserving and passing on know-how

The research that led to the book *Toyota Kata* focused on Toyota's managerial practices. The word 'kata' perfectly describes the routines we found: the *improvement kata* and the *coaching kata*.

In Japanese, the suffix kata means *way of doing*.

It refers to a form, routine or pattern of behavior, which can be practiced to become second nature. The practicing is done to develop skill.

Kata are teaching/training routines by which proven techniques are transmitted.

Kata are especially effective with activities that can be broken down into steps, which are more transferrable.

TOYOTA'S WAY OF IMPROVING

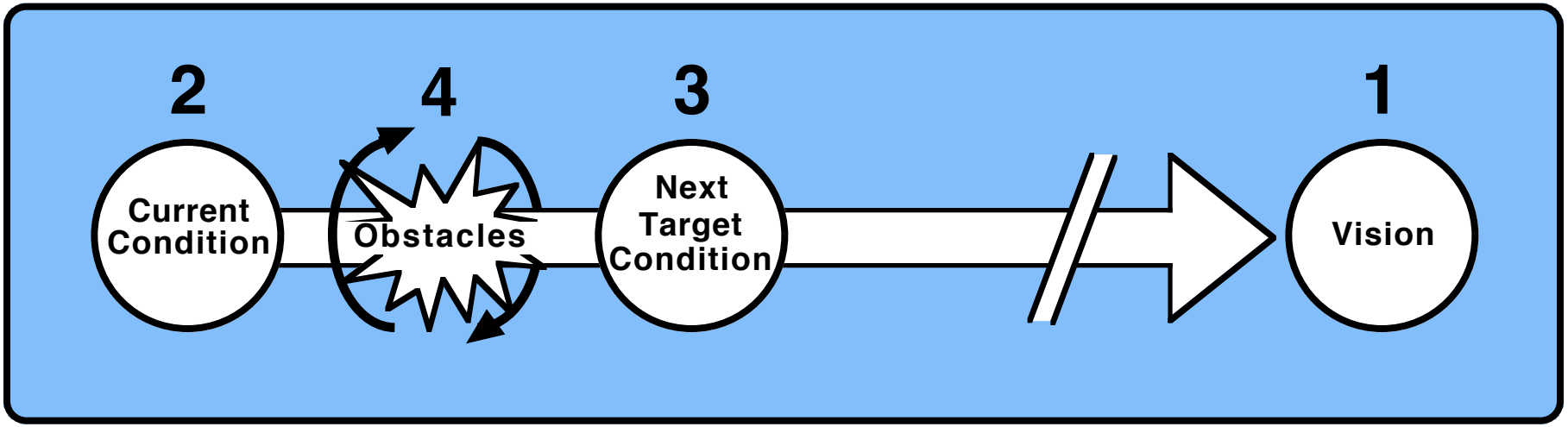
The IMPROVEMENT KATA represents Toyota's ideas about improving, adapting and innovating

By practicing this kata the learner experiences these ideas physically, not just in words or theory.

To develop new habits you need to practice new routines. The ultimate goal of practicing the improvement kata is to understand and internalize its pattern, so it can be executed in many different circumstances without thought or hesitation.

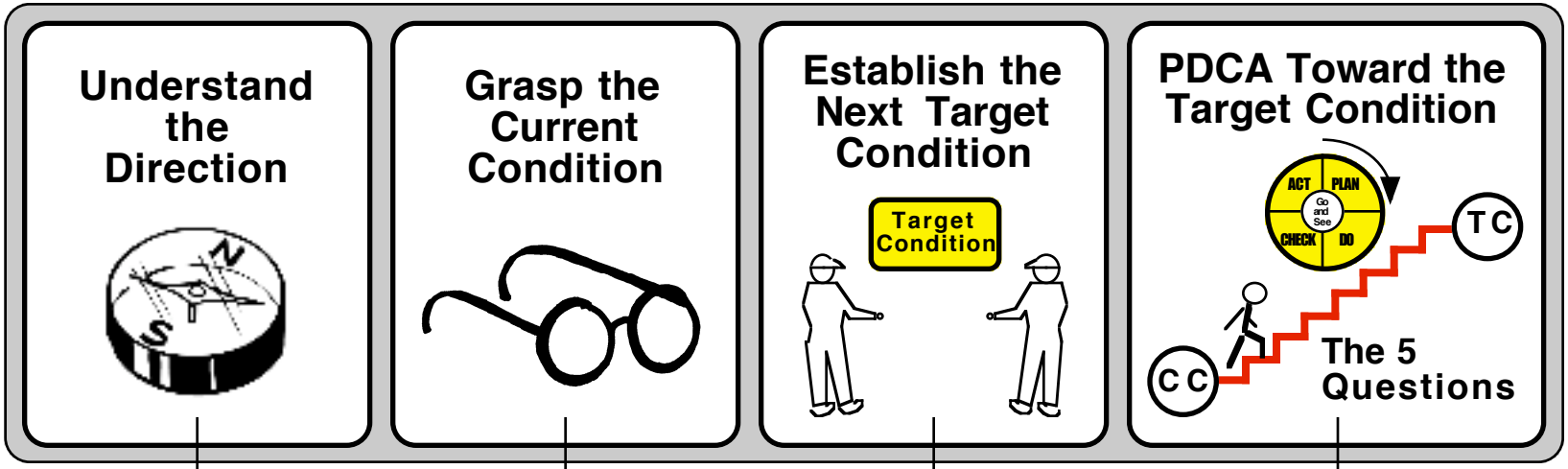
THE PATTERN OR SKILL WE ARE TRYING TO TEACH AND LEARN

The improvement kata is the *kaizen kata*. It's a response to a challenge. It's a systematic, scientific way of overcoming obstacles on the way to an objective, based on a four-part routine:



1. In consideration of a vision or direction...
2. Grasp the current condition.
3. Define the next target condition.
4. Move toward that target condition with PDCA, which uncovers obstacles that need to be worked on.

A LINEAR VIEW OF THE IMPROVEMENT KATA



What challenge are we striving to meet?

What is the current pattern of working?

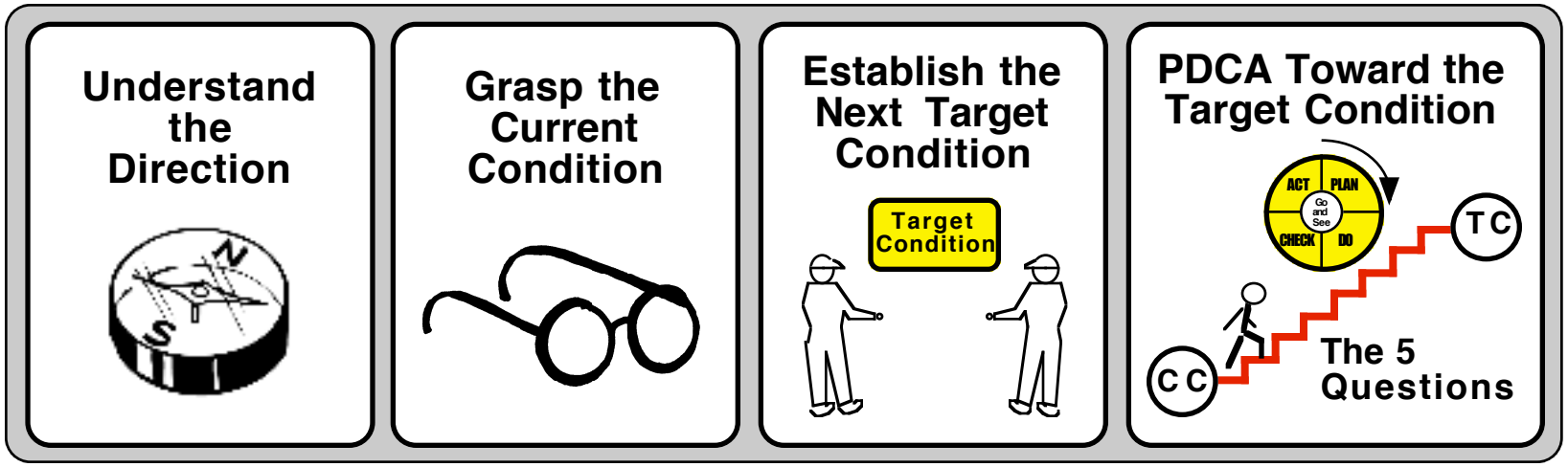
What pattern do we want to have next?

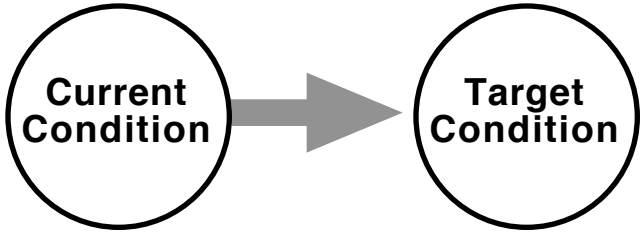
The step-by-step discovery process between where we are and where we want to be next.

THE IMPROVEMENT KATA

This is the necessary setup for doing effective PDCAs

This is where you discover what you need to work on





THE IMPROVEMENT KATA & COACHING KATA ARE THE LESS VISIBLE PART OF LEAN

Without this part we may get only temporary spot improvements, rather than continuous improvement

Visible

Lean tools, techniques and principles to improve quality, cost, delivery

Less Visible

- **Routine of thinking & acting**
- **Managers as coaches for practicing that routine**

WHAT PRACTICING THE IMPROVEMENT KATA GIVES YOU

- **A way of actualizing PDCA and continuous improvement in an organization.**

  Adds PDCA to people's toolkit. Embeds continuous improvement, adaptiveness and innovation in daily work.

- **Makes people more capable of improving processes and meeting challenges.**

  Provides a common protocol. It's a teachable routine for commonizing how members of an organization overcome obstacles and improve.

- **Generates better teamwork.**

  People focus on a shared target condition and have a common method for reaching it.

- **Bridges the gap between 'learning organization' theory and day-to-day reality.**

  Moves you from a predictable-zone mindset to a learning-zone mindset.

THE IMPROVEMENT KATA IS ABOUT STRIVING FOR A NEW STATE, NOT JUST TROUBLESHOOTING

It's a process of removing the obstacles between where you are and where you want to be. It's goal-directed improvement.

Troubleshooting	Striving
• Reacting to abnormalities • Trying to counteract entropy • You have to do it, because abnormalities happen	• Reaching for a new level of performance • A step-by-step process, aimed at a particular objective • Goal doesn't have to be big

TROUBLESHOOTING + STRIVING

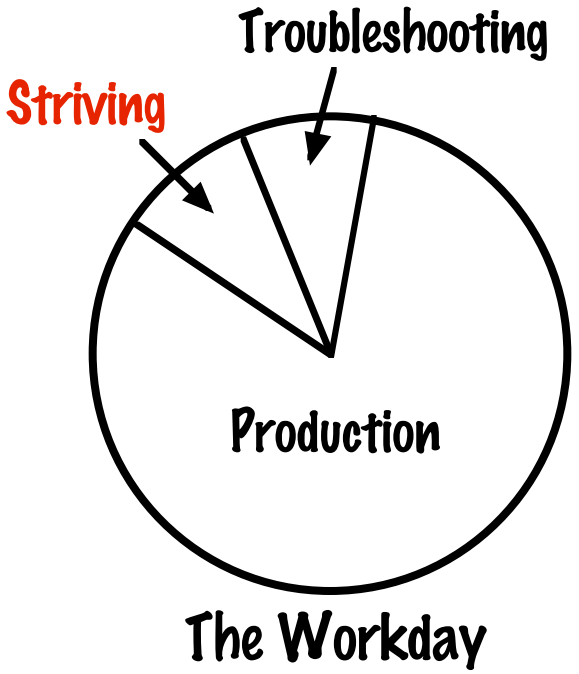
This handbook is about the striving portion

Just solving problems (troubleshooting) is not enough to generate sustained competitiveness.

Thriving in unpredictable, competitive circumstances involves actively and systematically striving for something, not just reacting to problems and trying to manage entropy.

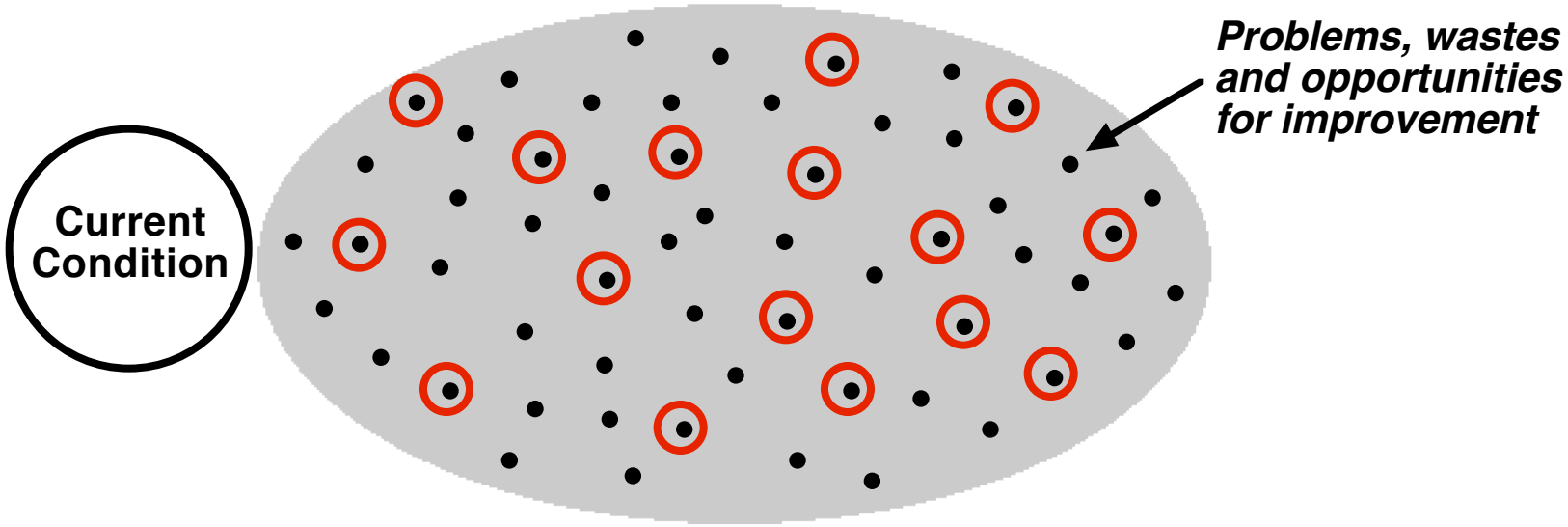
The point is that in order for our organization to thrive, some portion of everyone's workday should involve striving toward something new we want to achieve.

A challenge brings us to the current limits of our thinking, and forces us to learn and adapt



BUT HOW DO WE TEND TO TRY TO IMPROVE?

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



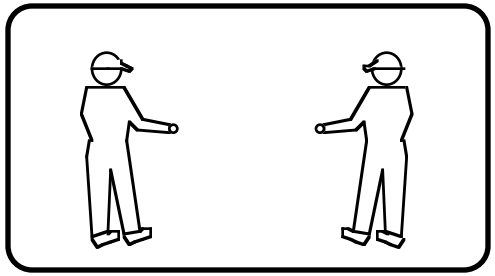
This scattershot approach may not achieve meaningful improvement that moves the organization forward.

It misspends our limited capacity for making improvements.

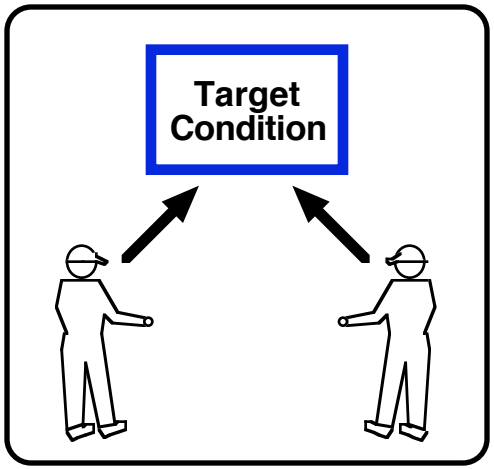
We don't learn much, because we're not experimenting.

ELIMINATING WASTE DOESN'T INVOLVE STRIVING TOWARD SOMETHING

Note the different psychology in the following scenarios:



"We moved the blow-off hose closer to the operator, which eliminated some waste."



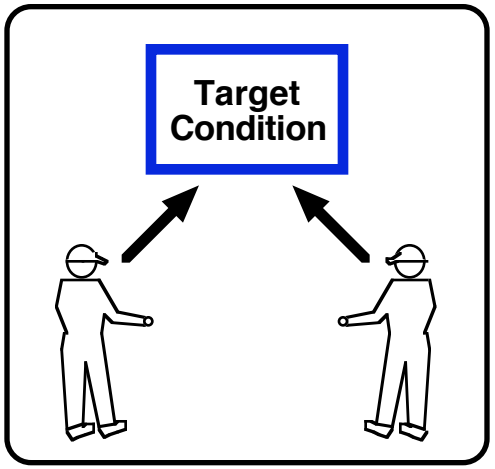
"We moved the blow-off hose closer to the operator, which got us a step toward to our process' target condition."

WHAT CAN WE IMPROVE?
versus
WHAT DO WE NEED TO IMPROVE?

Simply asking people, *"What should we improve?"* is not effective. Each viewpoint is naturally biased, and there is only limited time each day to work on improvement.

We should focus on what we *need* to do to improve. However, answering this question requires defining a target condition and having an effective way of working toward it.

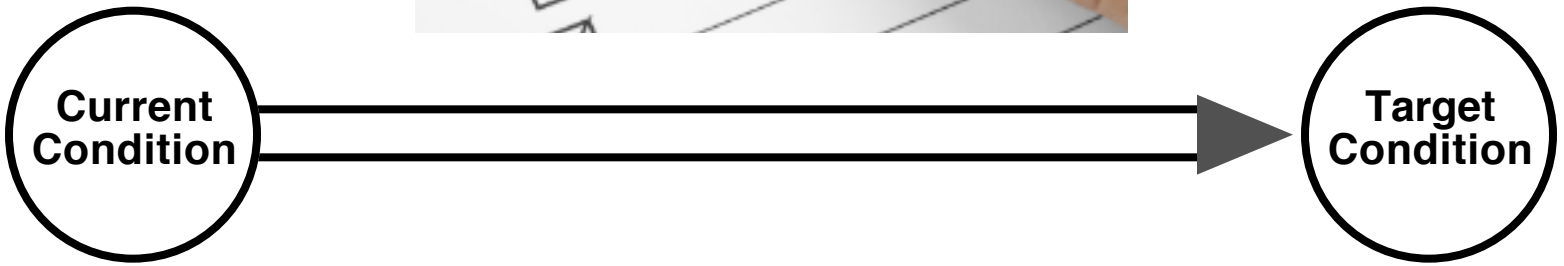
Following this more systematic approach and tackling the obstacles to the target condition is where team-member ideas really come into play!



The Lean revolution means kaizening everywhere, but not every*thing*. It involves working on those things that move a work process from its current condition to a defined next target condition.

AND HOW DO WE TEND TO TRY TO REACH AN OBJECTIVE?

We try to make the best plan, and then implement it



We think we know how we will get there, but both your knowledge and the situation change as you move forward!

With this approach we're also not doing enough experimenting, learning and adapting.

THE IMPROVEMENT KATA IS A DIFFERENT APPROACH

With the improvement kata you work iteratively toward a target condition, on the way to a vision, learning along the way. You work on those things that you discover you *need* to work on to reach the next target condition.

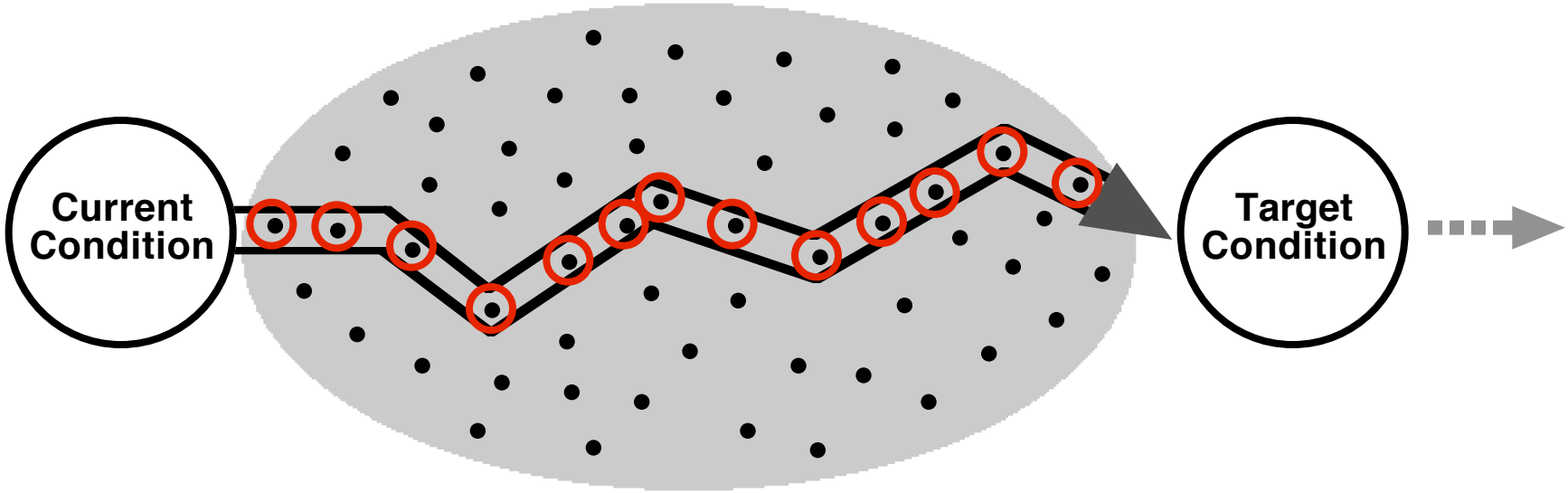
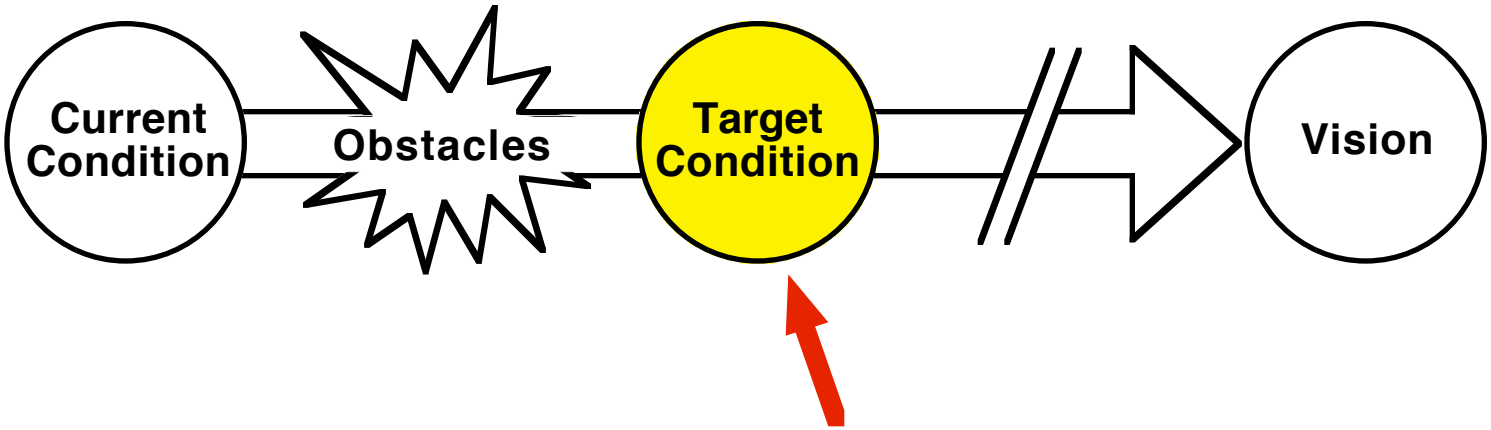


Diagram by Mr. Jeff Uitenbroek

THE IMPROVEMENT KATA IS FOCUSED

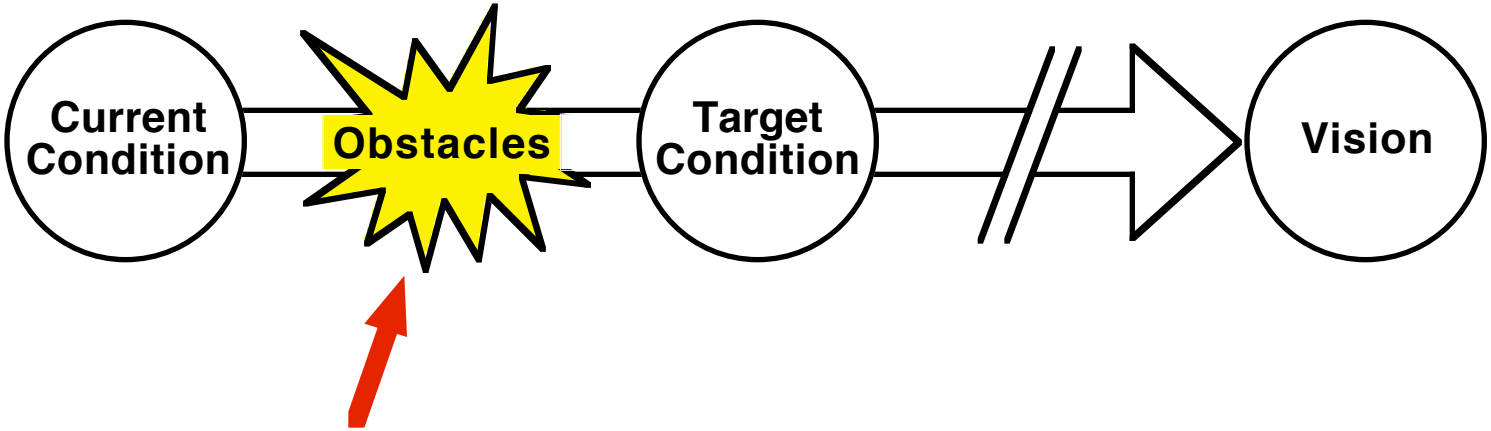


The target condition focuses people's attention and provides guidance.

Setting a target condition is not about choosing between existing options or best practices. It's about new performance.

By setting a target condition and trying to achieve it, you learn why you cannot. That's what you work on.

THE IMPROVEMENT KATA IS ITERATIVE



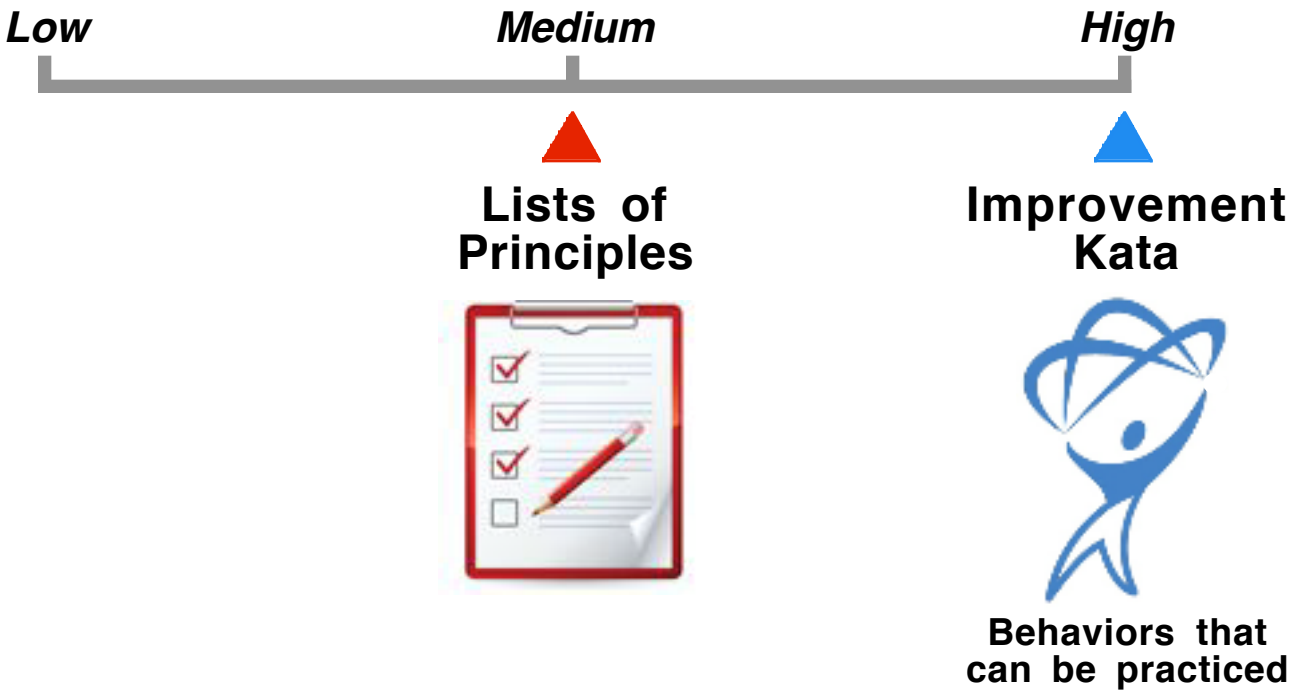
Rather than needing to wholly predict the path, the improvement kata spurs discovery and adaptation along the way.

Teams using the improvement kata learn as they strive to reach an objective, and adapt based on what they are learning.

THE IMPROVEMENT KATA IS OPERATIONALIZABLE

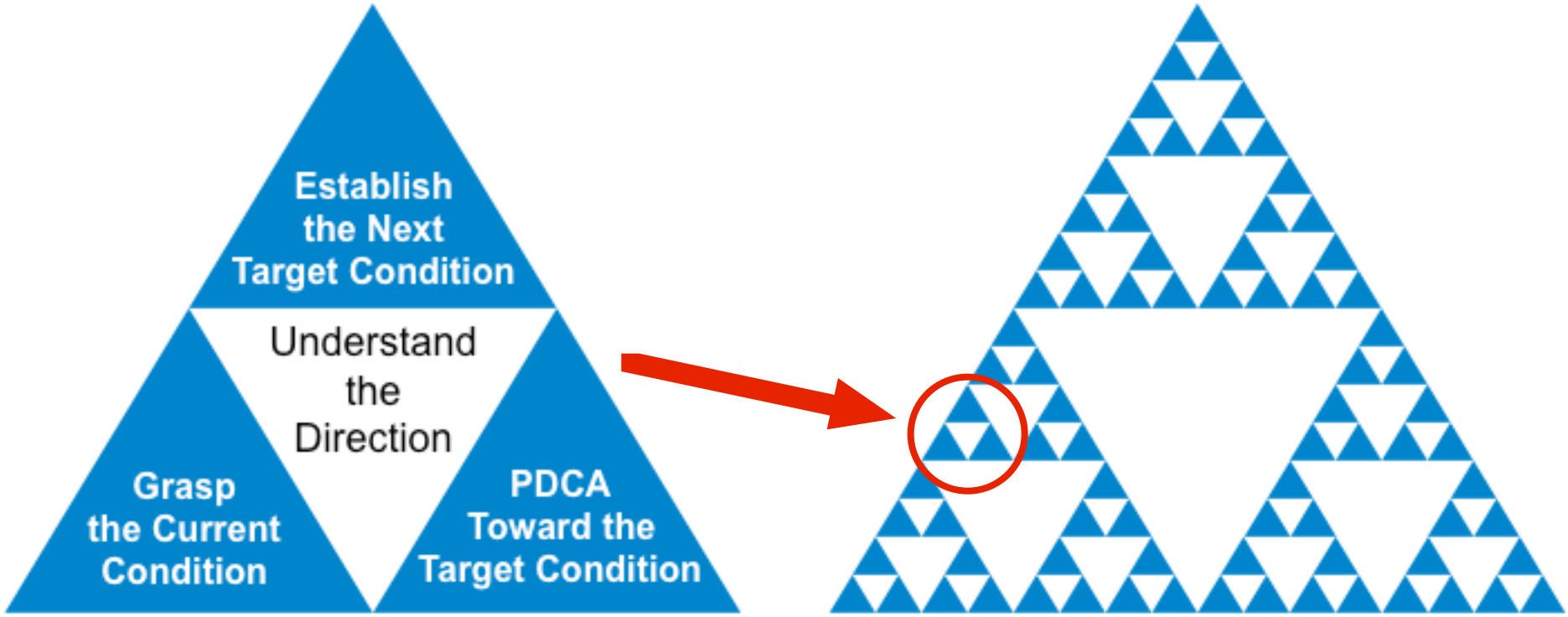
The improvement kata is a teachable, transferrable behavior pattern. Since new habits come from physical experiences, operationalizability is important.

Range of Operationalizability



THE IMPROVEMENT KATA IS FRACTAL

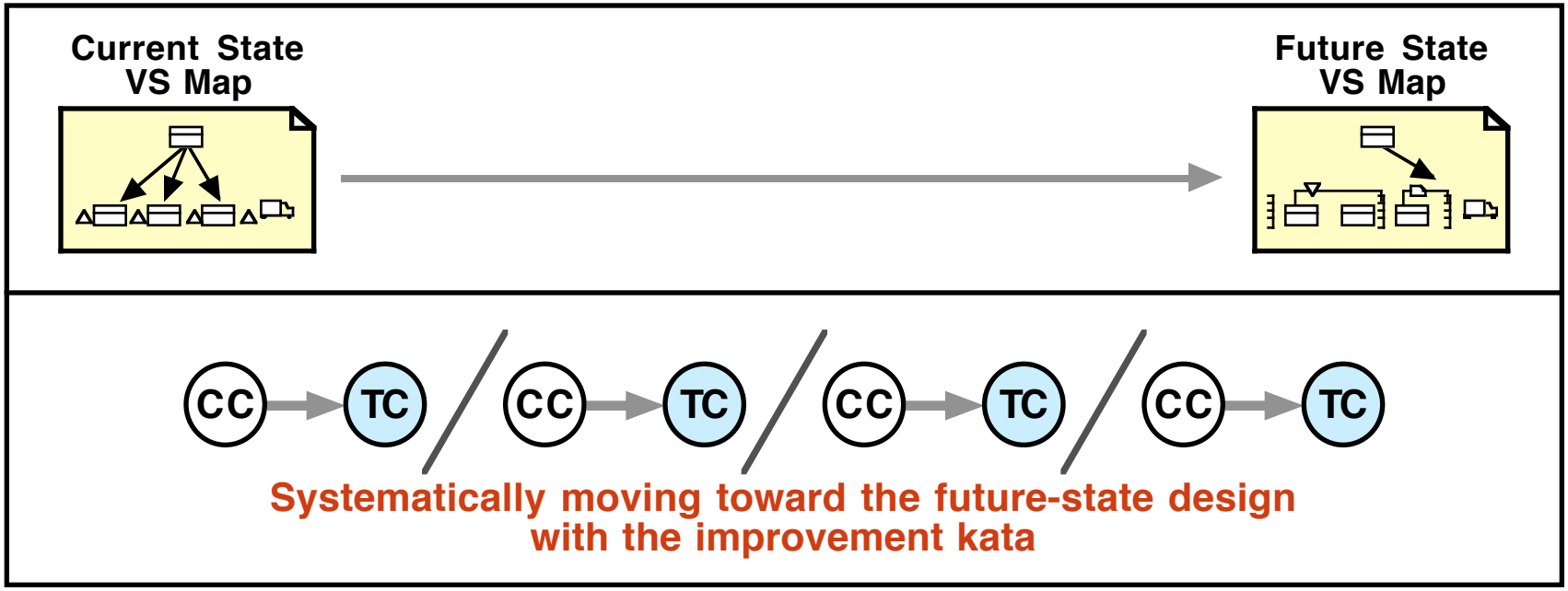
Once learned it can be practiced anywhere in the organization



Fractal depiction by Mr. Emiel van Est

THE IMPROVEMENT KATA IS HOW TO ACHIEVE YOUR FUTURE STATE MAP

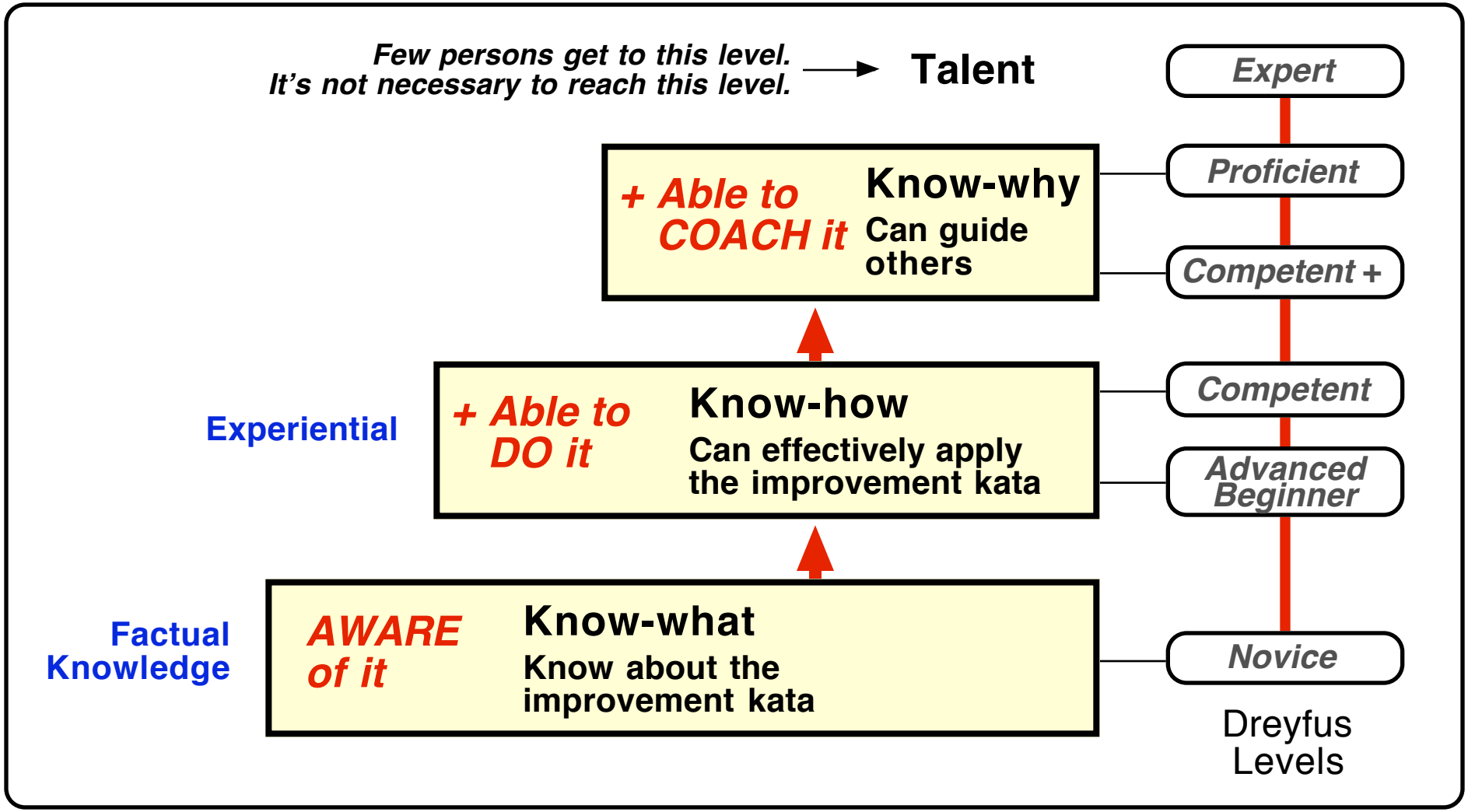
A future-state map describes how you want the value stream to be. The pattern of the improvement kata is how you get your value stream to function that way.



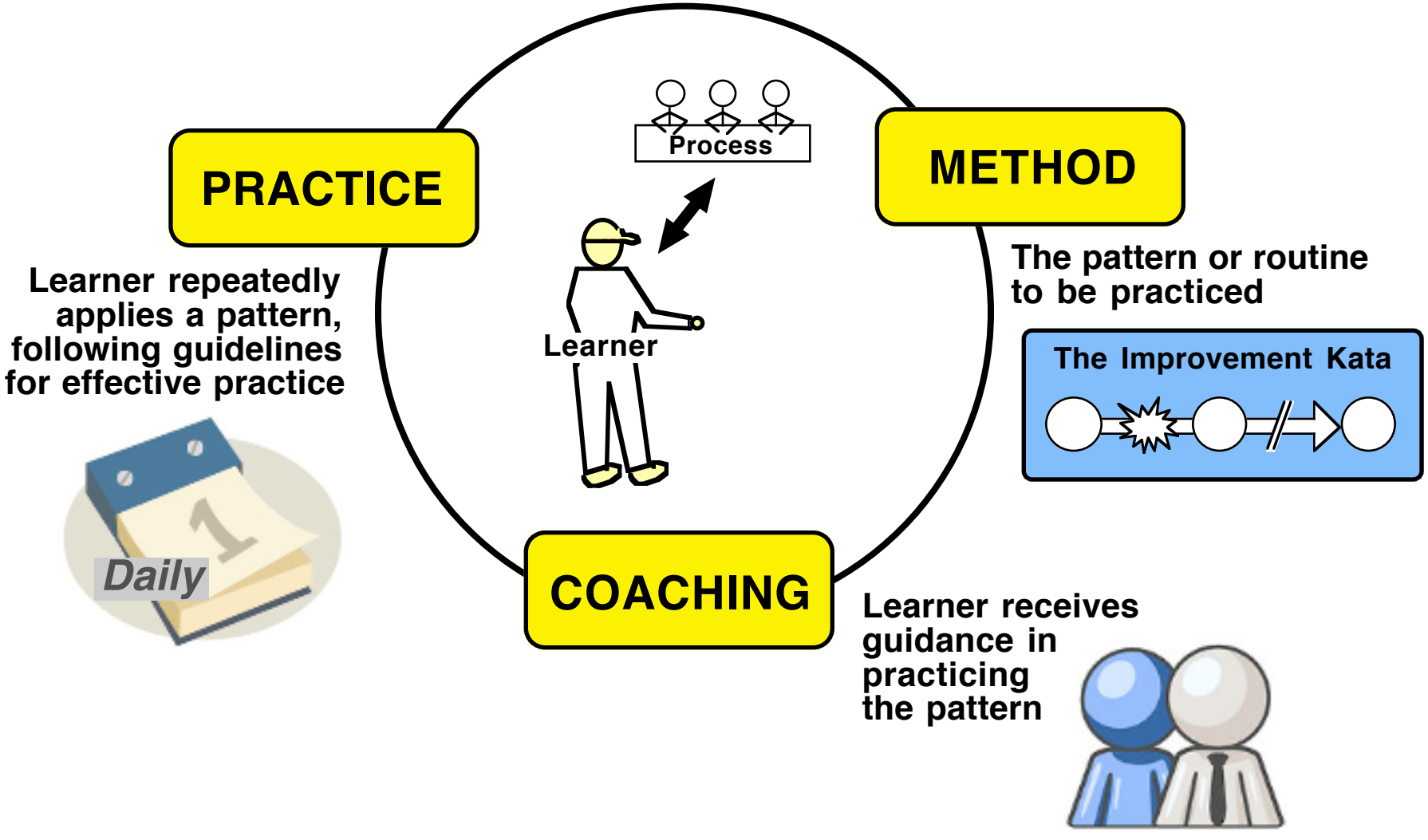
CC = Current Condition, **TC** = Target Condition

BUT AS WITH ANY SKILL, THERE IS A LEARNING PROGRESSION

Leaders, managers and coaches have to personally develop some improvement kata skill before they can coach others



INGREDIENTS FOR LEARNING A NEW SKILL



GUIDELINES FOR EFFECTIVE PRACTICING

How well one masters a skill depends more on how one practices than on merely performing the skill a large number of times

1) **First get a picture of the whole skill**
2) **Then break the skill (the kata) into elements** ***(Chunking)***
   - Identify the important elements / routines to be practiced
3) **Repeatedly practice an element** ***(Spaced repetition)***
   - Short daily practice is better than massed practice
4) **Practice at the edge of your capability**
   - Learning a skill involves making small errors and working on those points
5) **Practice slowly at first** ***(Slow down to speed up)***
   - Learn the basic routine / pattern first. As you learn to do the routine without thinking about each step, speed will come.
   - Beginners should try to follow the form closely. As you move up in skill level, then you can adjust how the routine is applied. (See the ***Dreyfus Levels***)
6) **Get feedback (periodic, not constant) from your coach**
   - You have to be able to detect your errors
7) **You have to want to learn the skill**
   - You have to be motivated in order to weave new neural pathways, although that motivation may come along the way

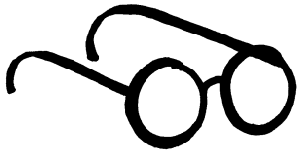
Sources: *The Talent Code* by Daniel Coyle, *Talent is Overrated* by Geoff Colvin, *Human Memory: Theory and Practice* by Alan Baddeley, Bjork Learning and Forgetting Lab (UCLA)

THE ROUTINES TO PRACTICE

Improvement Kata

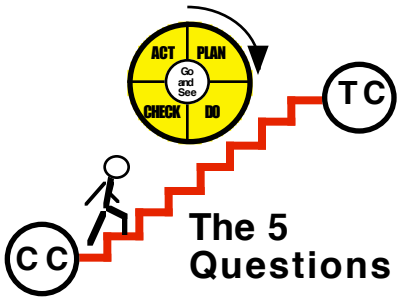
Understand the Direction

Grasp the Current Condition



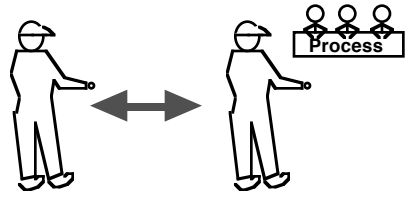
Establish the Next Target Condition

PDCA Toward the Target Condition



Coaching Kata

Coaching Cycles



STEPS TO SKILL DEVELOPMENT

READ

Read *Toyota Kata* & *The Talent Code*

AWARENESS SESSION

Overview and initial hands-on practicing of the TK routines. For example, take the 3-day University of Michigan TK course.

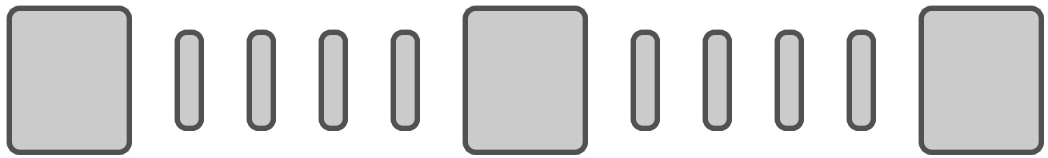
SKILL-BUILDING PRACTICE

Focused practice of the 4 routines:

- *Process Analysis*
- *Target Condition*
- *PDCA Cycles*
- *Coaching Cycles*

For example: Three concentrated practice sessions with daily application and coaching in between

Session 1 Session 2 Session 3



The learner focuses on improving one work process

DAILY PRACTICE

Integrate coaching cycles into daily work

A WAY TO MEASURE SKILL DEVELOPMENT

The *Dreyfus Model of Skill Acquisition* proposes that a student passes through the following five stages

Stage	Characteristics	Standard of Work	Autonomy
Novice	Adherence to rules or plans Little situational perception No discretionary judgement	Unlikely to be satisfactory unless closely supervised	Needs close supervision or instruction
Advanced Beginner	Action based on attributes or aspects Situational perception still limited All aspects are given equal importance	Straightforward tasks likely to be completed to an acceptable standard	Able to achieve some steps using own judgement, but supervision needed for overall task
Competent	Copes with crowdedness Sees actions partially in terms of LT goals Has standardized and routinized procedures	Fit for purpose, though may lack refinement	Able to achieve most tasks using own judgement
Proficient	Sees what is most important in a situation Perceives deviations from the normal pattern Maxims vary according to situation	Fully acceptable standard achieved routinely	Able to take full responsibility for own work, and coach others
Expert	No longer relies on rules / guidelines / maxims Grasp of situations & decision making intuitive Vision of what is possible	Excellence achieved with relative ease	Able to take responsibility for going beyond existing standards and creating own interpretations

Able to Coach

Adapted from: Dreyfus, Stuart E., *Formal Models vs. Human Situational Understanding: Inherent Limitations on the Modelling of Business Expertise*, University of California, Berkeley, 1981

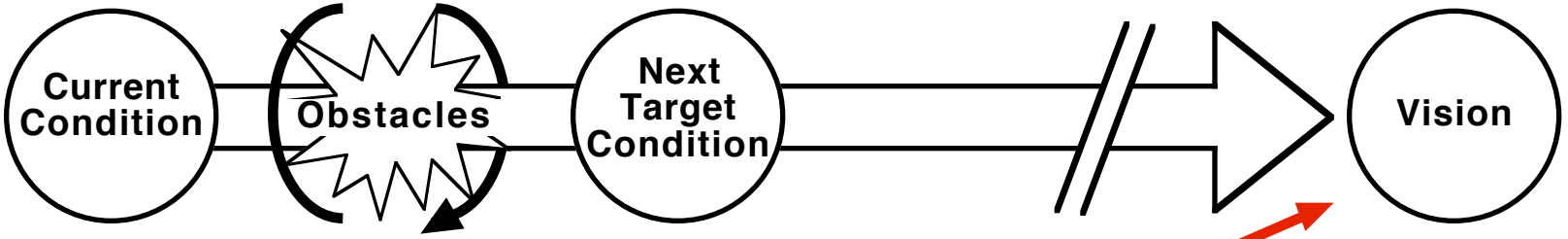
Note: The Dreyfus model measures skill level, not the person

DELIBERATE PRACTICE, FOR ACQUIRING SKILL

We may think that all skill is innate -- that you are either born with it or not -- but that is an incorrect assumption. Much of what happens in your organization is a consequence of the habits that people in your organization have learned through practice, whether deliberately or by happenstance.

DISASSEMBLING THE IMPROVEMENT KATA

Kata are usually practiced in pieces, until the whole sequence is learned. We'll go through the mechanics of the improvement kata in these four parts.



1: Understand the Direction

3: Establish the Target Condition

4: PDCA Toward the Target Condition

2: Grasp the Current Condition

As you apply the steps of the improvement kata...

WATCH FOR THE *THRESHOLD OF KNOWLEDGE*

There is always a threshold in our knowledge, every day. We can only see so far. The knowledge threshold is the "learning edge."

What's most important is how you and your team act when you reach a knowledge threshold.

Whenever you hit a knowledge threshold:

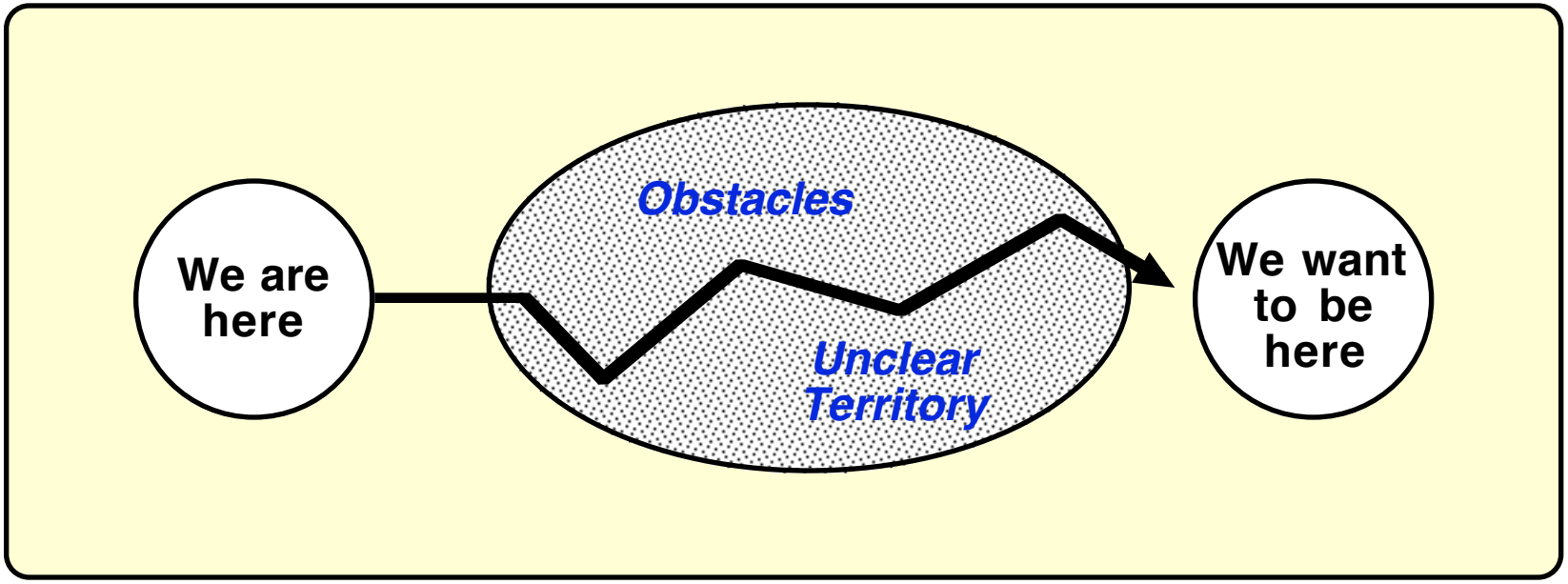
1. **Acknowledge it. Say, *"I don't know,"* or, *"not sure."***
2. **Don't try to move beyond it by conjecture. Relax, define a hypothesis, and take the time to go-and-see-it and go-and-try-it.**

ONE MORE THING

Once you start applying the improvement kata to a process, you shouldn't stop

YOU'RE ON THE WAY

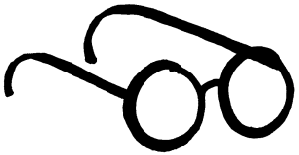
In a journey of practice and discovery



THE IMPROVEMENT KATA

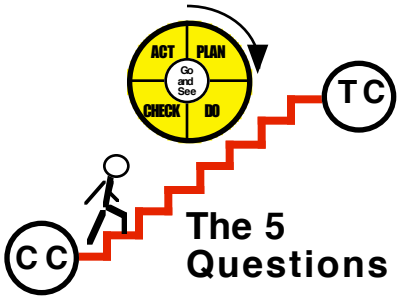
Understand the Direction

Grasp the Current Condition



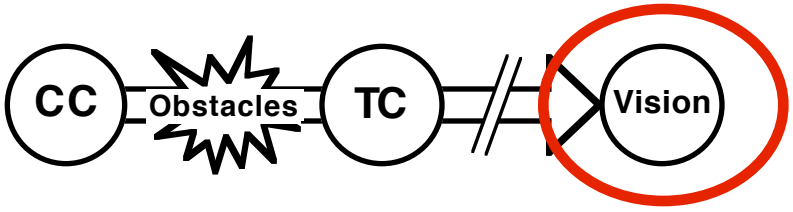
Establish the Next Target Condition

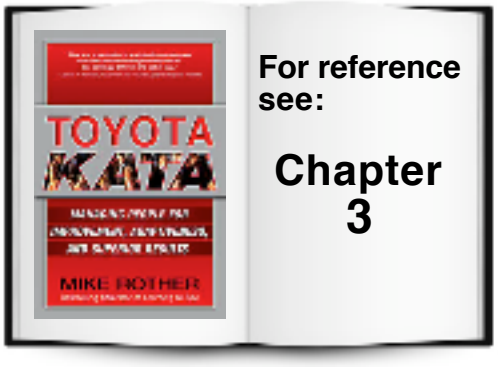
PDCA Toward the Target Condition



The Improvement Kata

1. UNDERSTAND THE DIRECTION

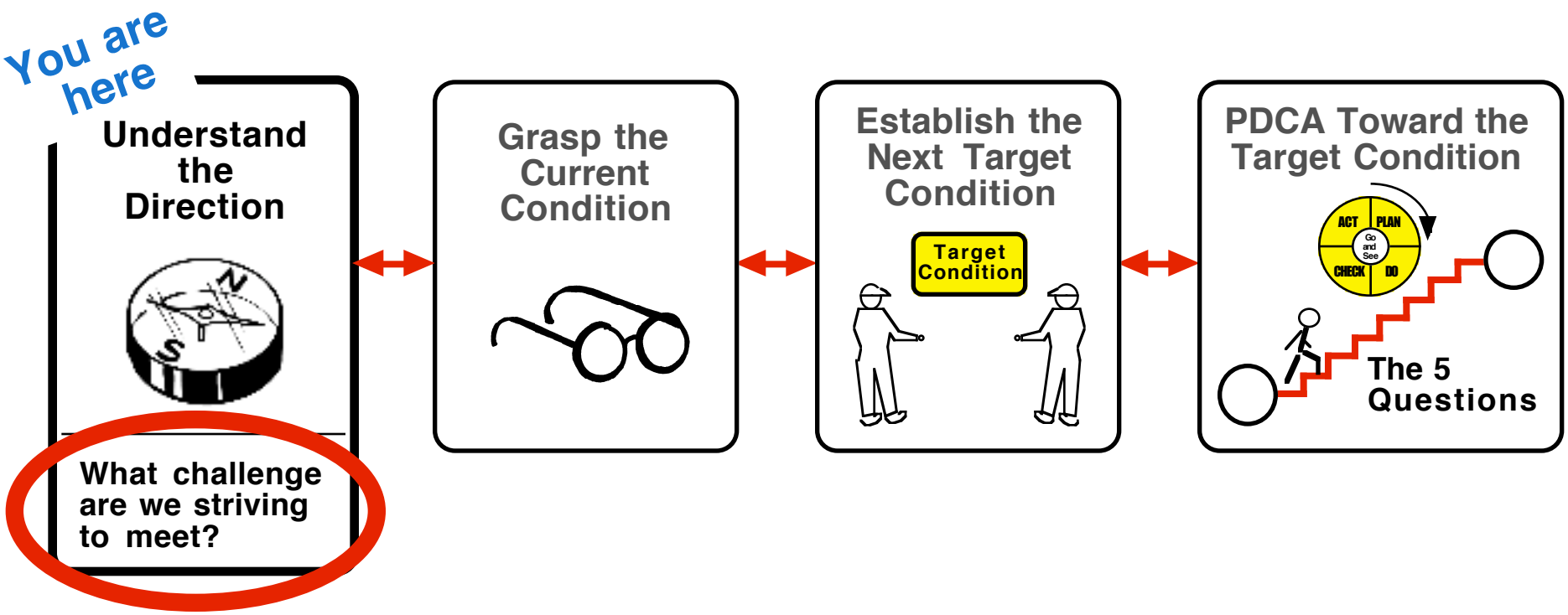




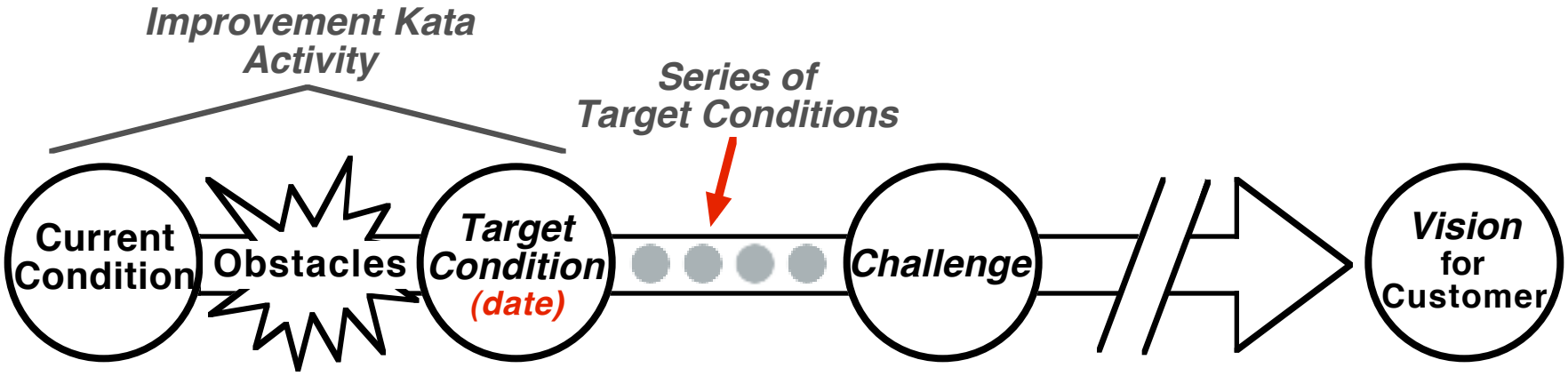
For reference see:

Chapter 3

ORIENTATION



OVERVIEW



1 Week to 3 Months out

Describes a process condition.

To be reached by a specified date.

1- 3 Years out

Comes from company objectives and future-state map.

Significant challenge that will take a series of target conditions to achieve.

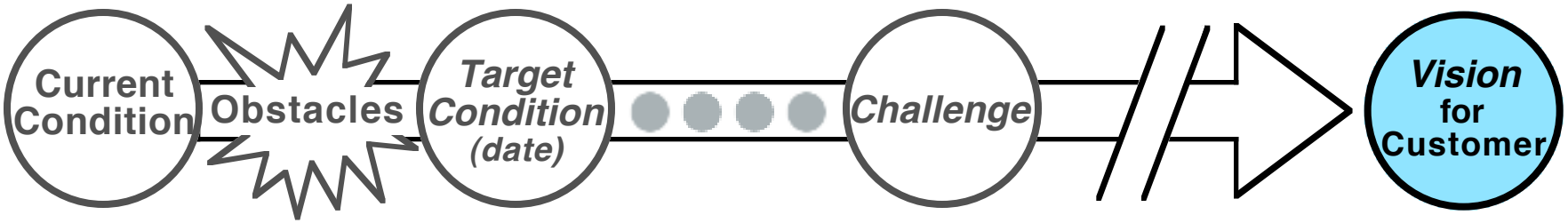
Distant

Overall direction giver.

Often related to 1x1 flow to the customer.

Too far away to motivate & guide improvement kata activity.

THE IMPROVEMENT KATA OPERATES IN THE SERVICE OF A VISION



Without a direction-giving vision...

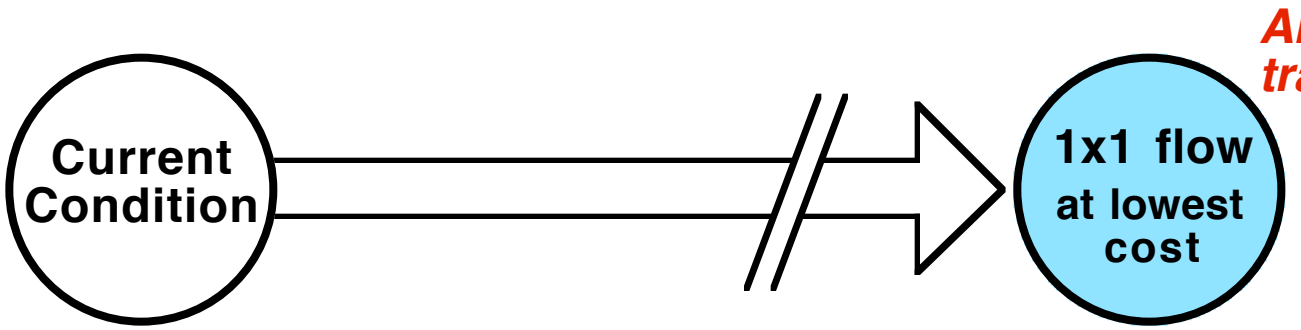
- **Proposals are evaluated independently, instead of as part of striving toward something. We tend to use short-term cost/benefit analysis to decide what to do.**
- **We tend to jump from one direction to another, rather than sticking to it and working through the obstacles.**

So what direction should you choose?

1X1 FLOW IS A UNIVERSAL DIRECTION

Humans have been striving toward greater 1x1 flow for centuries, when we define it as follows:

--> Getting something that is wanted or needed, when and where it is wanted or needed.



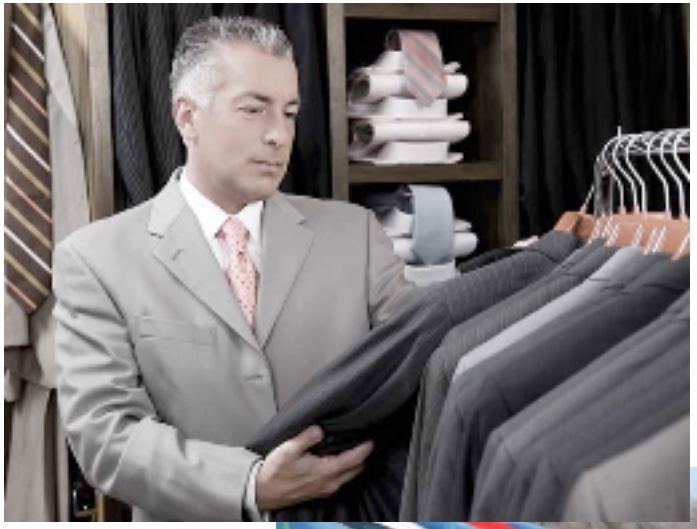
An inevitable trajectory

In the long run this is an inevitable trajectory. Either you strive for it, or some other organization will.

Why not add this universal vision to your vision and get going!?

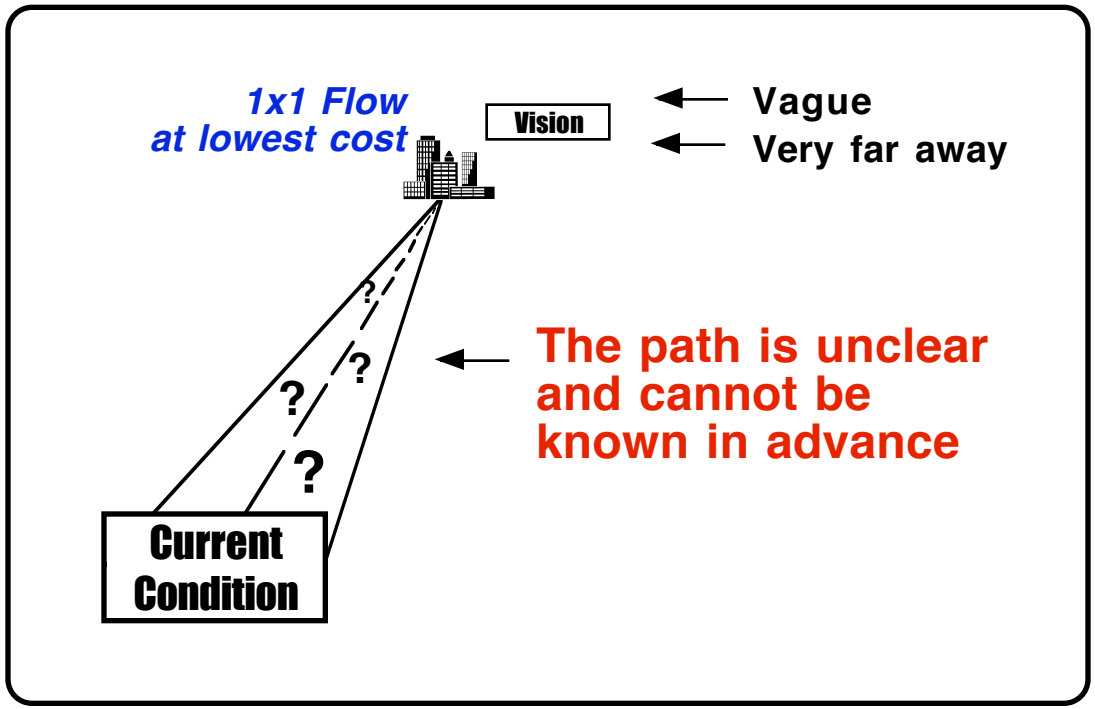
SOMEDAY IN THE FUTURE

A customer will want one unit of your product or service, and a company will make it for them, then and there, at the right quality & price



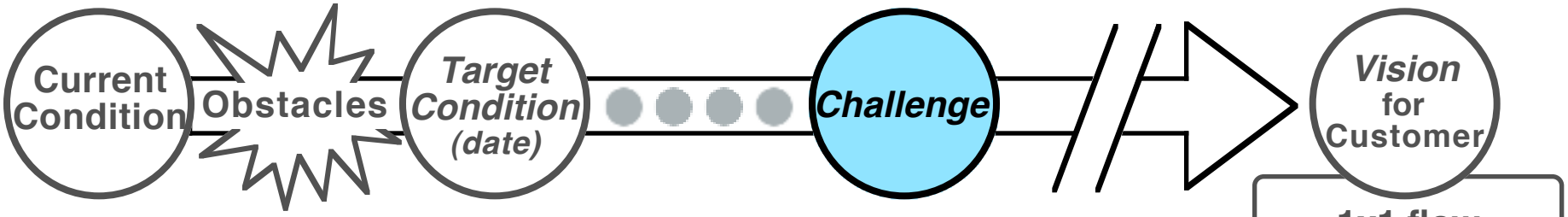
The only question open to you is... do you want to be that company or will it be someone else?

HOWEVER, A VISION CAN ONLY SERVE AS A LONG-TERM DIRECTION GIVER, NOT MUCH MORE



SO A MORE SPECIFIC CHALLENGE IS DEFINED

So that process-level improvement efforts have a focus and are aligned

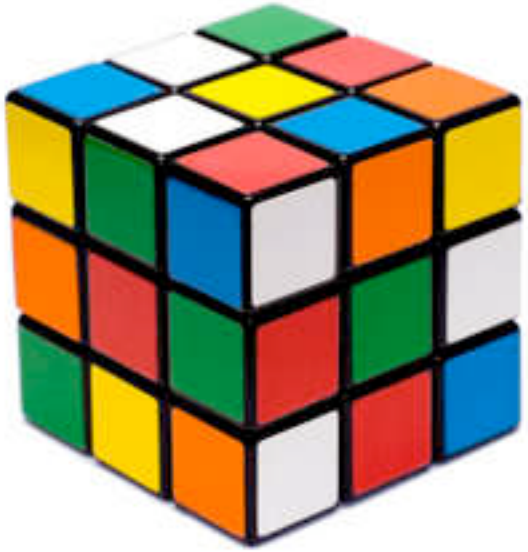


Example challenges:

- *"Let's machine parts directly in the 1x1 assembly flow"*
- *"Let's paint parts directly in the 1x1 assembly flow"*
- *"Let's build to truck, one kitchen at a time"*
- *"Let's have lab-test results done in 45 minutes, with no errors"*
- *"7 days from patient referral to psych evaluation for new patients"*
- *"Let's build the day ordered, and ship the next day"*

The challenge informs the process target conditions

A CHALLENGE IS...



- **A step toward to the vision, related to company objectives and breakthroughs for the customer.**
- **Typically 1-3 years out.**
- **Achievable. But we don't know in advance how we will achieve it.**
- **Challenging. Not easy, not impossible.**
- **A sentence beginning with the words, *"Wouldn't it be great if we could..."***
- **It's important to challenge the learner, so they feel a sense of accomplishment**

THE FUTURE-STATE MAP PROVIDES CHALLENGE

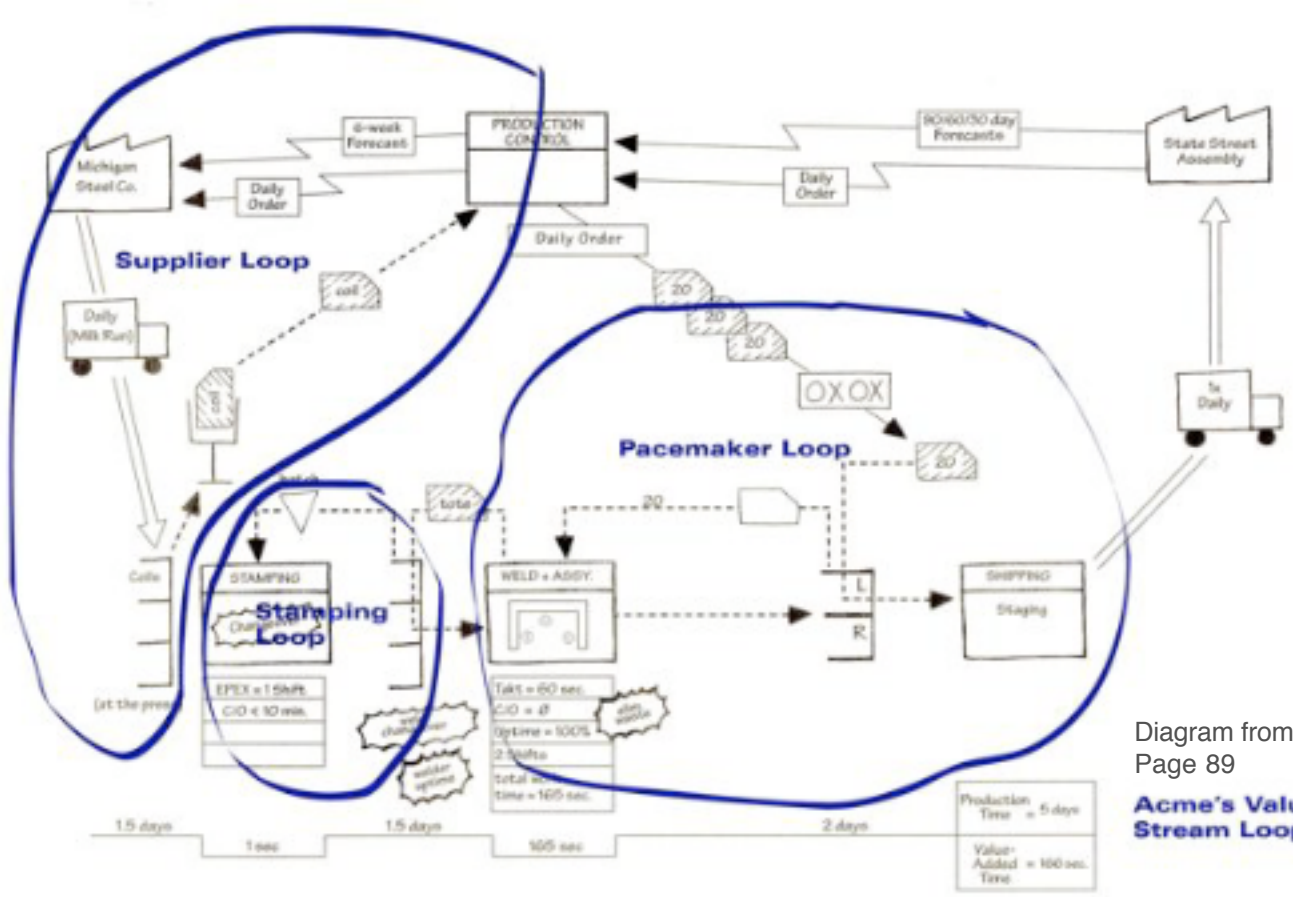
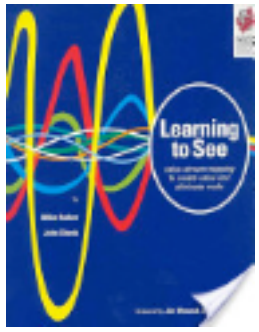


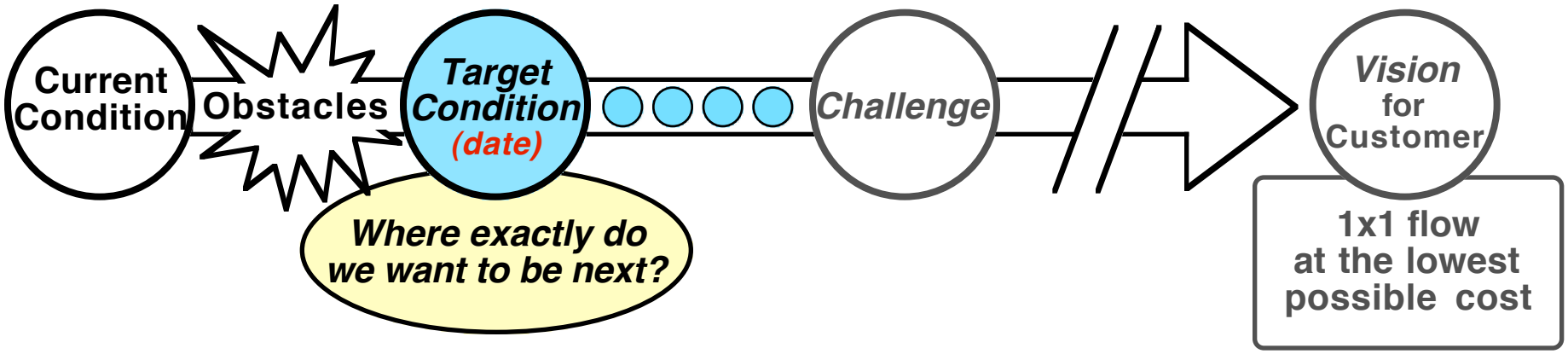
Diagram from *Learning to See* Page 89

Acme's Value-Stream Loops



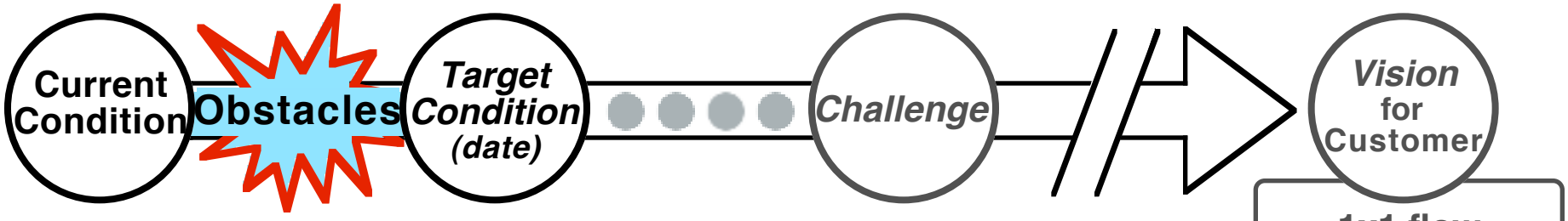
The future-state characteristics you design for the loops of a value stream provide challenge and coordination for establishing target conditions at the individual work processes in the loops. A future-state value stream loop is a *hoshin* for improvement at the processes in that loop.

BUT A SPECIFIC PROCESS TARGET CONDITION IS WHERE THE ACTUAL ACTIVITY IS



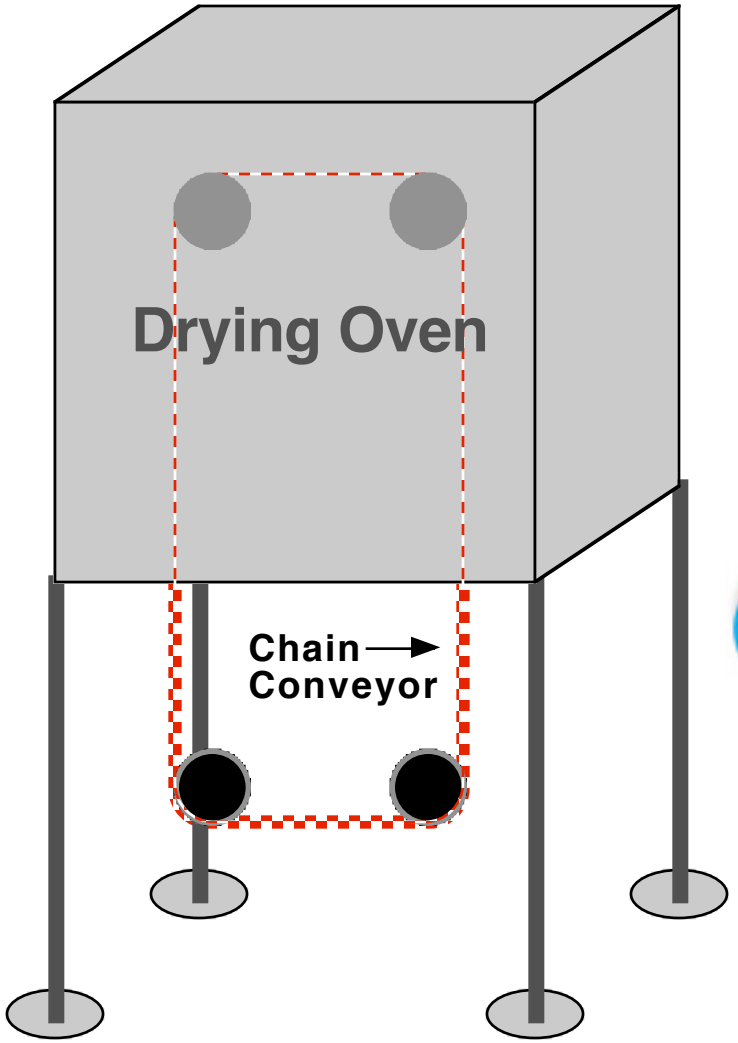
- A target condition is typically at the process level.
- This is goal-directed process improvement.
- A target condition represents a step toward the challenge.
- Think of a target condition as a nearer-term desired state that is defined in more detail than the challenge.
- A target condition includes a specified target date, typically 1 week to 3 months out.
- It takes a series of target conditions to meet the challenge.

OBSTACLES TO THE TARGET CONDITION ARE WHERE DETAILED, DAILY PDCA ACTIVITY TAKES PLACE



EXAMPLE
Developing a compact, in-line paint drying oven

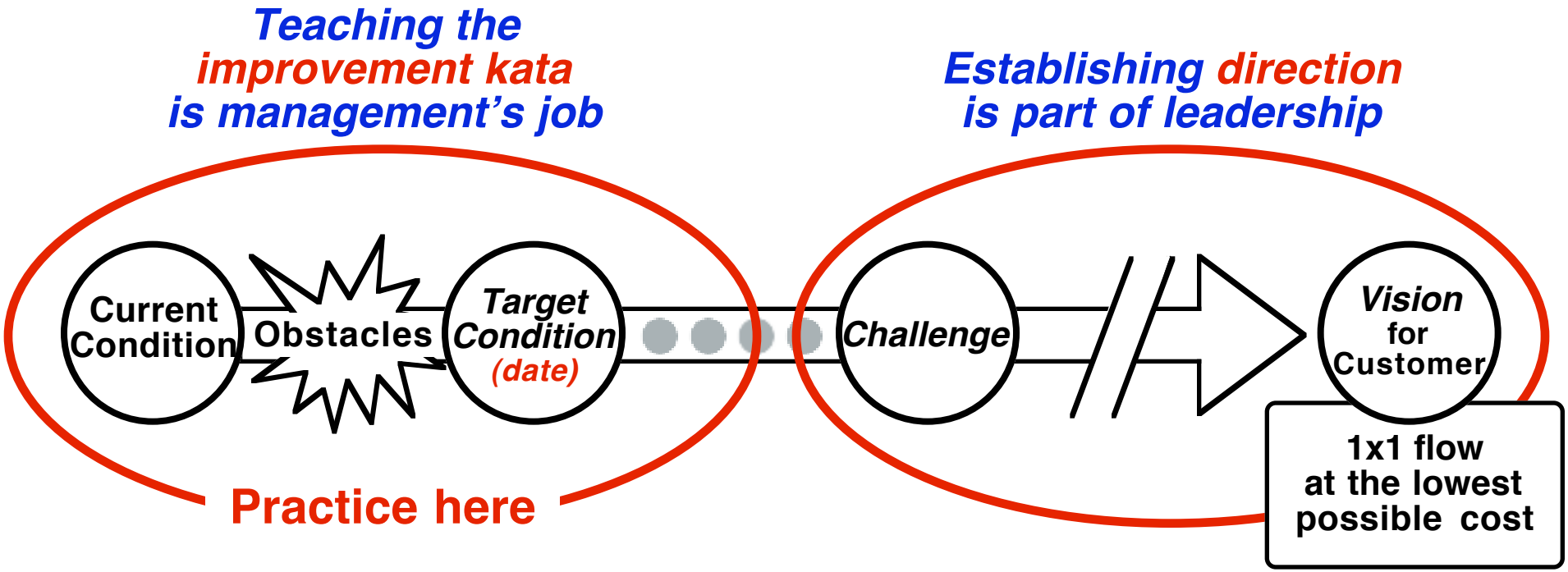
Current Obstacle: Chain conveyor derails when parts are hung on it



VISION	***1x1 Flow***	***More General***
CHALLENGE	***Paint in Line***	
TARGET CONDITION	***In-Line Oven (attributes defined)***	
OBSTACLE	***Chain Derails***	***More Specific***

Detailed PDCAs are here

THE IMPROVEMENT KATA INVOLVES BOTH MANAGEMENT AND LEADERSHIP

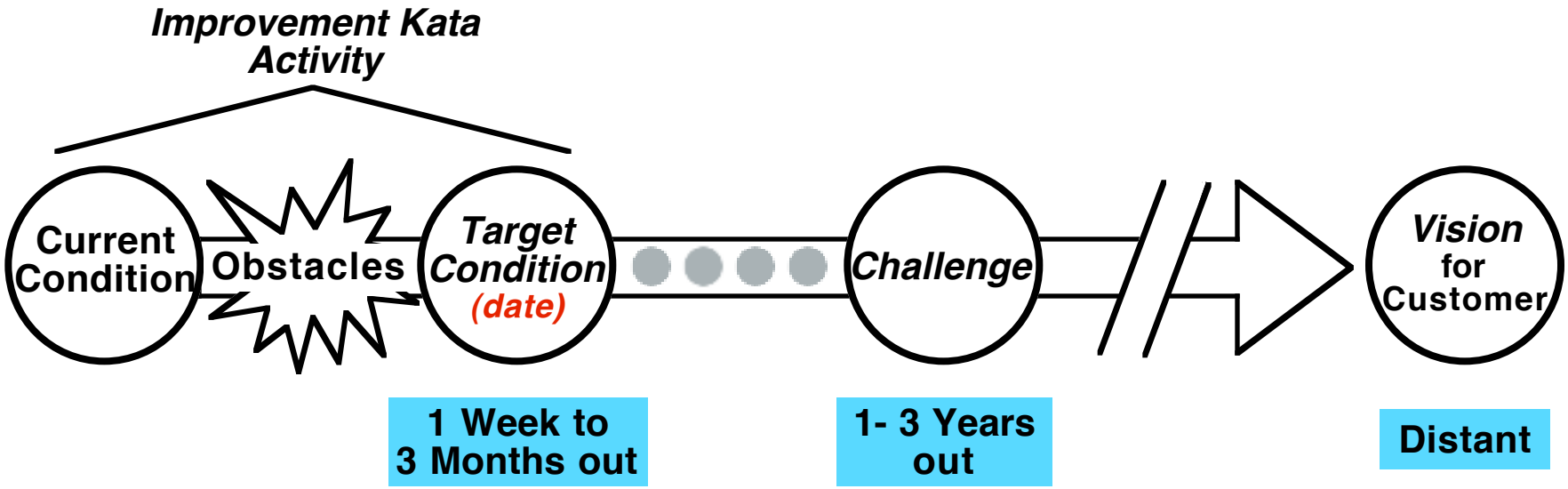


Setting a vision & challenge is not enough. You also need a means for getting there.

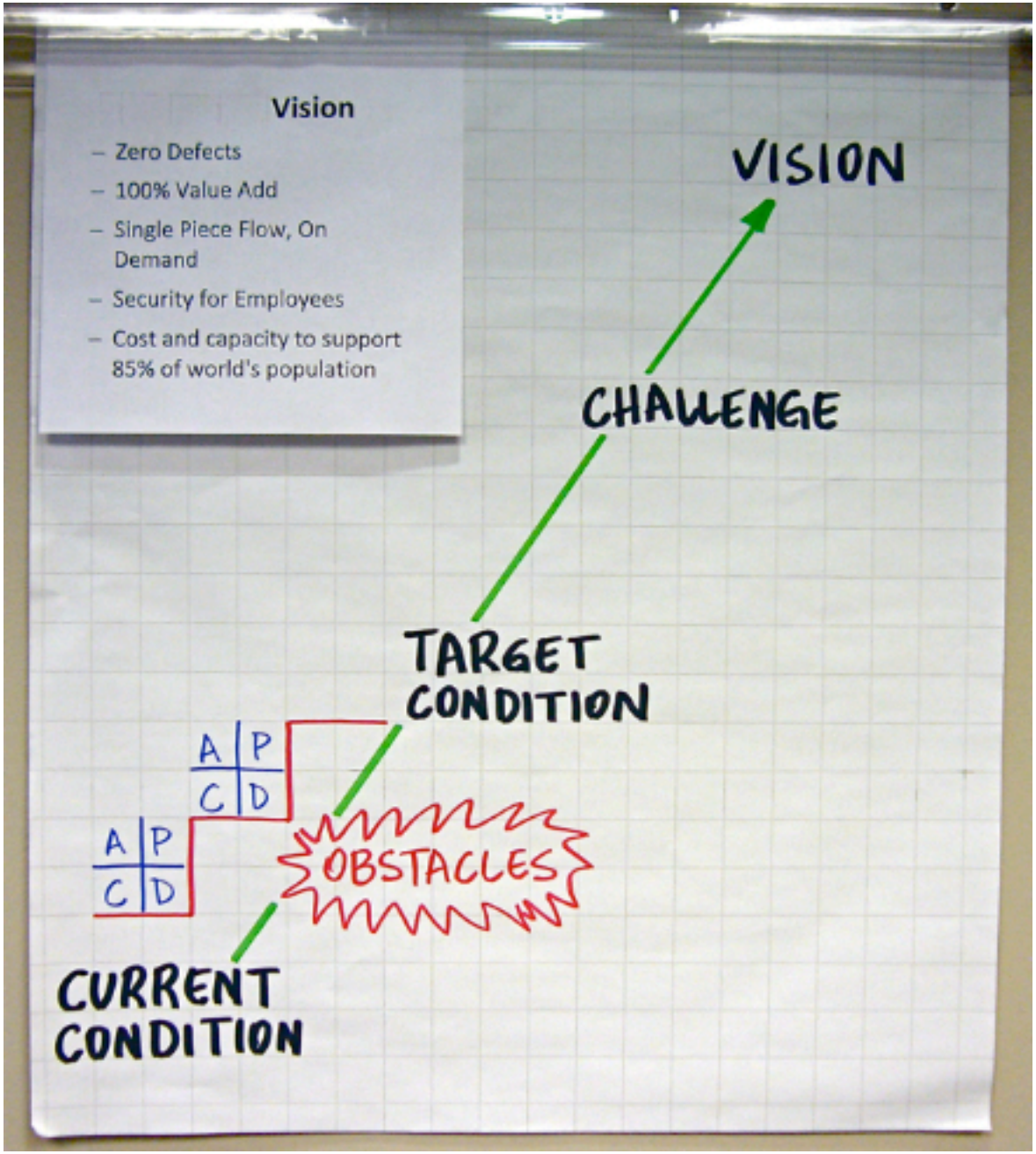
- **Leading involves establishing vision & challenge. Coordinating.**
- **Managing involves teaching people a systematic, effective way of overcoming obstacles and meeting challenges.**

SUMMARY

The systematic pattern of the improvement kata is a bridge between where you are and where you want to be



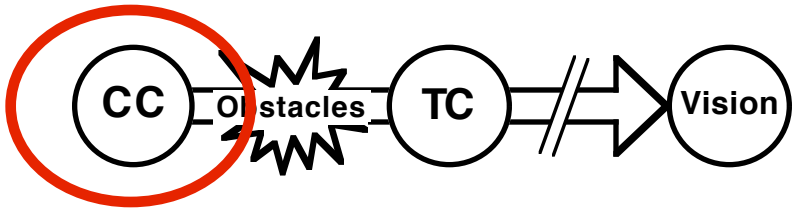
- A vision without a challenge is too distant.
- A challenge without a vision is too variable. Any direction is possible.
- Issuing a challenge without teaching improvement-kata skills is just an exhortation (a goal set in the absence of a method for achieving the goal).


Vision
– Zero Defects
– 100% Value Add
– Single Piece Flow, On Demand
– Security for Employees
– Cost and capacity to support 85% of world's population
VISION
CHALLENGE
TARGET CONDITION
A P C D
A P C D
OBSTACLES
CURRENT CONDITION

2. GRASP THE CURRENT CONDITION

(The Toyota Kata Process Analysis)

Practice this Routine

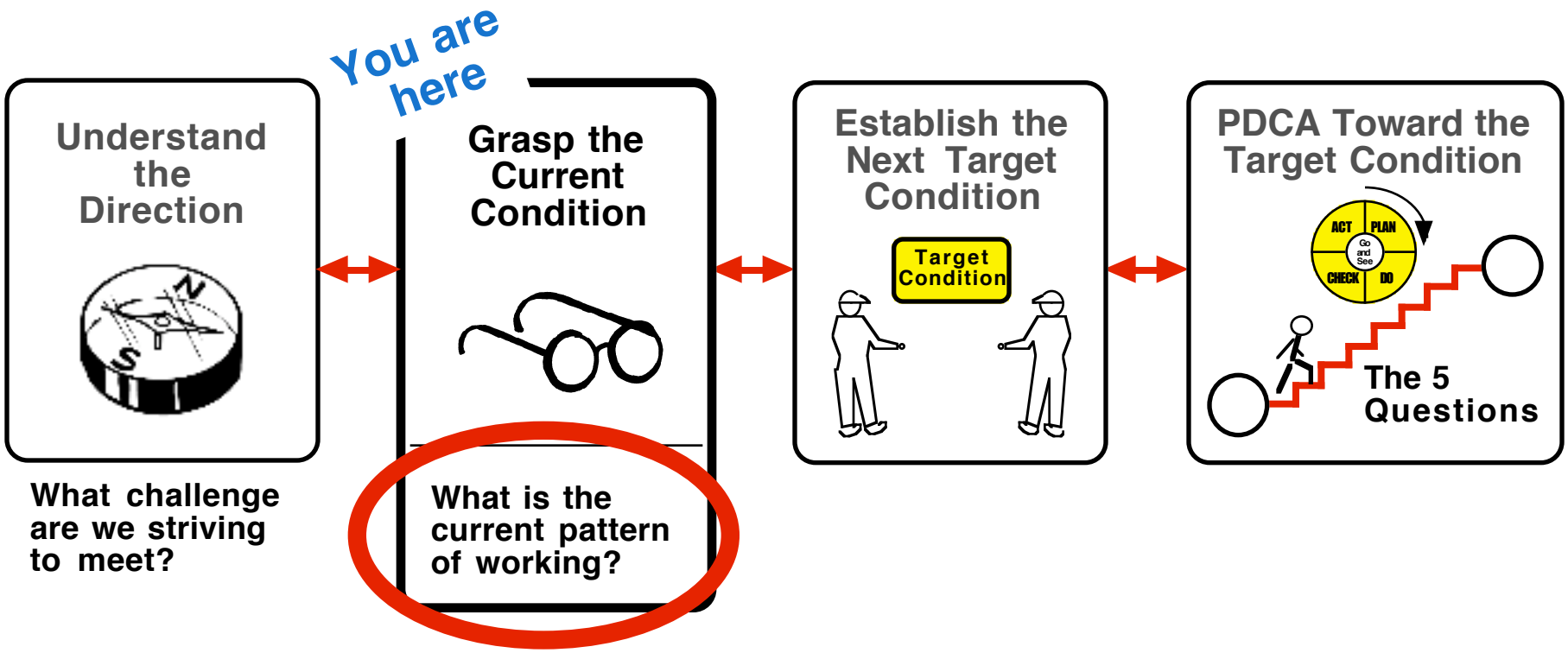


ORIENTATION

The Toyota Kata process analysis is a systematic way to observe and analyze current process condition

The TK process analysis was developed from watching how Toyota coaches guided learners at Toyota supplier sites.

Adjustments to this analysis may be necessary in order to fit it to the characteristics of various processes, but the basic steps as presented here are usually about the same.



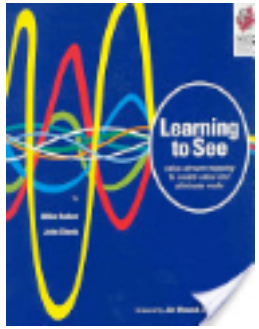
THE PURPOSE OF THIS PROCESS ANALYSIS

The purpose of this process analysis is *not* to uncover problems, wastes or potential improvements. Analyzing the current condition is done to obtain the facts & data you need in order to define an appropriate target condition.

Grasping the current condition is part of the process of establishing a target condition.

Once you have a target condition *then* you can strive to move toward it and discover what you need to work on.

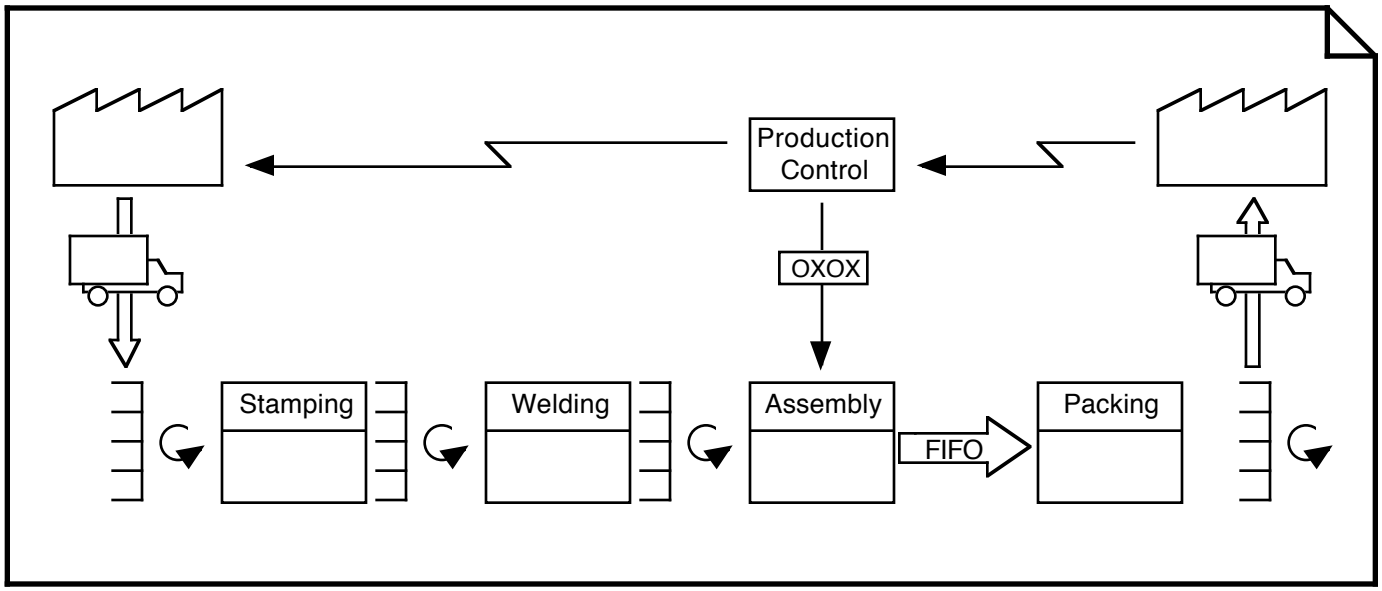
START WITH CS & FS VALUE STREAM MAPS



A) Walking the value stream and drawing a current-state map helps you understand the overall flow and identify the segments, or "loops," of the value stream.

B) Take from the future-state map:

What is the current challenge for the loop of the value-stream that your focus process is in?

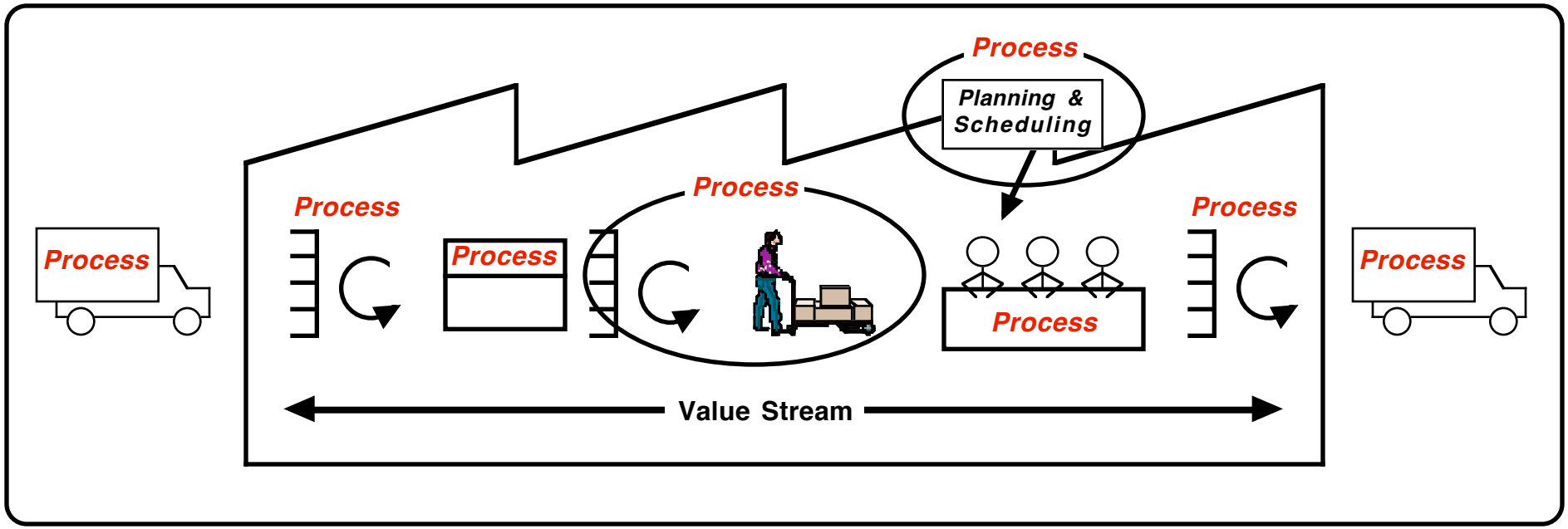


For instructions on how to create current- and future-state value stream maps, refer to the book *Learning to See*

THEN MOVE TO THE PROCESS LEVEL

The word "process" can refer to several kinds of activity, not just production processes. Material handling, order-entry, lab procedures, handling customer returns, etc.

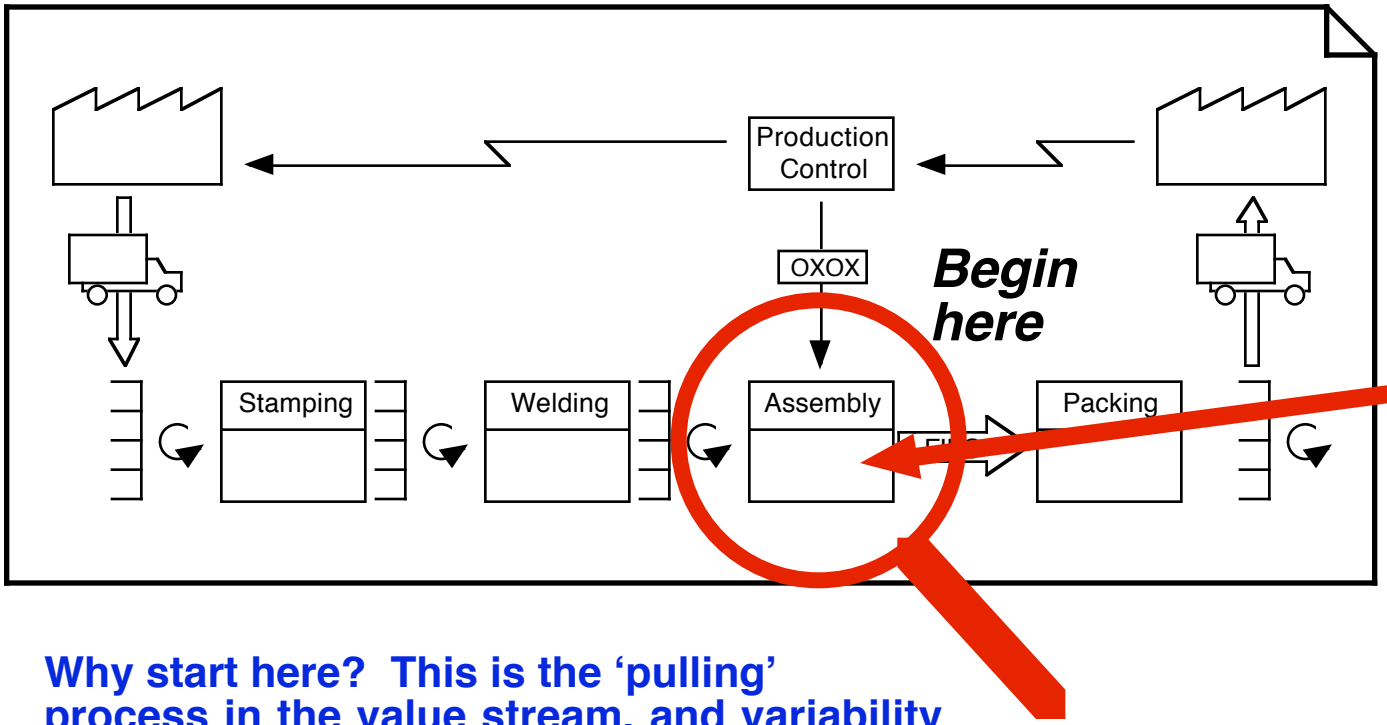
Processes are like the chainlinks of a value stream.



AT WHAT PROCESS IN THE VALUE STREAM DO YOU BEGIN?

Generally... start with the pacemaker process, which is at the downstream, customer-end of the value stream

(see Appendix 1 in *Toyota Kata* and page 90 in *Learning to See*)



Why start here? This is the 'pulling' process in the value stream, and variability here adversely affects upstream processes. That makes the causes of problems upstream harder to understand.

Start by striving to reduce variation in the downstream pacemaker process, and see where in the value stream that leads you.

STEPS OF THE TK PROCESS ANALYSIS

Step ①

Customer Demand and Line Pace

- Customer takt
- Planned cycle time
- Number of shifts currently running

Keep this sheet handy

Step ②

Overview of the Process

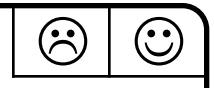
- Define the start & end points of the process
- Get to know the process by sketching a block diagram of it
  - Where does WIP accumulate?
- How much does process output fluctuate? (Cycle-to-cycle and shift-to-shift)
- Note other details about the current operating pattern

Use the same bullets in your summary!

Step ③

Machine Capacity

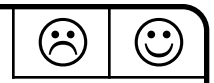
- Can the automatic equipment support the planned cycle time?
- How close are we to our current machine capacity limit?
- What is the fastest Pc/t the equipment can currently support?
- Review shift options



Step ④

Process Fluctuation

- Time 20-40 full cycles of each operator's work
- Are each operator's work steps the same from cycle to cycle?



Step ⑤

Necessary Number of Operators (if process were stable)

- Calculate number of operators

PROCESS ANALYSIS IS ITERATIVE!

What you learn in one step may influence a prior step. That's normal.

Customer Demand and Line Pace

- Customer takt
- Planned cycle time
- Number of shifts currently running

Overview of the Process

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Machine Capacity

- Can the automatic equipment support the planned cycle time?
- How close are we to our current machine capacity limit?
- What is the fastest Pc/t the equipment can currently support?
- Shift options?

☹ No ☺ Yes

Process Fluctuation

- Time 20-40 full cycles of each operator's work
- Are each operator's work steps the same from cycle to cycle?

☹ No ☺ Yes

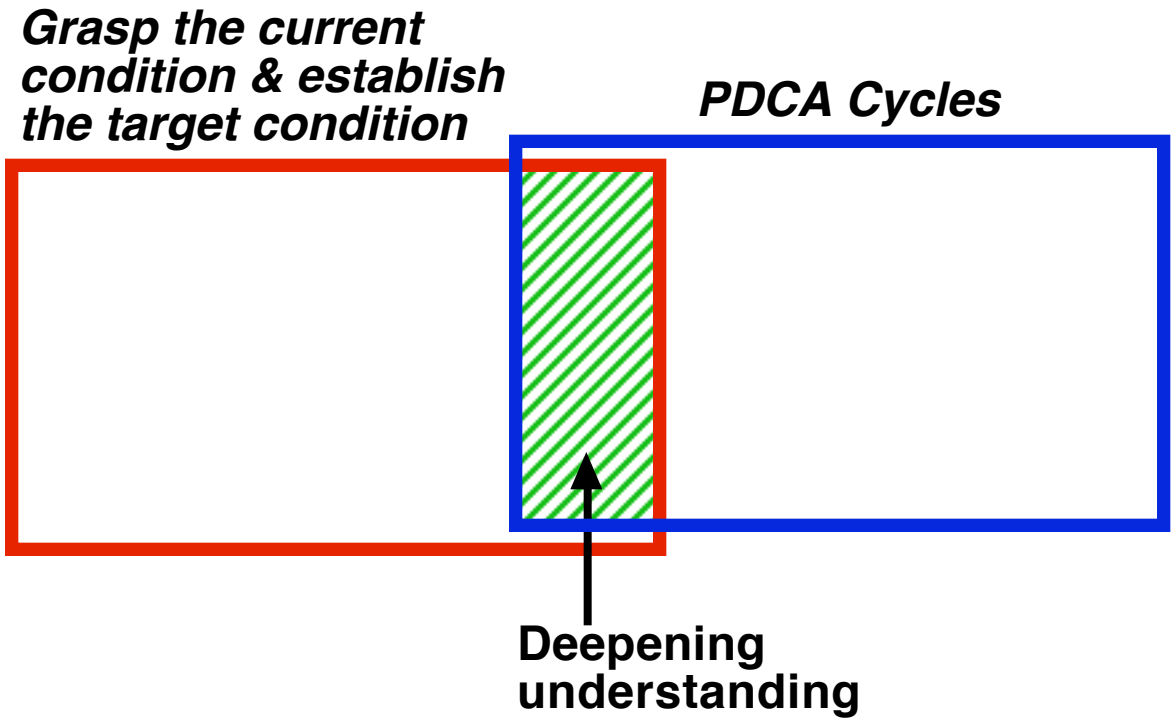
Necessary Number of Operators (if process were stable)

- Calculate number of operators

AND YOU DON'T HAVE TO GET A PERFECT UNDERSTANDING OF THE CURRENT CONDITION

Don't try to understand everything about the process before you establish a first target condition and get going with PDCA cycles toward that target condition.

As you conduct PDCA cycles you will iteratively deepen your understanding of the process. That's normal, especially with your first few target conditions.



TIPS FOR TEACHING PROCESS ANALYSIS

The terms "novice" and "proficient" refer to Dreyfus levels (see the Appendix)

- ❑ **What you're doing is trying to find the current pattern of operation, so you can establish a desired pattern of operation (target condition).**

  For novice learners, choose a process that is easier to understand and analyze. The goal here is to learn the routine of process analysis.

  Ideally the practice process will have two or more operators (handoffs), at least one automated machine and a takt time between 10 - 180 seconds. A subassembly process can be a good choice for first practicing.

- ❑ **Have a novice learner follow the process analysis steps as closely as possible. Don't jump ahead, for example, because you are trying to imprint a pattern. Competent learners, on the other hand, can start to vary the approach somewhat according to the situation.**

- ❑ **As you move through the analysis steps you will often have to go back to review or recalculate an earlier step based on what you are learning. That's normal.**

- ❑ **Chunk the practicing:**
  - **Have the learner complete one process analysis step at a time.**
  - **After each step have the learner summarize on a flipchart and present.**
  - **The learner should present information in the order shown in the steps table on page 8. Each time the learner presents have him begin at Step 1.**

- ❑ **The coach must go along during the process analysis, and should also analyze the process at the same time, not in advance. This way the coach will be in a good position to evaluate what the learner is doing.**

- ❑ **It takes practice to become proficient at grasping the current condition. At the beginning, a process analysis can easily take a couple of days. As you gain experience, you can often do it in a few hours.**

• EQUIPMENT •

- Stopwatch that measures in seconds
- Graph paper
- Pencil, eraser & ruler
- Calculator

• SHOP FLOOR COURTESY •

- Approach the process via the Team Leader or Supervisor
  - Introduce yourself
  - Explain what you are doing
  - Do not interrupt the operators while they are working
- Explain that you are watching the work, not the operator
- Show any notes you've taken
- Say *thank you* before you leave
- Hands out of pockets

Step ①

Customer Demand and Line Pace

- Customer takt
- Planned cycle time
- Number of shifts currently running

Overview of the Process

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Machine Capacity

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- Review shift options

Process Fluctuation

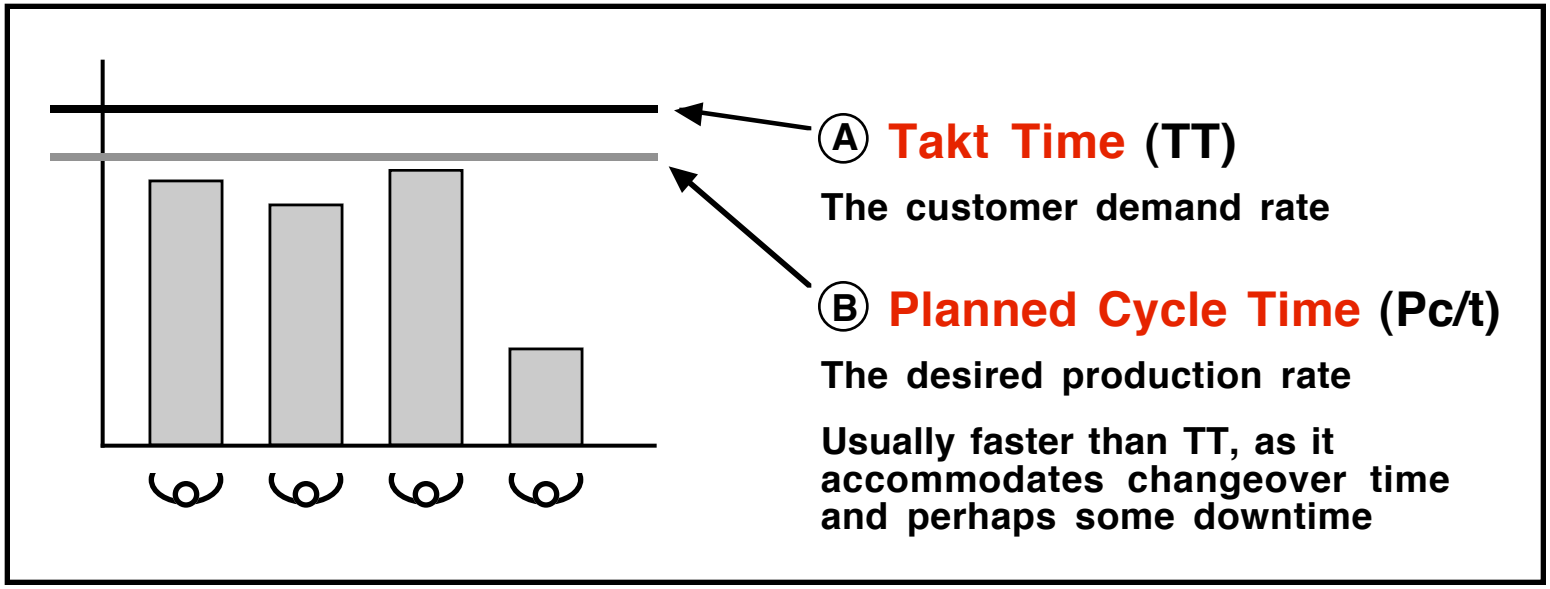
- Time 20-40 full cycles of each operator's work
- Are each operator's work steps the same from cycle to cycle?

Necessary Number of Operators (if process were stable)

- Calculate number of operators

① CUSTOMER DEMAND AND LINE PACE

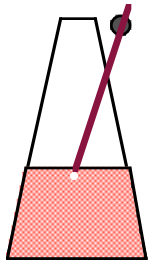
Two numbers to calculate, if possible



The Takt Time and Planned Cycle Time numbers you initially calculate may turn out to be wrong, but they are usable enough for a starting point. As you get deeper into the work process you will recognize additional factors that need to be considered for arriving at a more accurate TT & Pc/t.

Ⓐ CUSTOMER TAKT

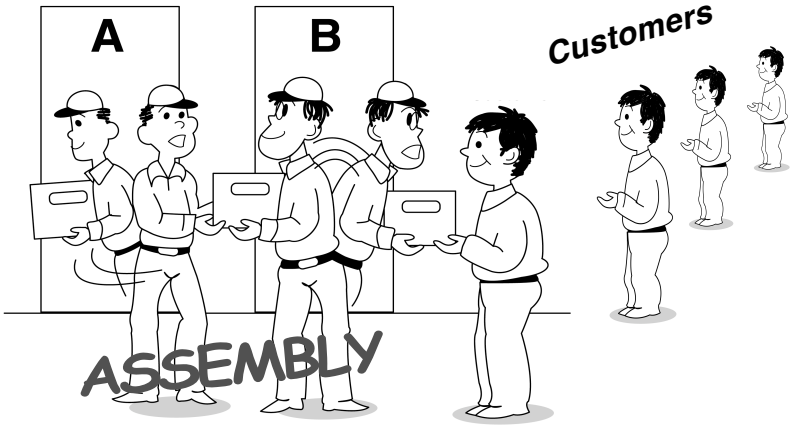
Provides a picture of the rate of customer demand on a process over a period of time (eg: 2-4 weeks)



$$\text{Takt Time} = \frac{\text{your effective operating time / shift or day}}{\text{quantity customer requires per shift or day}}$$

Example

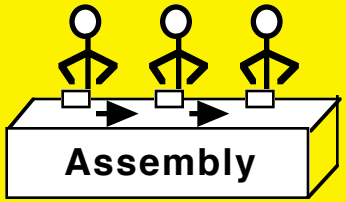
$$\frac{26{,}100 \text{ seconds available time}}{450 \text{ pieces required}} = 58 \text{ seconds takt time}$$



Note: Customer demand rates change over time. Toyota recalculates takt time every 30 days, and reviews it every 10 days.

CALCULATING CUSTOMER TAKT

Example



- 1840 pieces/day total
- 2 Shifts, 8 hours each
- 2 x 10 min break/shift
- 10 changeovers / day
- C/O Time = 15 min per c/o
- Reliability = 90%

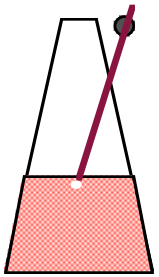
TAKT =

Your calculation for the focus process

But, can we cycle this process at takt?

Ⓑ PLANNED CYCLE TIME

The pace at which the process should run



Once you have calculated takt, subtract changeover time and other losses such as unplanned downtime and scrap & rework rates from available time to arrive at the *planned cycle time* (Pc/t). This is the actual speed at which the line should be running.

(A) Changeover time. Make your first Pc/t calculation simply using the number of changeovers currently done per day, and their current times. You can also calculate again with other numbers of changeovers and different changeover times, in order to explore what might be reasonable possibilities.

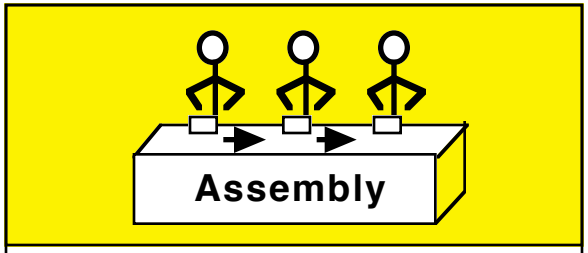
(B) Downtime. There are two kinds of downtime: Short stoppages throughout the day that add up, and rarer but catastrophic failures. In calculating Pc/t we are concerned with the small stoppages. You cannot cover for catastrophe with a faster Pc/t.

Toyota considers changeover time in Pc/t calculations but not downtime, as Toyota plants usually have a gap between shifts and use that time to make up for small stoppages.

One useful tactic is to set Pc/t at 15% faster than Takt, and strive to fit changeovers and other losses within that 15%

CALCULATING PLANNED CYCLE TIME

(see Toyota Kata page 278)



- 1840 pieces/day total
- 2 Shifts, 8 hours each
- 2 x 10 min break/shift
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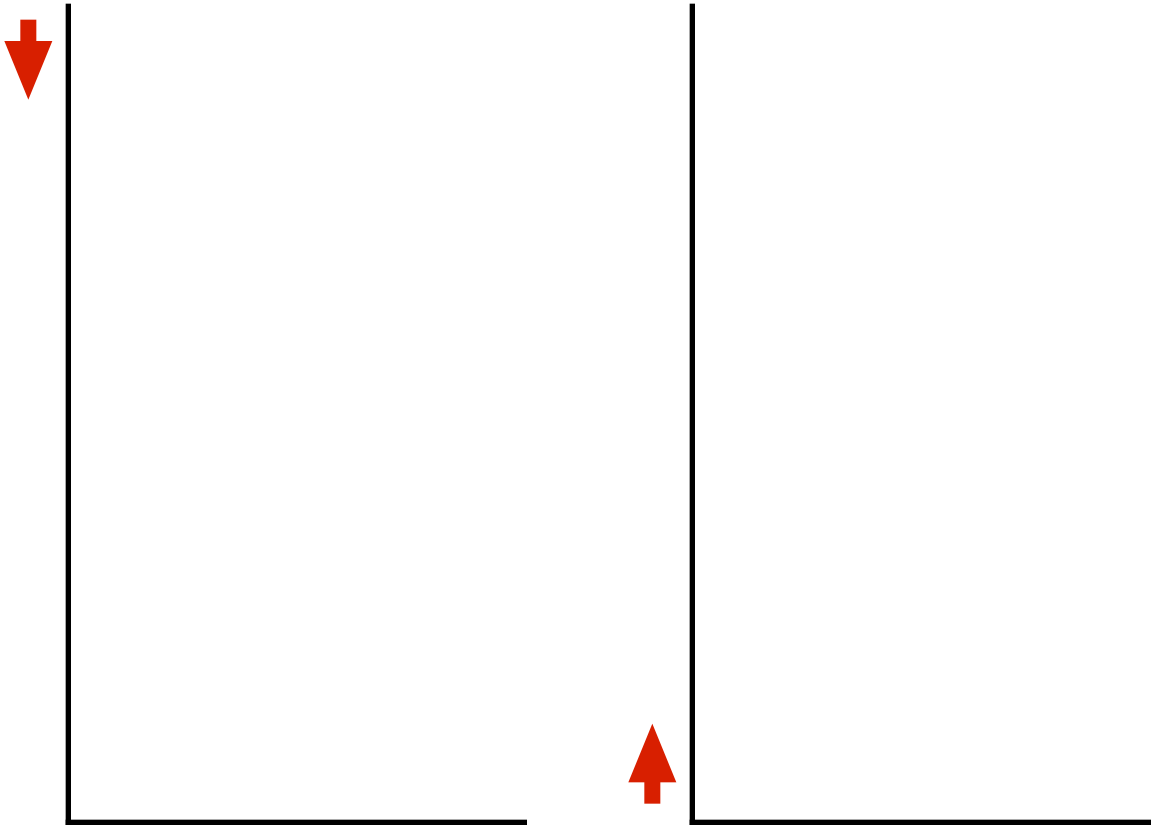
- C/O Time = 15 min
- Reliability = 90%

TAKT =

Planned C/T =



- Use a one-day interval to make Pc/t calculations.
- If you are seeking Pc/t, calculate DOWN. If you know the Pc/t, calculate UP.
- Use the optimal changeover sequence.
- Put changeover time at the top of the stack

Show each category of losses individually, rather than combining them in an "OEE" figure, so you can see what are the issues.

Your calculation for the focus process

Note: If you can't calculate takt and planned cycle times, work instead with increments of process output, called *toggles*.

For example, alter the number of operators and/or shifts to arrive at different increments (toggles) of capacity.

Customer Demand and Line Pace

- Customer takt
- Planned cycle time
- Number of shifts currently running

Step ②

Overview of the Process

- **Define the start & end points of the process**
- **Get to know the process by sketching a block diagram of it**
  - **Where does WIP accumulate?**
- **How much does process output fluctuate? (Cycle-to-cycle and shift-to-shift)**
- **Note other details about the current operating pattern**

Machine Capacity

- Can the automatic equipment support the planned cycle time?
- How close are we to our current machine capacity limit?
- What is the fastest Pc/t the equipment can currently support?
- Review shift options

Process Fluctuation

- Time 20-40 full cycles of each operator's work
- Are each operator's work steps the same from cycle to cycle?

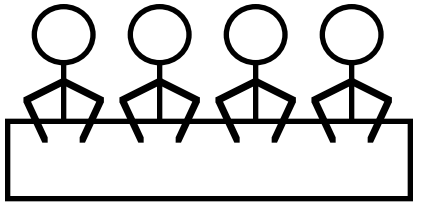
Necessary Number of Operators (if process were stable)

- Calculate number of operators

② OVERVIEW OF THE PROCESS

You may ask others about process details, but do not interview or ask others about process problems or improvement ideas.

Learn to see and understand for yourself.



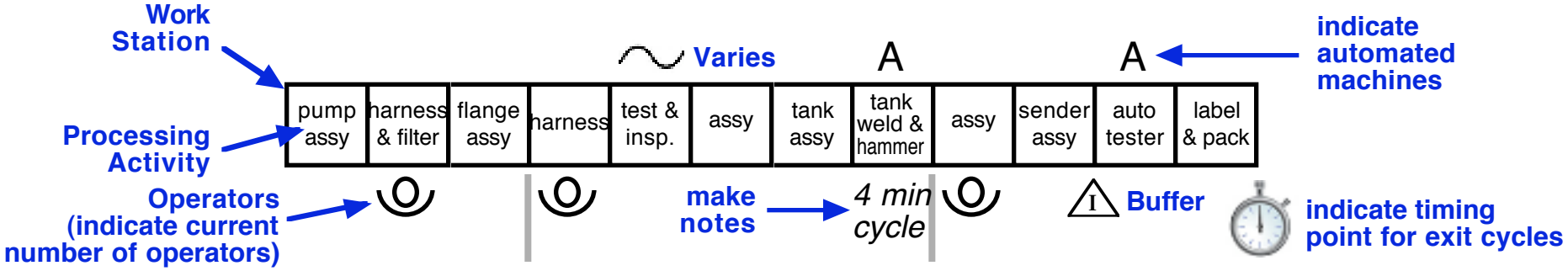
WHAT DO YOU SEE?

- **Define the start & end points of the process.**
- **Get to know the process by sketching a block diagram of it.**
  - **Where does WIP accumulate?**
- **How much does process output fluctuate?**
  - **a) Time & graph 20-30 exit cycles at the process**
  - **b) Maintain a run chart of actual output quantity per shift**
- **Note other details about the current operating pattern.**
  - **Not *good* or *bad*. Simply describe the current work pattern.**
  - **Are the operators' work steps the same each cycle?**

SKETCH A BLOCK DIAGRAM OF THE CURRENT PROCESS

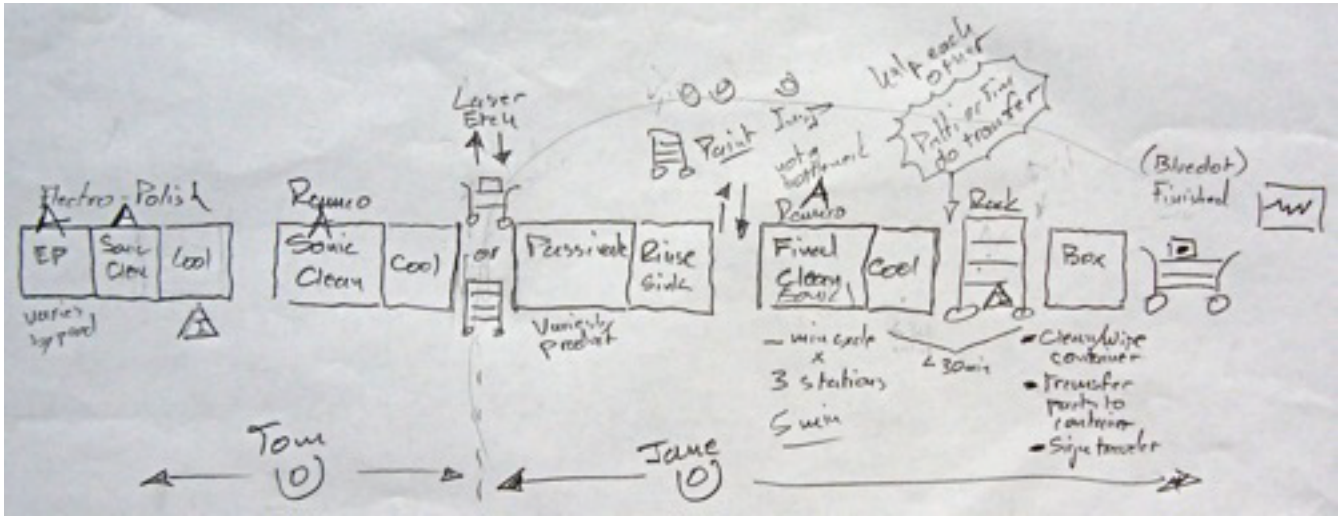
Draw a straight-line sketch of the workstations in the process. The drawing does not resemble the actual layout. It shows the work flow. Each box simply = a workstation, table, fixture or machine.

(Do not draw to scale or worry about the actual shape, ie. layout, of the line. Simply make each box the same size.)



Add detail as you observe and go through the process analysis. The drawing usually gets messy, as shown below.

Everyone Draw

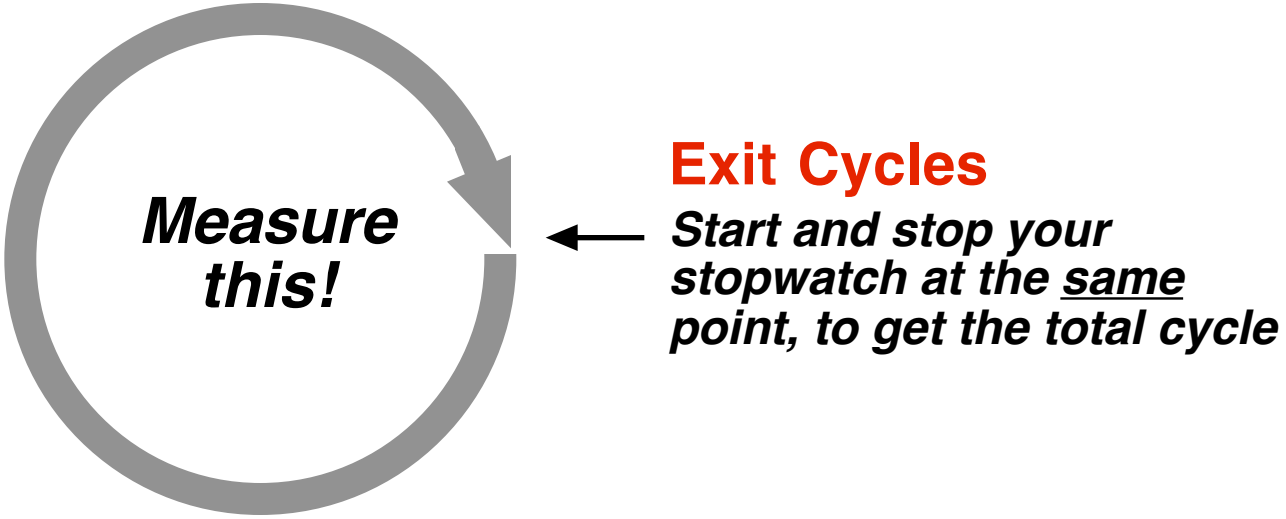


Worksheet for drawing block diagram

TIME 20-30 EXIT CYCLES

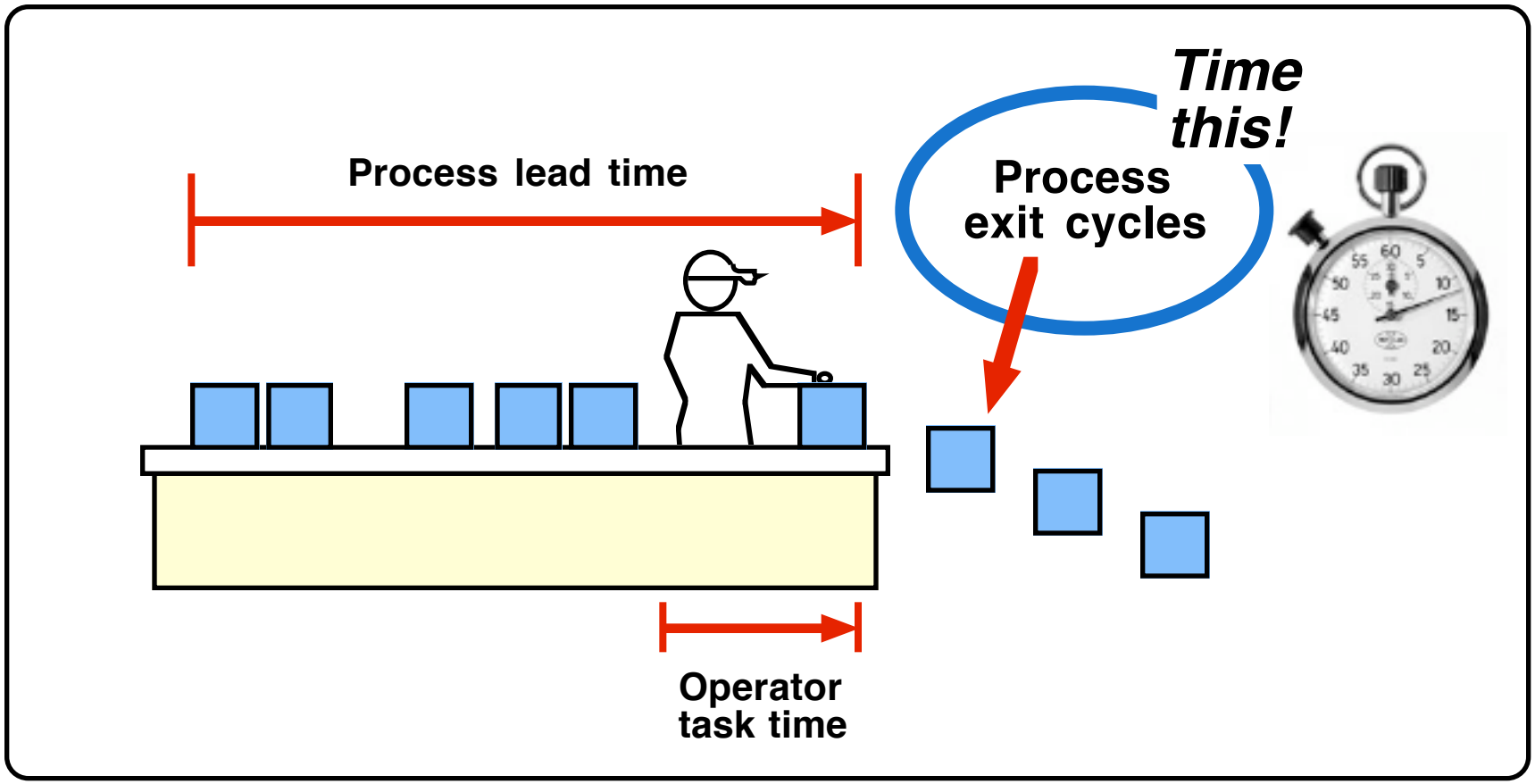
An 'exit cycle' is how often a piece is finished

- **Go to the last in-cycle workstation in the process; essentially the end of the process. If the last workstation is something like a periodic packout (*out-of-cycle work*), move upstream a step.**
- **Select a single reference point in the cycle for starting & stopping your stopwatch. Let the stopwatch run until the operator returns to this point, no matter what takes place.**
- **Record the times on the worksheet on page 25.**
- **Note any significant wait time or out-of-cycle work you observe.**



PROCESS EXIT CYCLES

This is the time between completed units coming off the end of the process. It's not how long, but *how often* a piece is finished.



At this stage of analysis you don't have to worry too much about operator task time

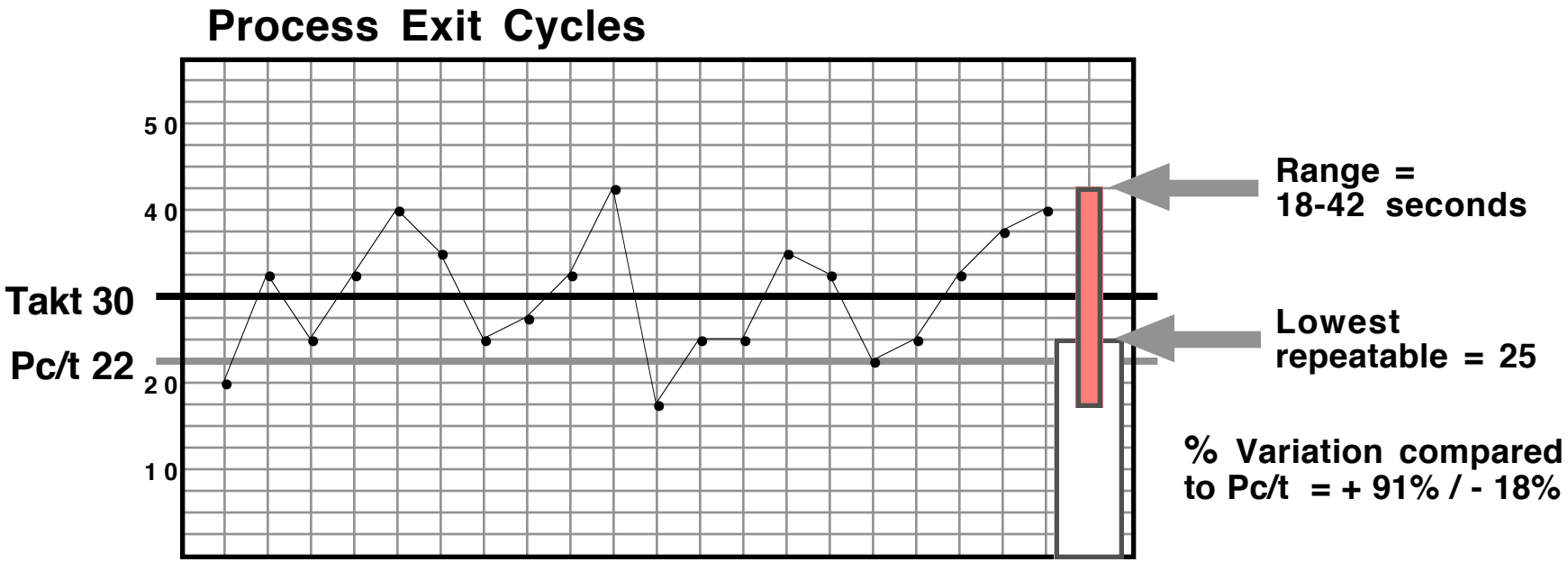
WORKSHEET FOR TIMING CYCLES

Unit of measure	

	Times	Notes
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		
13		
14		
15		
16		
17		
18		
19		
20		
21		
22		
23		
24		
25		

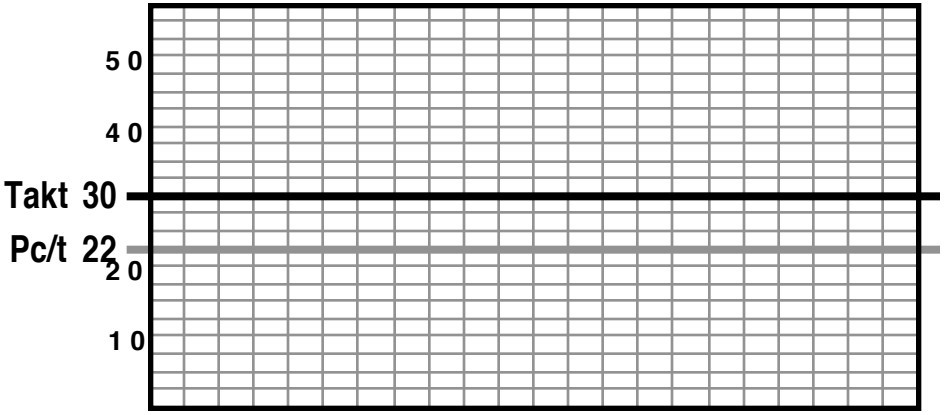
DRAW A RUN CHART OF THE DATA POINTS

Do not use averages



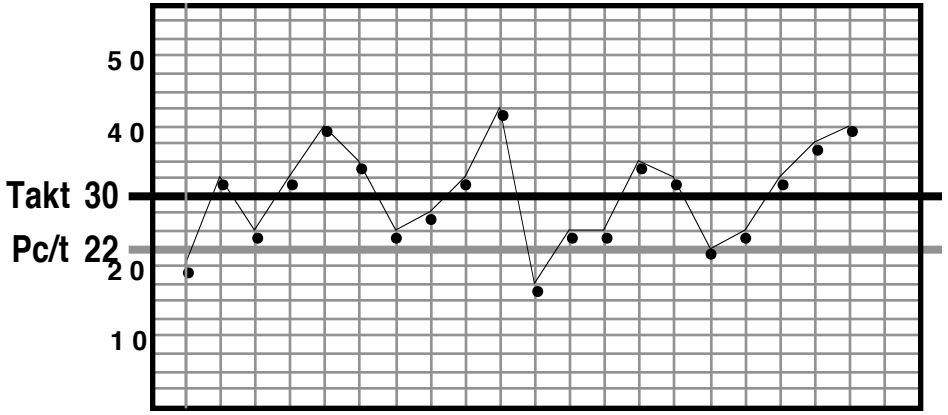
RUN CHART - Step by Step

Step 1



1) If you have a Takt Time and/or Planned Cycle Time for the process, draw horizontal lines for them on the chart

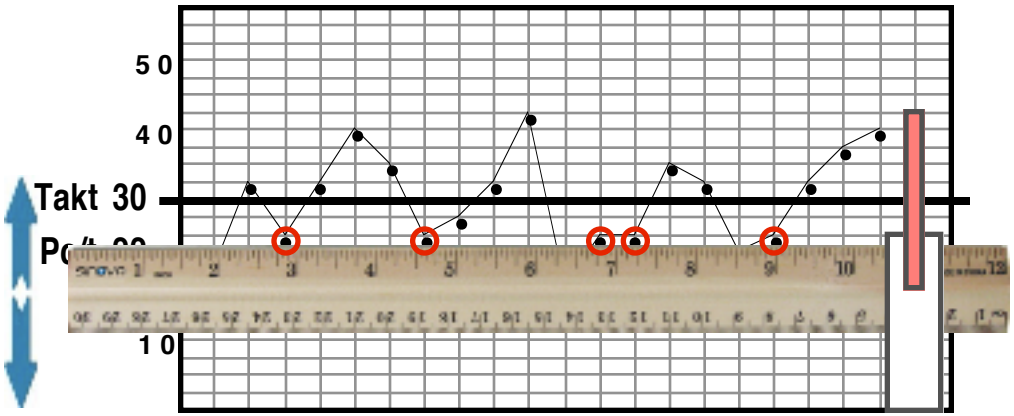
Step 2



2) Plot & connect the data points

RUN CHART - Step by Step

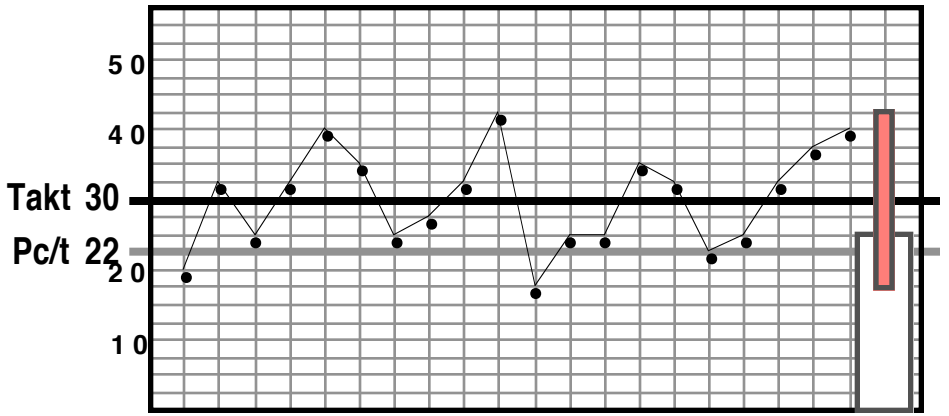
Step 3



3) Find the *lowest repeatable time* by moving a ruler up from the bottom until data points start repeating.

   Draw the bar to show the lowest repeatable time + the thinner bar to show the range.

Step 4



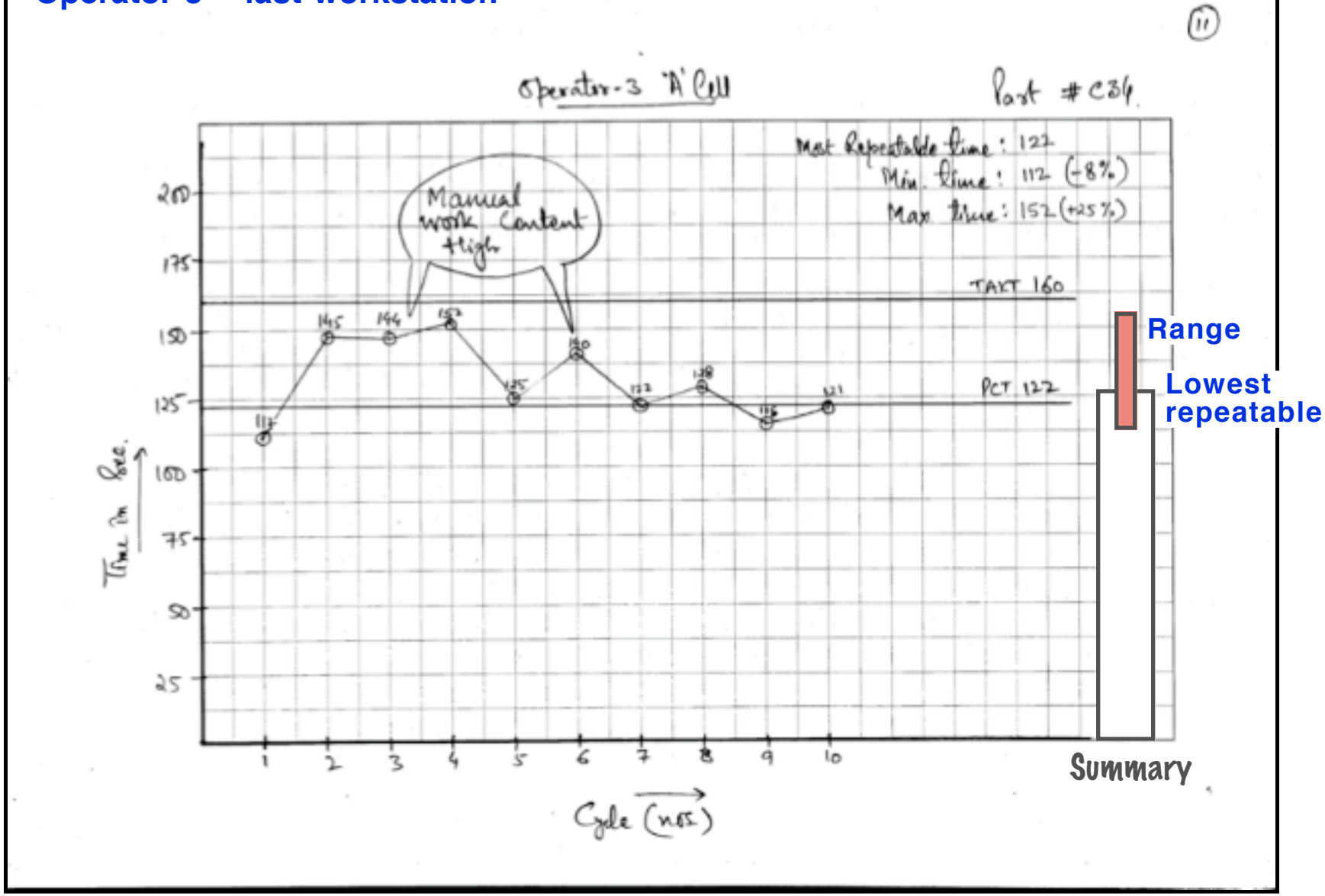
4) Calculate current +/- % variation as follows:

   %+ Var: (Highest point - Pc/t) ÷ Pc/t

   %- Var: (Lowest point - Pc/t) ÷ Pc/t

EXAMPLE RUN CHART OF EXIT CYCLES

Operator 3 = last workstation



Customer Demand and Line Pace

- Customer takt
- Planned cycle time
- Number of shifts currently running

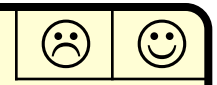
Overview of the Process

- Define the start & end points of the process
- Get to know the process by sketching a block diagram of it
  - Where does WIP accumulate?
- How much does process output fluctuate? (Cycle-to-cycle and shift-to-shift)
- Note other details about the current operating pattern

Step ③

Machine Capacity

- **Can the automatic equipment support the planned cycle time?**
- **How close are we to our current machine capacity limit?**
- **What is the fastest Pc/t the equipment can currently support?**
- **Review shift options**



Process Fluctuation

- Time 20-40 full cycles of each operator's work
- Are each operator's work steps the same from cycle to cycle?

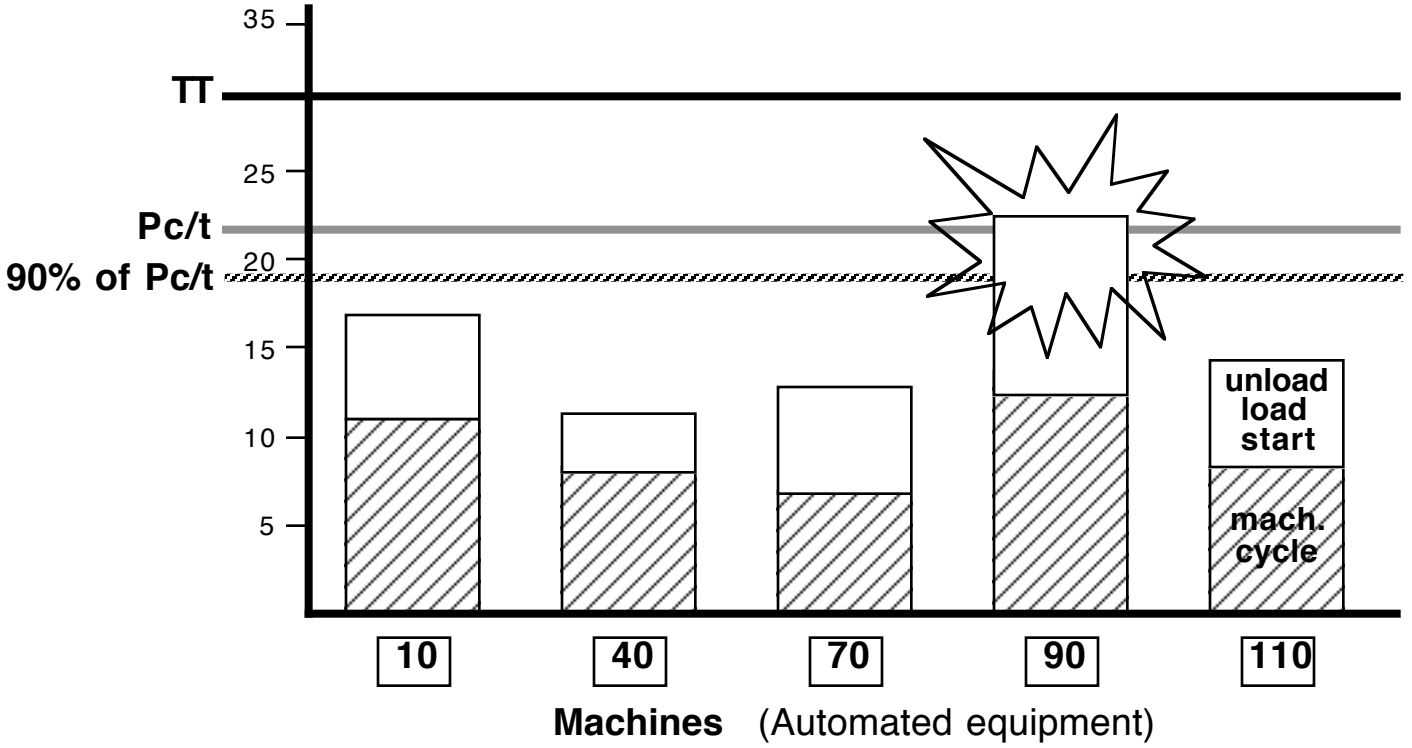
Necessary Number of Operators (if process were stable)

- Calculate number of operators

③ MACHINE CAPACITY

Machine Capacity Chart

Accuracy is important here



TOTAL MACHINE CYCLE TIME GUIDELINE

Total machine cycle should be no > 90% of Pc/t in order to make a consistent 1x1 flow possible. (In fully automated lines 95% of Pc/t may be acceptable.)

1. **If machine utilization is too high workstations become close-coupled and small cycle variations telegraph up- and downstream. This causes instability and leads to the need for buffers.**

2. **If machine utilization is too high operators will have to wait for a machine to finish at some workstations, which interrupts their work cycle and causes instability. It is OK for a machine to finish cycling and wait for the operator cycle, but an operator should never wait for a machine.**

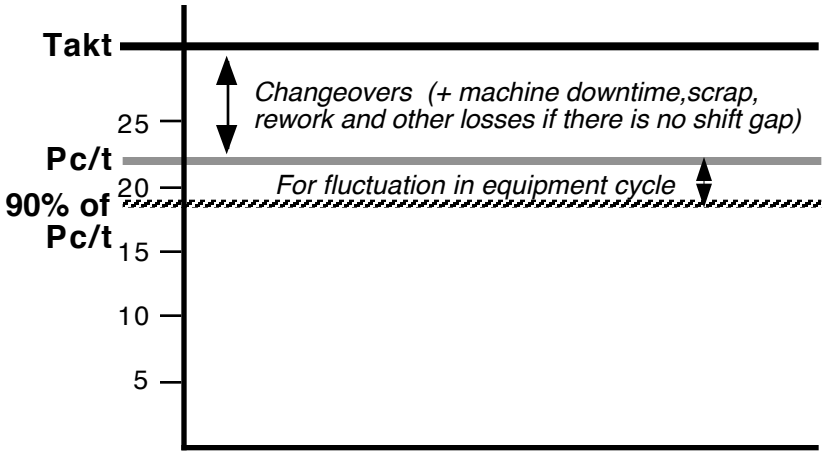
The fastest Pc/t a line is currently able to run a 1x1 flow (current capacity) is:

$$\frac{\text{Longest total machine cycle time}}{0.90}$$

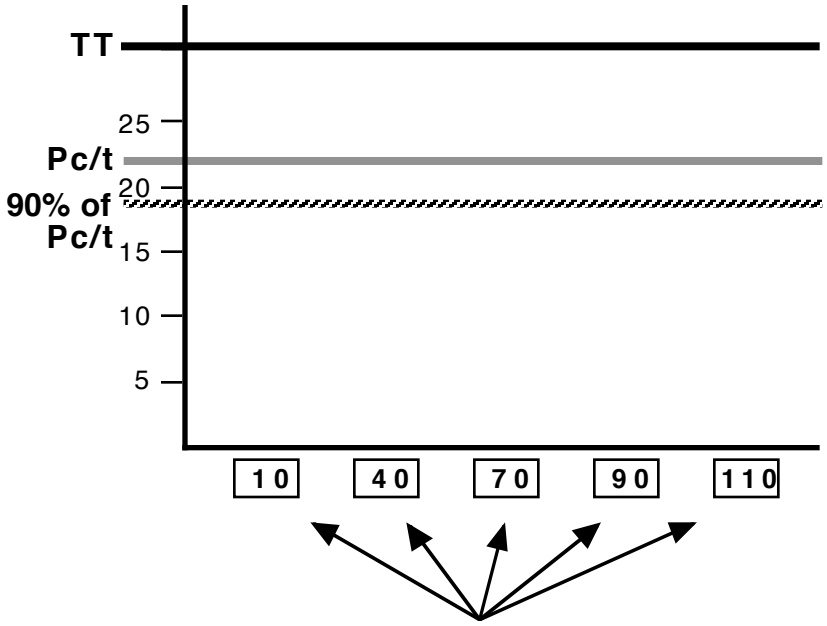
MACHINE CAPACITY CHART - Step by Step

This applies only to *automated machines*, which are able to cycle while the operator does something else.

Do not include machines that require operator guidance, such as hand tools, hand welders, arbor presses, etc. These will be included when you measure operator times.

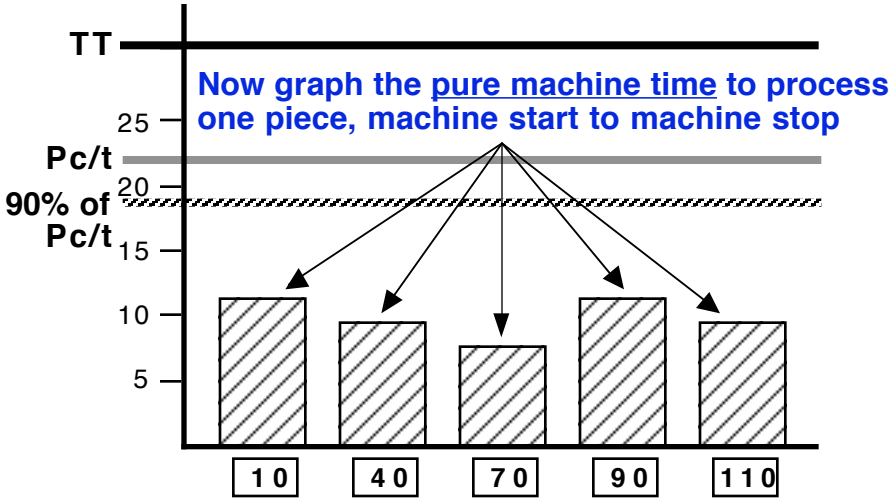


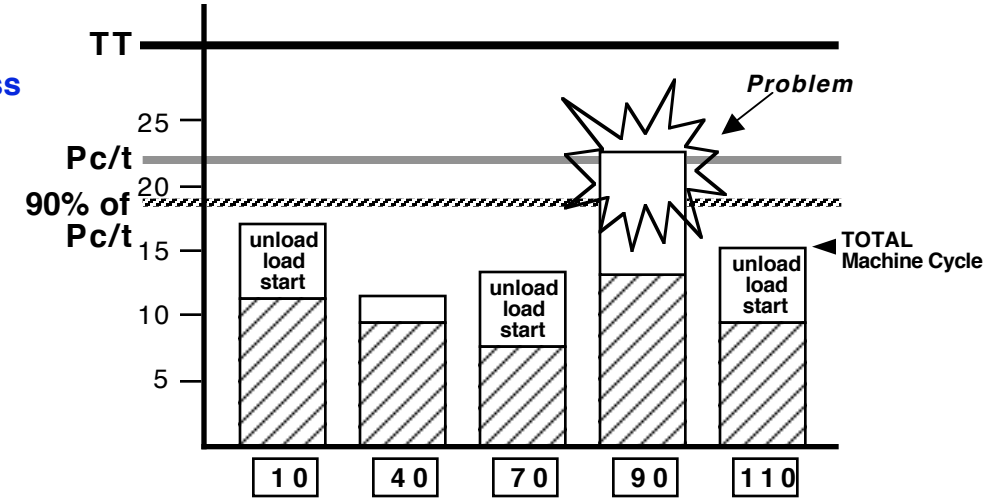
First draw in lines for the takt time, planned cycle time, and 90% of planned cycle time.



Next list the automated machines in the process (machines that can cycle without an operator).

MACHINE CAPACITY CHART - Step by Step





Pure machine time is only the time the machine takes from the cycle start to the end of the automatic cycle.

Note: You usually only need to measure a few cycles to obtain this number, since machine cycle times are often relatively consistent.

Finally, add unload and load times to the machine times. This is the time it takes to unload and load the machine, if the machine has to wait during unloading and loading.

The sum of:

Pure machine cycle + unload/load time

Equals the:

Total machine cycle time (TMc/t)

WORKSHEET FOR RECORDING MACHINE TIMES

You don't need many cycles when timing machine cycles

Machine	
1	
2	
3	
4	
5	

Machine	
1	
2	
3	
4	
5	

Machine	
1	
2	
3	
4	
5	

Machine	
1	
2	
3	
4	
5	

REVIEWING SHIFT OPTIONS

Number of Shifts	Example	Your calculation for the focus process
1	15 / 11 / 10	
2	30 / 22 / 19	
3	45 / 33 / 28	

One shift currently not possible here, because the machine cycle times are longer than this

TT / Pc/t / Max Mc/t

Max Mc/t = Pc/t x 90% →

Longest possible total machine cycle time for a consistent 1x1 flow.

Customer Demand and Line Pace

- Customer takt
- Planned cycle time
- Number of shifts currently running

Overview of the Process

- Define the start & end points of the process
- Get to know the process by sketching a block diagram of it
  - Where does WIP accumulate?
- How much does process output fluctuate? (Cycle-to-cycle and shift-to-shift)
- Note other details about the current operating pattern

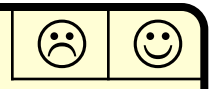
Machine Capacity

- Can the automatic equipment support the planned cycle time?
- How close are we to our current machine capacity limit?
- What is the fastest Pc/t the equipment can currently support?
- Review shift options

Step ④

Process Fluctuation

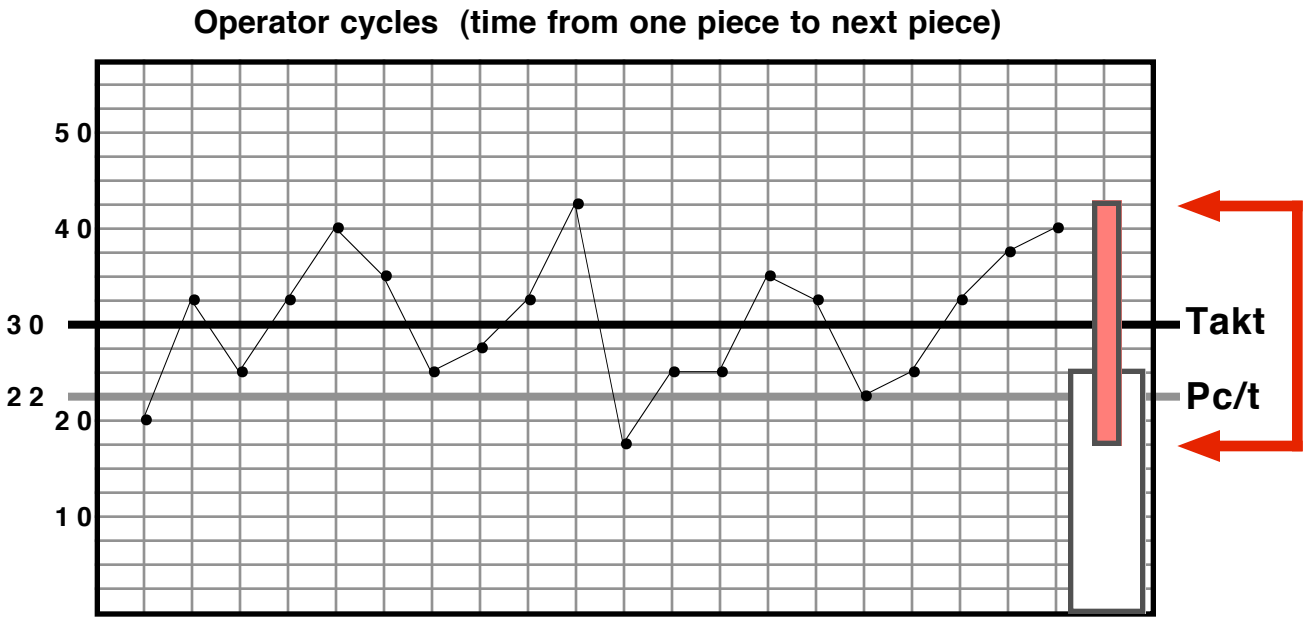
- **Time 20-40 full cycles of each operator's work**
- **Are each operator's work steps the same from cycle to cycle?**



Necessary Number of Operators (if process were stable)

- Calculate number of operators

④ PROCESS FLUCTUATION



Too much fluctuation

No improvement. Causes of problems always changing.

Inability to meet customer requirement without overtime

No rhythm. Sometimes rush, sometimes wait. Standardized work not possible.

Difficult to develop skills. Always changing.

Inconsistent quality.

If the process is not cycling within desired limits or unable to meet customer quality or quantity requirements, address this before trying to make other improvements.

If there is too much fluctuation, a continuous improvement process cannot be developed.

TIME 20-30 CYCLES FOR EACH OPERATOR

- **Do not disturb or interrupt the operators.**
- **Time full cycles. Select a single reference point in the cycle for starting and stopping your stopwatch. Let the stopwatch run until the operator returns to this point in the cycle.**

  --> Make notes of significant wait time & out-of-cycle work (OOC).
- **Do not use averages. Averages conceal instability.**
- **Draw a run chart of the full cycles for each operator as shown.**
- **Calculate % variation**
- **Graph lowest repeatable time and range for each operator.**

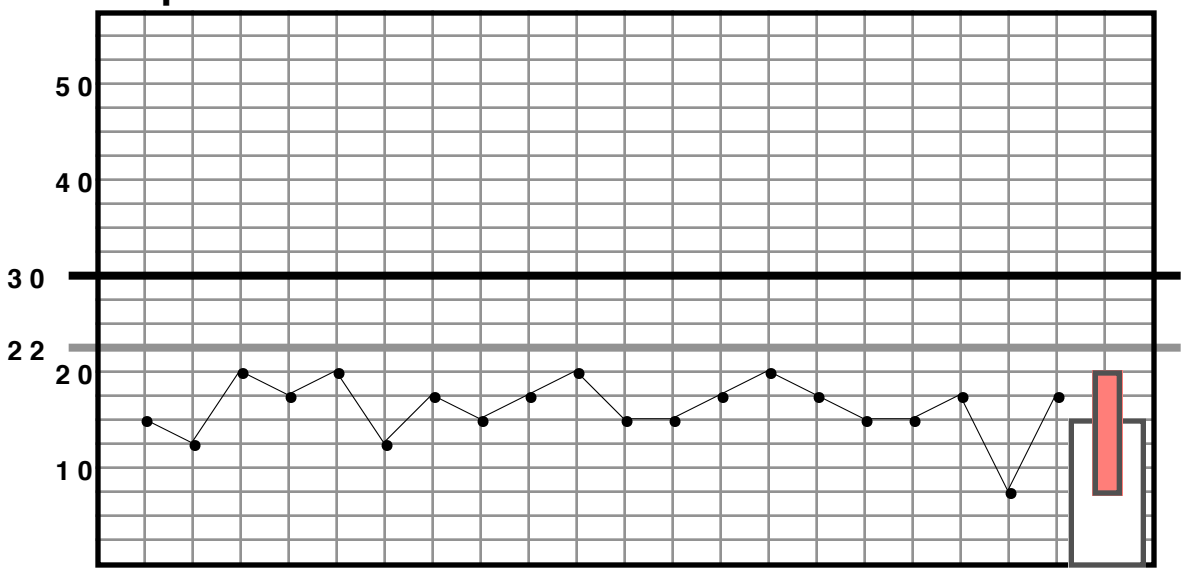
Are each operator's work steps the same from cycle to cycle?

You are now getting two pieces of information:

- **Variation in total operator cycles**
- **Lowest repeatable time = *estimated* operator time for each operator's set of tasks (be sure to subtract significant wait time).**

EXAMPLE

Operator 1



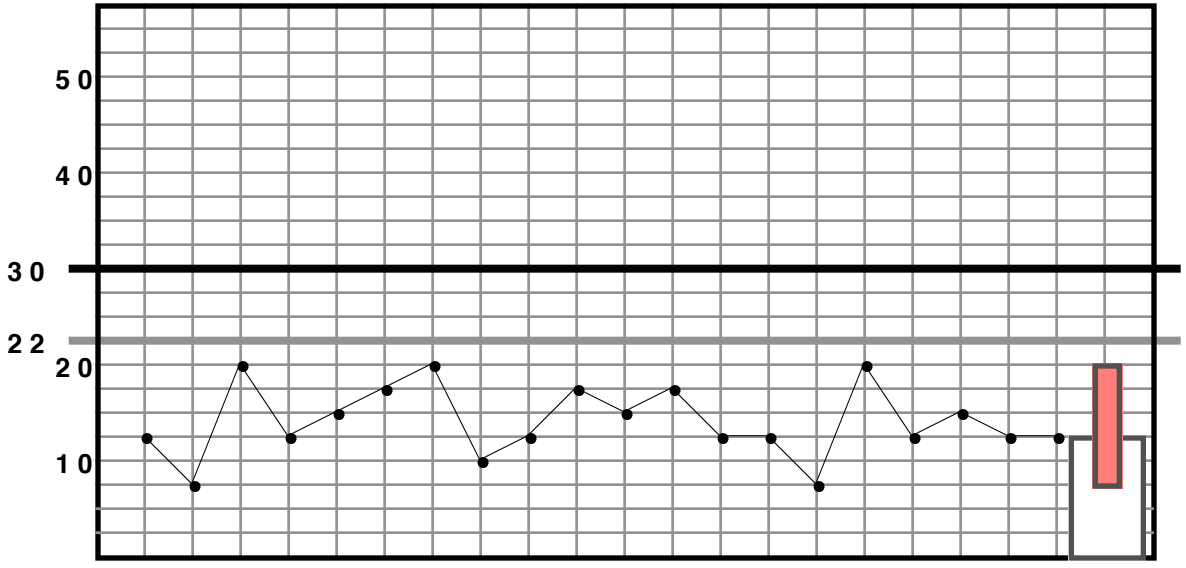
Range = 8-20 seconds

% Variation compared to Pc/t = + 0% / - 63%

Total variation = +/- 63%

Lowest repeatable = 15

Operator 2



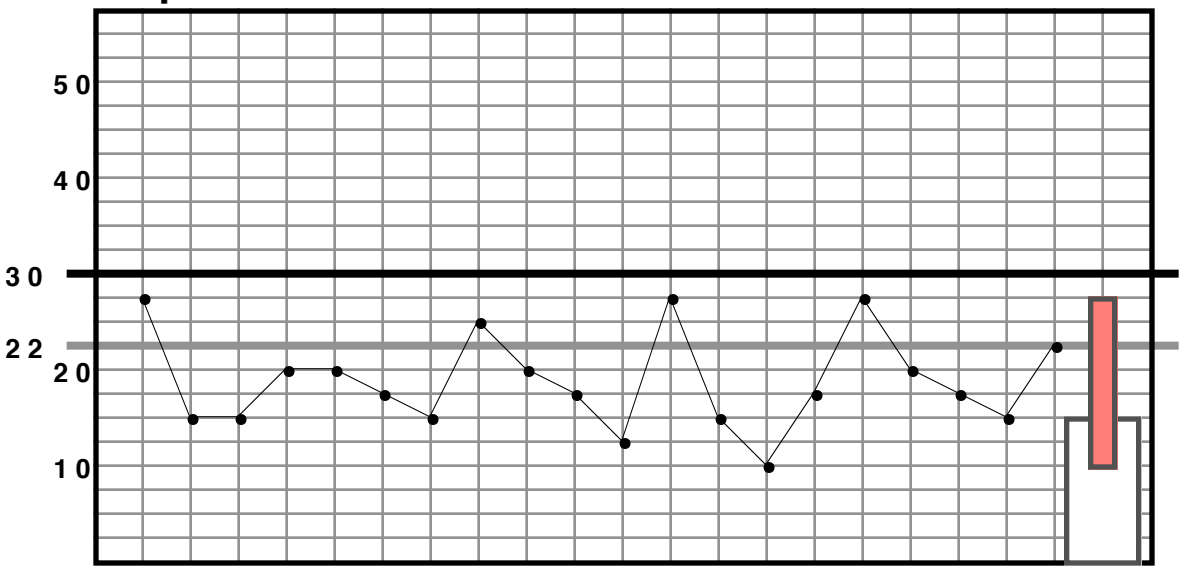
Range = 8-20 seconds

% Variation compared to Pc/t = + 0% / - 63%

Total variation = +/- 63%

Lowest repeatable = 13

Operator 3



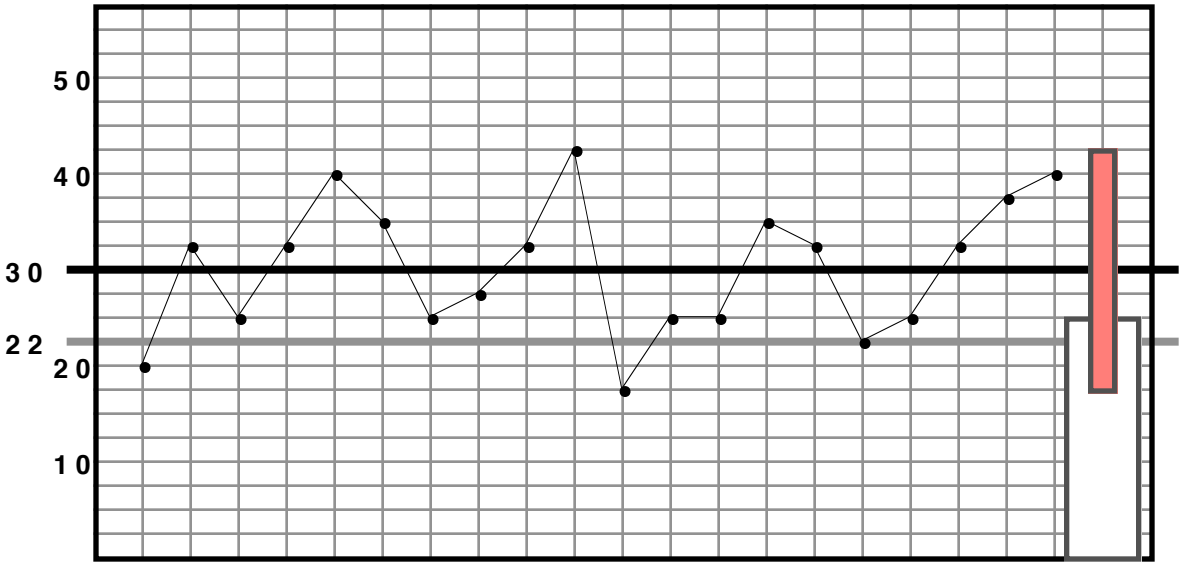
Range = 10-28 seconds

% Variation compared to Pc/t = + 27% / - 55%

Total variation = +/- 82%

Lowest repeatable = 16

Operator 4 (process exit cycles)



Range = 18-42 seconds

% Variation compared to Pc/t = + 91% / - 18%

Total variation = +/- 109%

Lowest repeatable = 25

Customer Demand and Line Pace

- Customer takt
- Planned cycle time
- Number of shifts currently running

Overview of the Process

- Define the start & end points of the process
- Get to know the process by sketching a block diagram of it
  - Where does WIP accumulate?
- How much does process output fluctuate? (Cycle-to-cycle and shift-to-shift)
- Note other details about the current operating pattern

Machine Capacity

- Can the automatic equipment support the planned cycle time?
- How close are we to our current machine capacity limit?
- What is the fastest Pc/t the equipment can currently support?
- Review shift options

Process Fluctuation

- Time 20-40 full cycles of each operator's work
- Are each operator's work steps the same from cycle to cycle?

Step ⑤

Necessary Number of Operators (if process were stable)

- **Calculate number of operators**

⑤ ESTIMATE NECESSARY NUMBER OF OPERATORS
If the process were stable

Operator (or task)	Lowest repeatable operator cycle (or task time)	Notes
1	15 seconds	
2	13 seconds	
3	16 seconds	
4	25 seconds	
	Σ = 69 sec	

Estimated total in-cycle operator work time to process one piece

$$\text{Necessary number of operators} = \frac{\text{Total operator time to process 1 piece}}{\text{Planned cycle time}}$$

This is not about reducing the number of operators, but determining the correct number of operators... if the process were stable and there is no out-of-cycle work.

$$\frac{69 \text{ sec. total cycle time}}{22 \text{ sec. Pc/t}} = 3.2 \text{ operators}$$

Note: If there is a consistent wait time in each cycle, subtract that wait time

Your calculation for the focus process

Operator (or task)	Lowest repeatable operator cycle (or task time)	Notes

WHY IS IT OK TO USE LOWEST REPEATABLE TIME?

Because these times & the number-of-operators calculation are just a starting point for PDCA!

This approach is acceptable if you plan to work with rapid PDCA cycles (as with the improvement kata) and will do so daily. PDCA starts early.

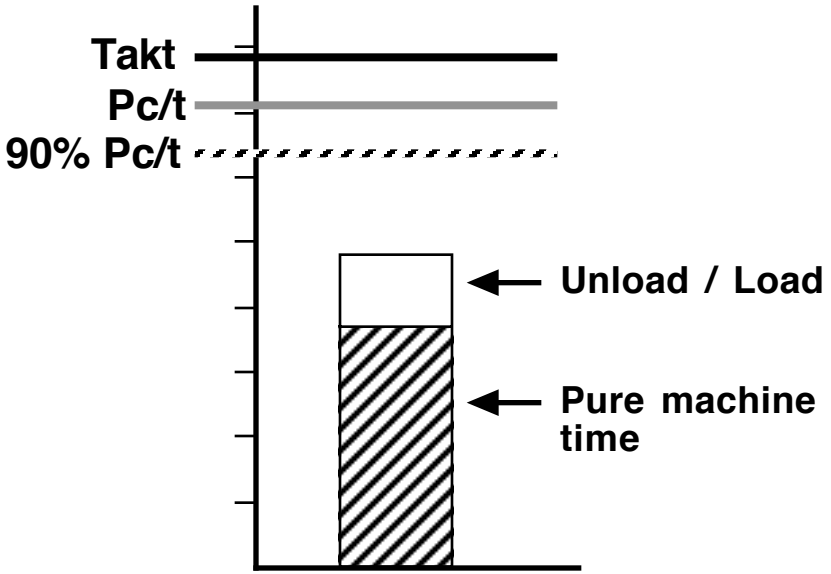
Then the initial times don't need to be exact, because you will notice analysis errors and other problems along the way, and adjust as you move forward.

You're not setting a standard at this point. You're getting current-condition information & data to establish your first target condition. As you move toward that first target condition:

- **You'll learn more about the process, which can be incorporated into the next target condition**
- **You can get more detailed times for the work elements if necessary**

NOTE THAT OPERATOR TIME AND MACHINE TIME ARE TWO DIFFERENT THINGS!

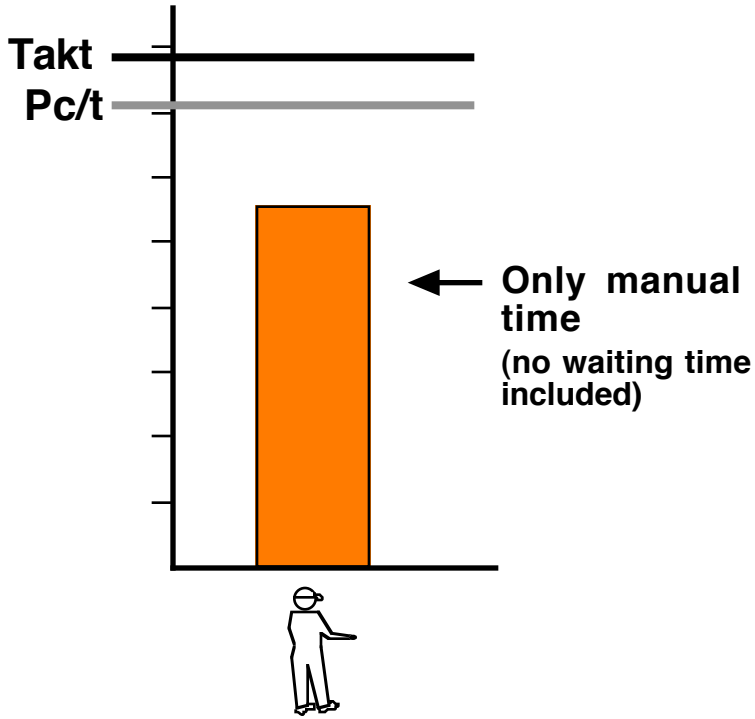
Machine Time



Purpose: To check if machines can satisfy the Pc/t

Operator Time

We're now looking at this

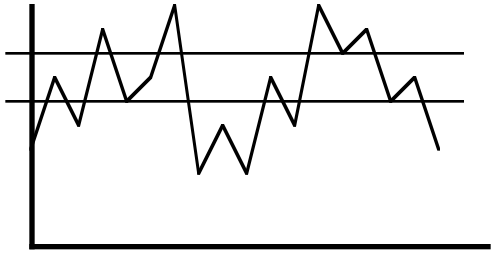


Purpose: To calculate necessary number of operators

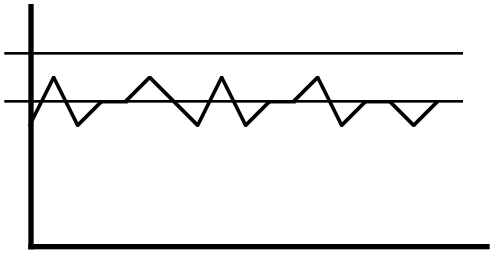
- ☞ *Do not confuse these two.*
- ☞ *Separate your analysis of man and machine!*

WHY IT IS IMPORTANT TO OPERATE A PROCESS WITH THE CORRECT NUMBER OF OPERATORS

- ⇨ **Problems become apparent instead of remaining hidden.**
- ⇨ **Overstaffing leads to greater inconsistency in the process.**
  Having too many operators in the line leads to increased variability as people jump around, help one another, work ahead to build batches, and work differently from cycle to cycle. Having too many operators creates instability, which makes understanding the causes of problems more more difficult.
- ⇨ **Instead of adding extra operators, work on the problems.**



Operator cycles
Underutilized operator



Operator cycles
Operator fully loaded to Pc/t

Note: If you operate the line with the correct number of operators you will need to develop a way to respond quickly from outside the line when problems occur.

SUMMARIZING THE CURRENT CONDITION

Customer Demand and Line Pace

- Customer takt
- Planned cycle time
- Number of shifts currently running

Use these bullets in your summary

Overview of the Process

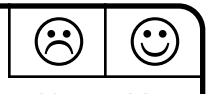
- Define the start & end points of the process
- Get to know the process by sketching a block diagram of it
  - Where does WIP accumulate?
- How much does process output fluctuate? (Cycle-to-cycle and shift-to-shift)
- Note other details about the current operating pattern

Machine Capacity

- Can the automatic equipment support the planned cycle time?
- How close are we to our current machine capacity limit?
- What is the fastest Pc/t the equipment can currently support?
- Shift options?

Process Fluctuation

- Time 20-40 full cycles of each operator's work
- Are each operator's work steps the same from cycle to cycle?



Necessary Number of Operators (if process were stable)

- Calculate number of operators

-- Example 1: A Standard Form (left side) --

Process:	Challenge:	TC date:

Current Condition

Takt time:

Pc/t:

# of Shifts:

Overtime (how much):

Output / Shift (run chart):

# of Operators:

Where 1x1, where WIP:

Describe the process steps, sequence, times:

Exit cycle fluctuation %:

Other observations about the current pattern:

-- Example 2 --

All-in-one summary for a manual line

Customer Demand / Line Pace

- Takt Time = 30 seconds
- PC/T = 22 seconds
- Gap = 27%
- Running 2 Shifts + overtime
- 10 changeovers per day

Overview

- Output cycles vary +/- 109%
- Operator work steps vary
- 4 operators
- WIP (as shown)
- Line does not meet Pc/t and must run overtime

Machine Capacity

- Op 90 cannot meet Pc/t (see chart)

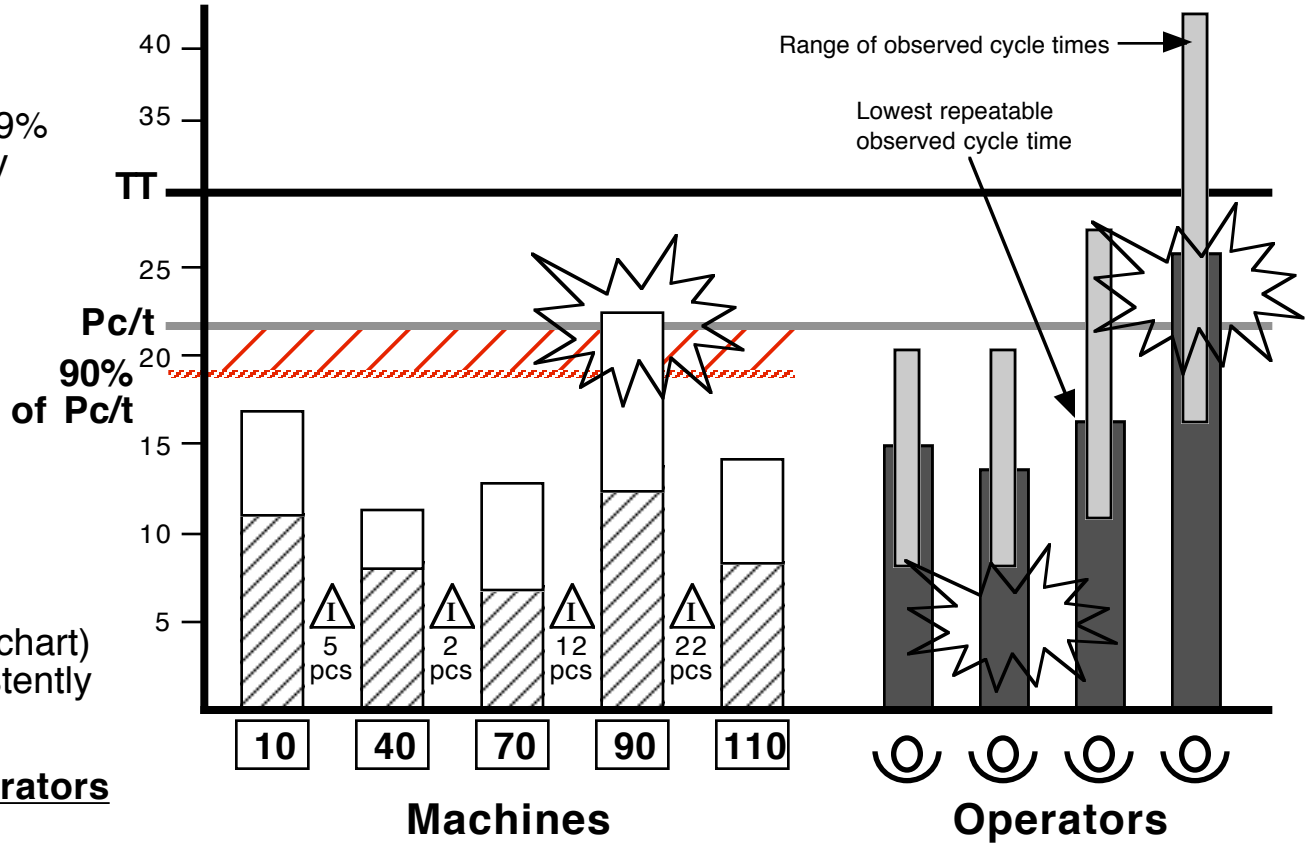
Process Stability

- Operator cycles fluctuate up to -30% / + 90% (see chart)
- Operator 4 cannot consistently meet Pc/t

Necessary Number of Operators

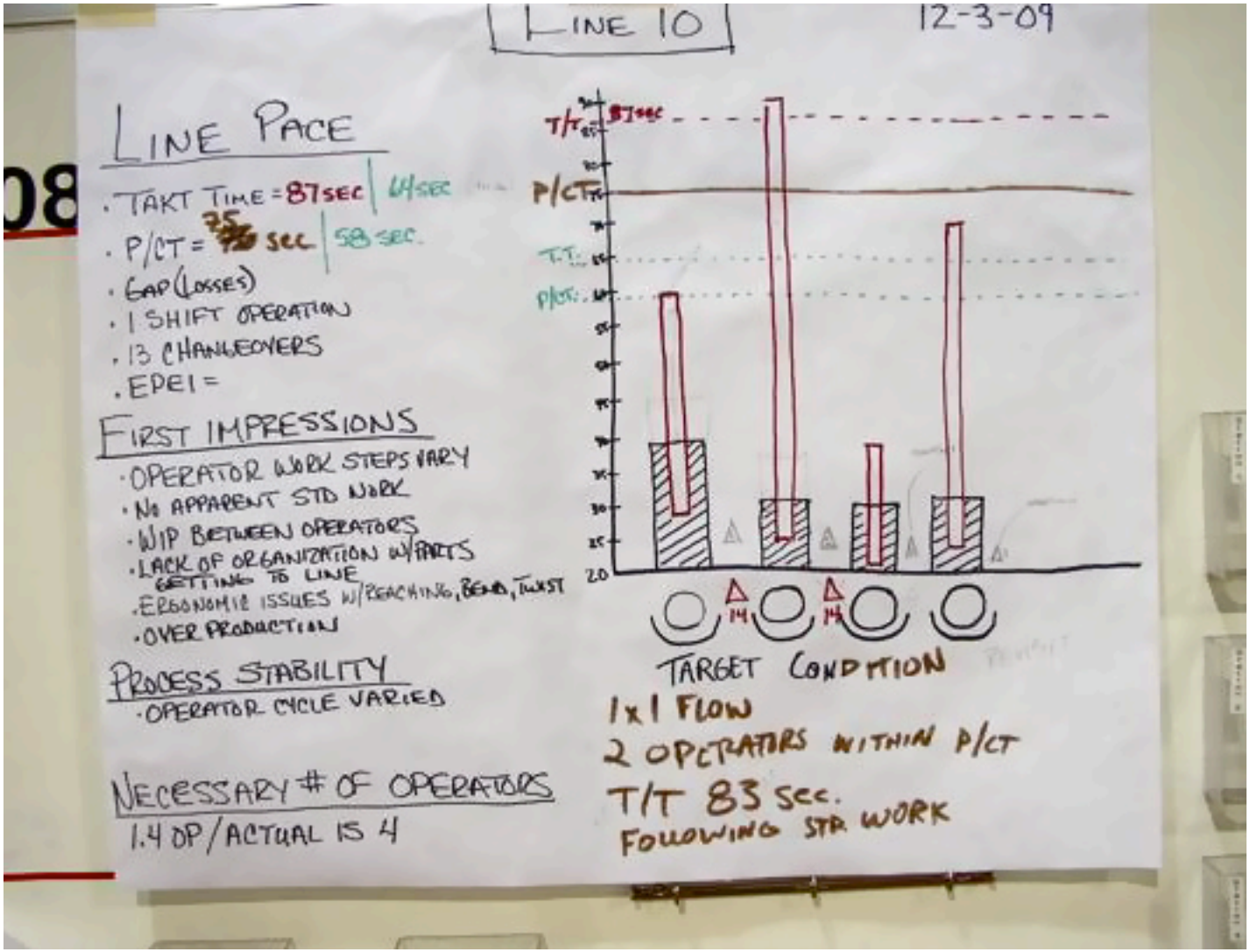
- 3.2 operators / 4 actual
- Operators 1, 2 & 3 are underutilized (see chart)

CURRENT CONDITION	
Process	
Date	



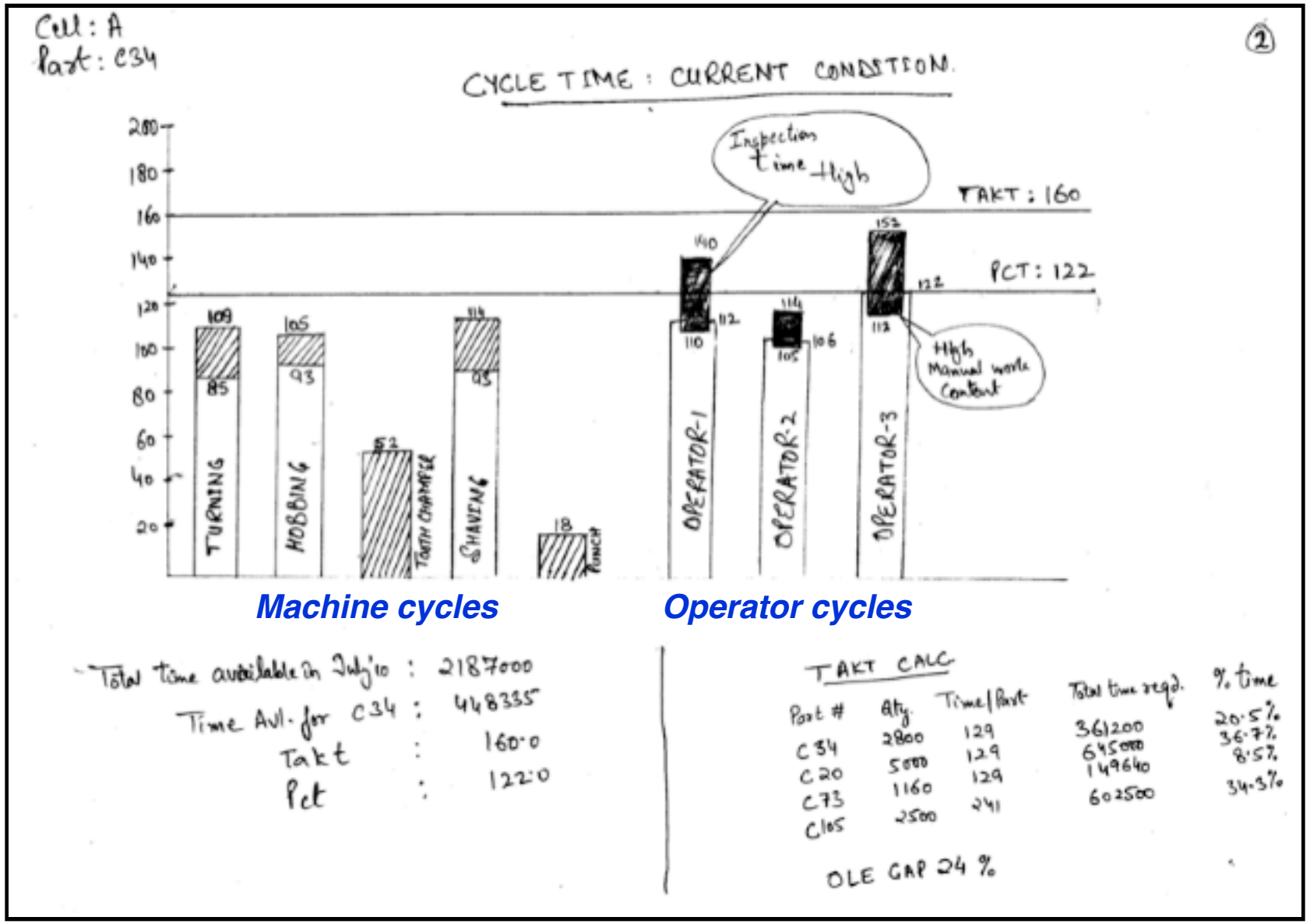
-- Example 3 --

All-in-one summary for a manual line



-- Example 4 --

Cycle time summary



Comments

(12)

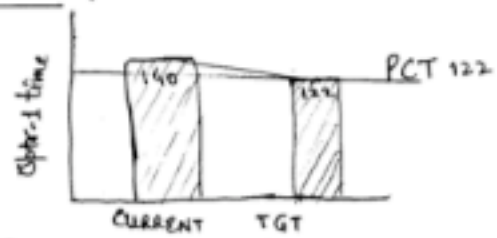
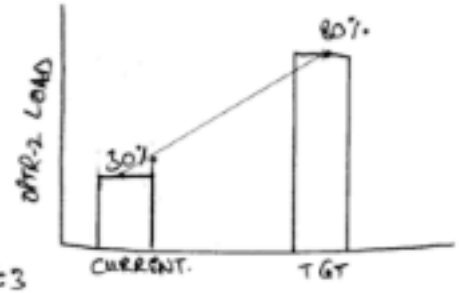
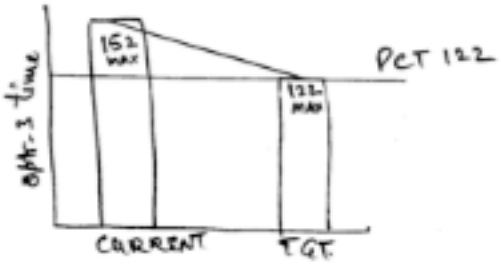
'A' Cell Kata Excercise :- FIRST IMPRESSION Part #C34

1. INSPECTION TIME AT TURNING MACHINE IS MORE THAN PCT (18 Secs.)
2. OPERATOR-2 HAS 70 % WAITING TIME/IDLE TIME.
3. OPERATOR-3 TIME IS HIGHER THAN PCT (25%).
4. OPERATOR-3 WORK CONTENT (MANUAL) IS MORE DUE TO 3 M/Cs RUNNING (i.e. Tooth Chamfering, Shaving & Punching) COUPLED WITH VISUAL INSPECTION OF EACH PART (100%).

First target condition

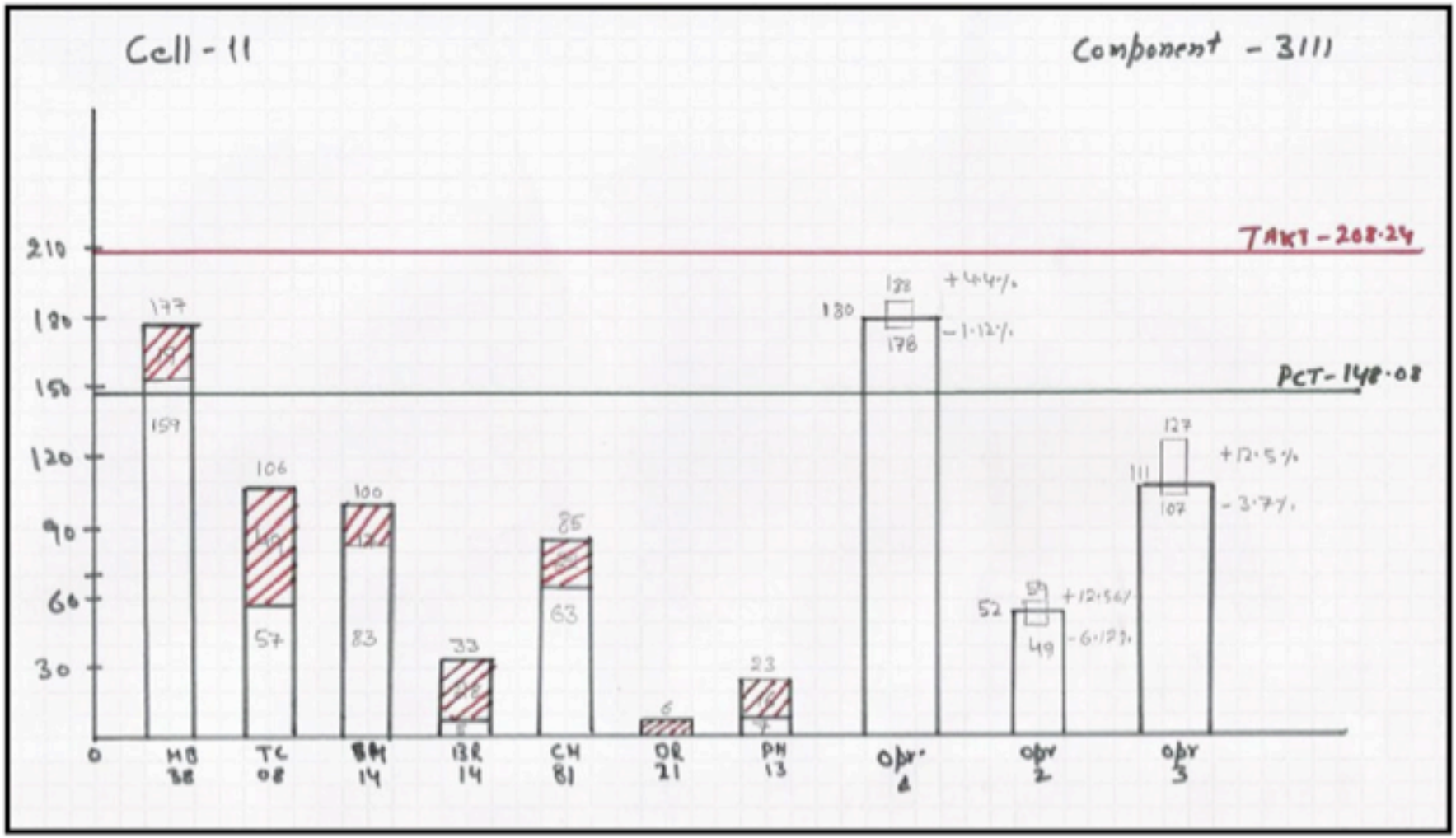
'A' Cell
Part #C34

(13)

CURRENT CONDITION	TARGET CONDITION
1. OPR-1 TIME IS MORE THAN PCT BY 18 SECONDS.	1. TARGET: 1 
2. OPERTOR-2 HAS BEEN LOADED 30% (70% WAITING TIME)	2. TARGET: 2 
3. OPTR-3. CT IS HIGHER THAN PCT BY (30 SECS.)	3. TARGET: 3 

-- Example 5 --

Cycle time summary



Machine cycles ***Operator cycles***

Remaining data

Line pace.

1. customer schedule - 11500/month
2. No of Working days - 25
3. TAKT TIME - 208.24 Sec.
4. PCT - 148.08 sec.
5. Gap - 13%.
6. operation - 3 shifts
7. Change over - None

Necessary No of opr.s.

opr. 1 CT = 180

opr. 2 CT = 52

opr. 3 CT = 111

No of operators

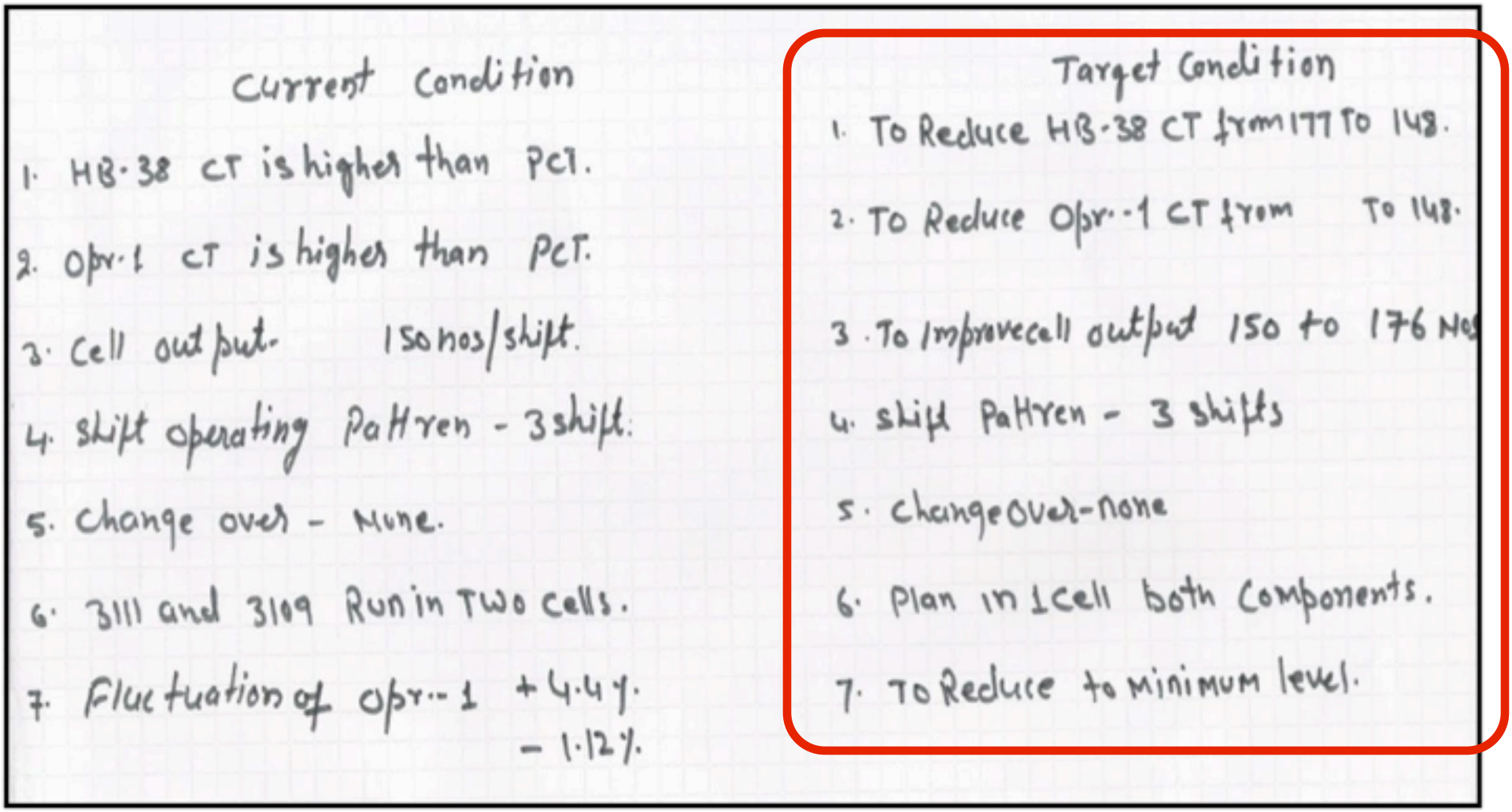
$$\frac{180+52+111}{148}$$

$$= 2.31$$

Fisst Impression

1. HB-38 and opr. 1 CT is higher than PCT.
2. opr. 2 and opr. 3 CT is under PCT.
3. Fifo System not Followed.
4. Process Layout zig zag.
5. DR-17 (Drill M/c) not in use.
6. Process Trouble is the highest loss of the cell.

First target condition



Current Condition

1. HB·38 CT is higher than PCT.
2. Opr·1 CT is higher than PCT.
3. Cell output- 150 nos/shift.
4. Shift operating Pattren - 3 shift.
5. Change over - None.
6. 3111 and 3109 Run in Two cells.
7. Fluctuation of opr·· 1 +4.4%. -1.12%.

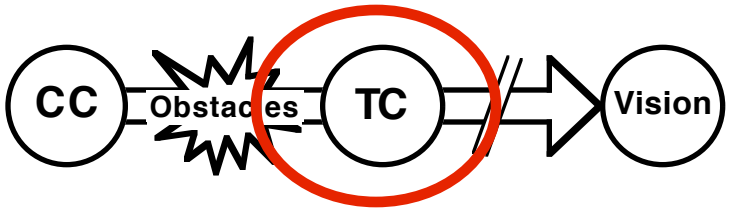
Target Condition

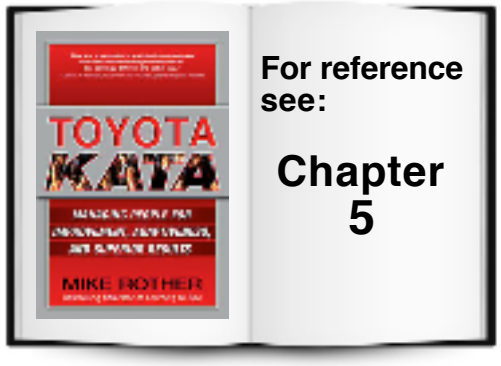
1. To Reduce HB·38 CT from 177 To 148.
2. To Reduce Opr··1 CT from To 148.
3. To Improve cell output 150 to 176 Nos
4. Shift Pattren - 3 shifts
5. Change Over-none
6. Plan in 1 Cell both Components.
7. To Reduce to minimum level.

This target condition is not yet ideal. Words like "*reduce*," "*improve*," and "*minimum level*" do not belong in a target condition. The target condition should describe and specify a status at a point in time.

3. ESTABLISH THE TARGET CONDITION

Practice this Routine

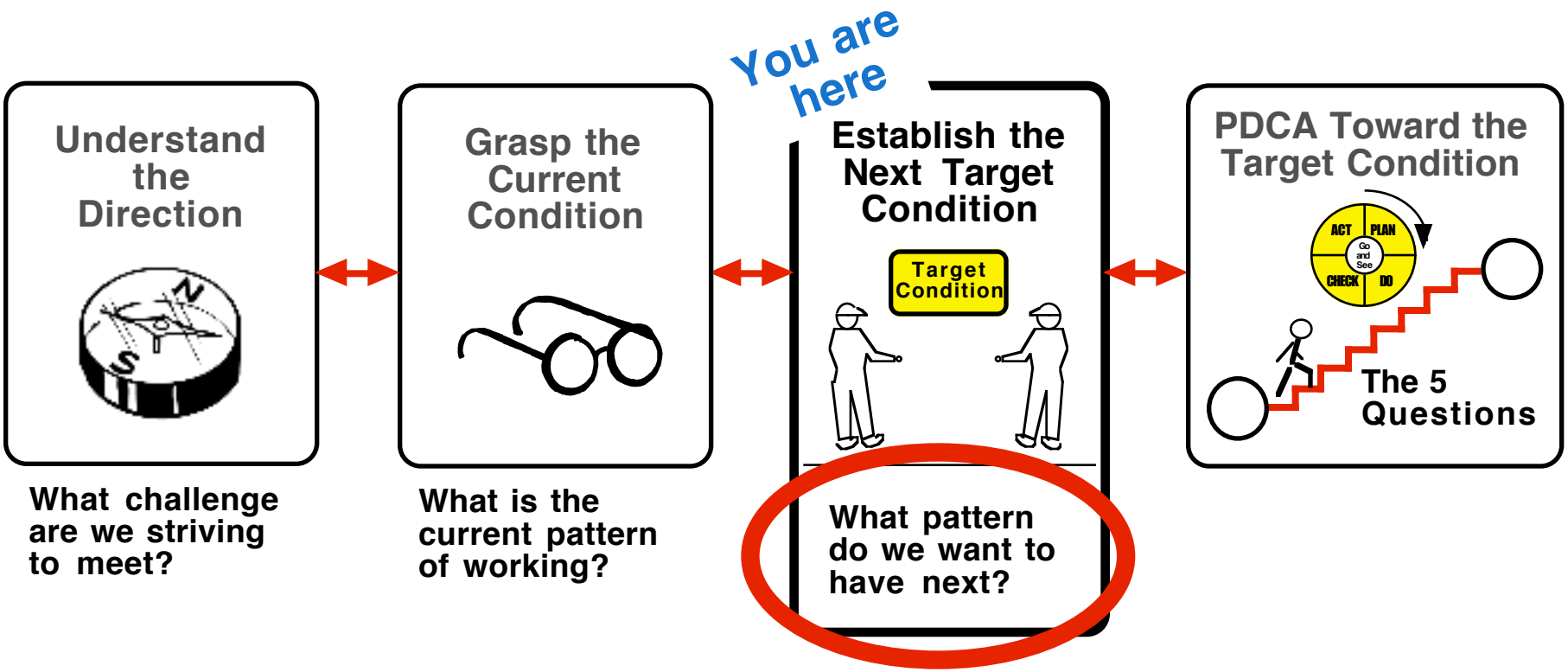




For reference see:

Chapter 5

ORIENTATION

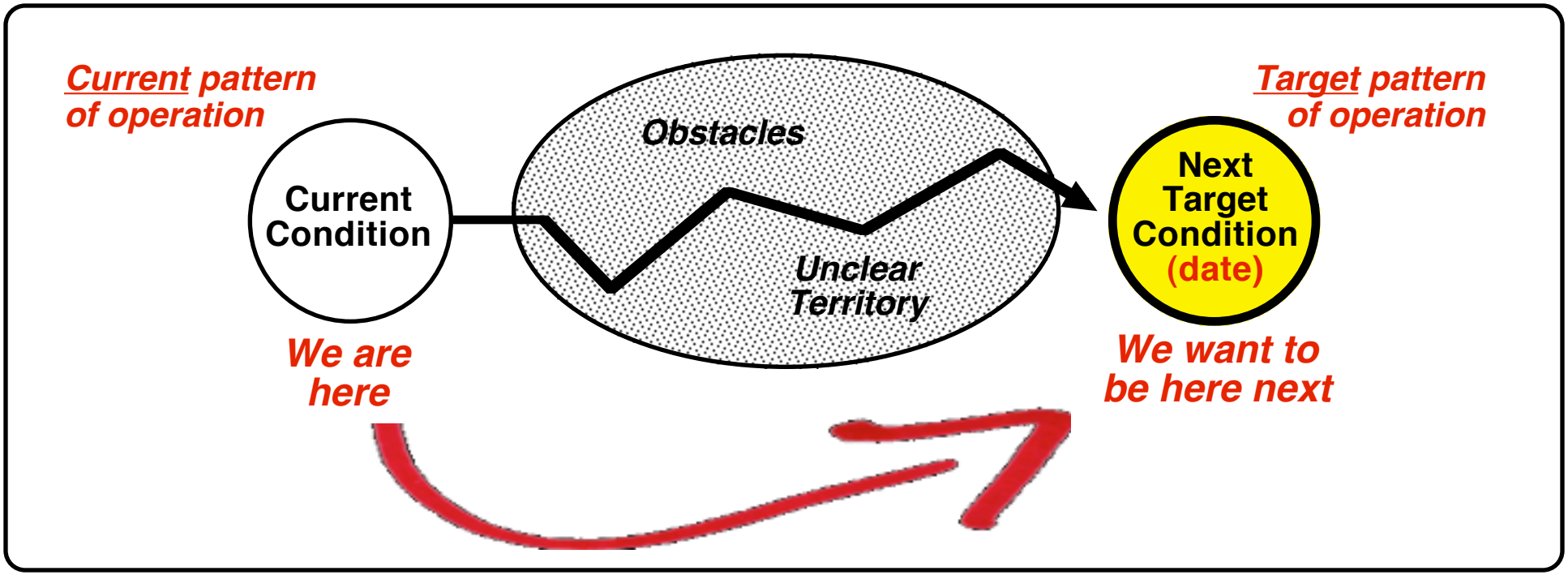


WHAT IS A TARGET CONDITION?

A target condition describes a desired future state, to be achieved by a specified target date. The target date is usually between 1 week and 3 months out.

A target condition answers questions like:

- ***How do we want this process to operate?***
- ***What is the intended normal pattern?***
- ***Where do we want to be next?***



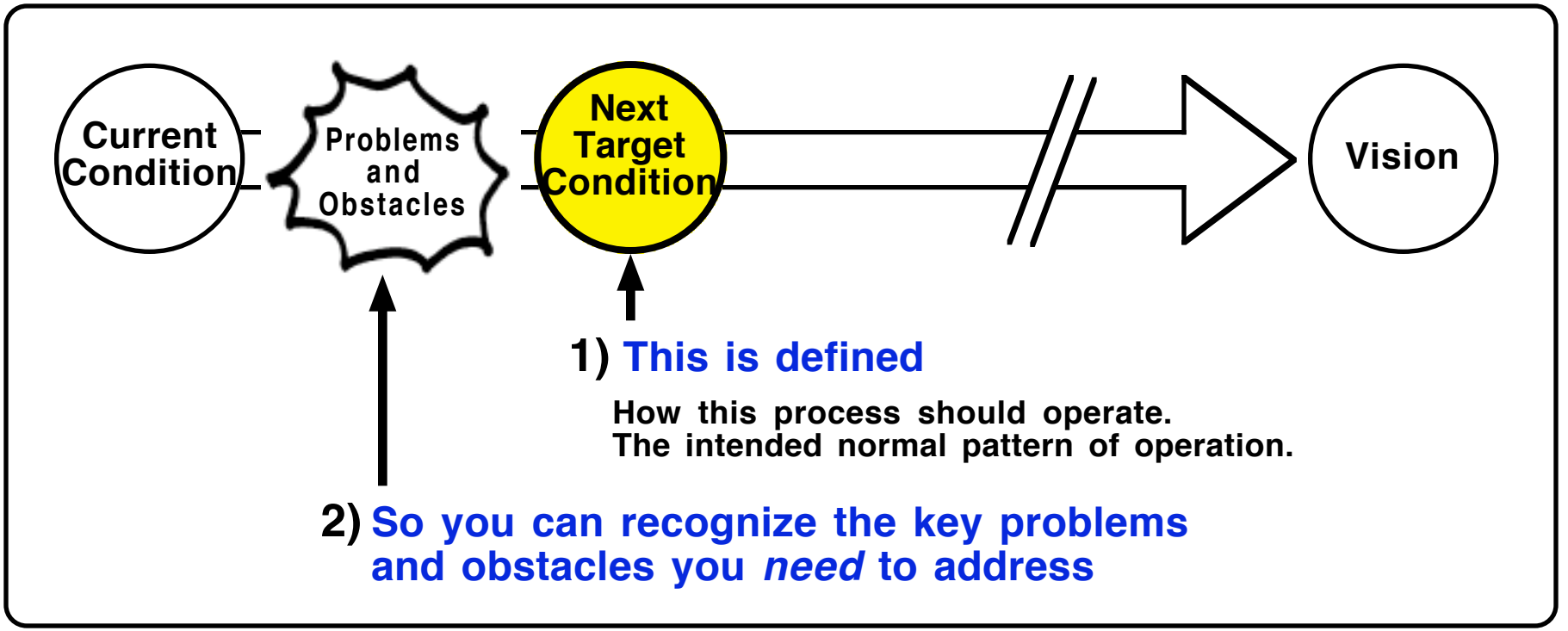
THE PURPOSE AND VALUE OF SETTING A TARGET CONDITION

Once you've experienced the role a target condition plays, you may find it difficult to work without one.

You'll find it difficult to work without having specified what you are trying to achieve.

(1) A TARGET CONDITION ALLOWS YOU TO BE MORE SCIENTIFIC

By setting an objective and then trying to hit it you learn why you cannot. That's what you then work on.



The improvement kata involves going after only the problems, the *obstacles*, that prevent you from getting to the specific target condition you are striving to reach -- one at a time.

(2) A TARGET CONDITION HELPS YOU BEAT ENTROPY

Without something to strive for, we tend to slip back

Deming estimated that 80-95% of process variation is random, or *common cause* variation. These are systemic problems.

Examining each failure and searching for the root cause in order to solve the problem (a common approach) is the wrong approach for systemic problems. You'll be treading water.

In order to take action against the results of common cause variation, the performance of the system itself must be changed. A systemic improvement is needed. That's what a target condition represents.

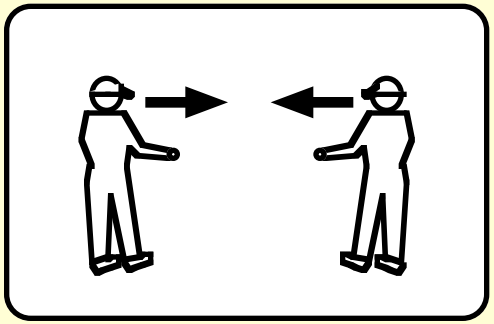
PDCA without a target condition can be like trying to learn from randomness.

If you only stay in a reacting-to-problems troubleshooting mode, entropy can easily creep in and process performance degrades. This is a cause of the improve-and-slip-back ratcheting effect.

(3) A TARGET CONDITION ENABLES TEAMWORK

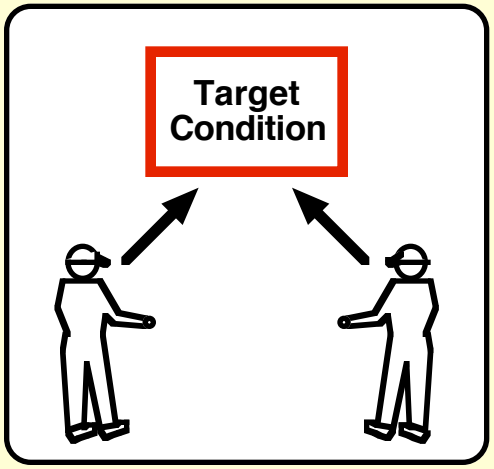
WITHOUT a target condition

My idea versus your idea.



WITH a target condition

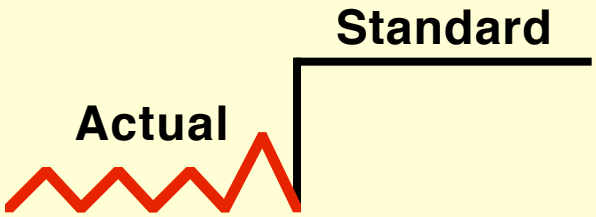
What do we need to work on next to reach our objective?



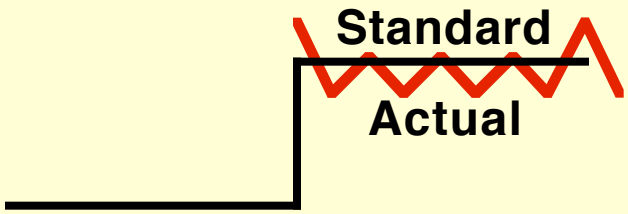
TARGET CONDITION THINKING

Standards are Target Conditions

A good way to think of many standards is as something you are striving to achieve. The standard itself doesn't make anything happen. The issue is, "How we will get this process to actually operate as described in the standard?"



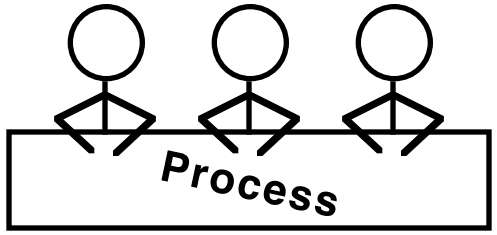
A "standard" is a description of how a process should operate. It is the intended, normal pattern.



"Standardized work" means, in essence, that a process is actually operating as specified by the standard.

A standard is an idea of where you want to be. It's something you aspire to.

A TARGET CONDITION versus A TARGET

Target Condition	Target An outcome, result, or goal
 A description of how the process should operate in order to achieve the target.	Inventory level Inventory turns Lead time Output per hour Cost, Labor cost Quality level Productivity etc.
Actionable **The process operating in this way will generate**	**Cannot be achieved directly** **.....these outcomes and results**

A *target* is an outcome, while a *target condition* is a description of a process operating in a way, in a pattern, that we predict will result in the outcome.

EXAMPLE - Basketball

Target Condition	Target An outcome, result, or goal
How to play in order for the outcome to happen	20% more shots made
Actionable The process operating in this way will generate.....	**Cannot be achieved directly** .....these outcomes and results

WHAT INFORMATION IS IN A TARGET CONDITION?

A target condition describes how you want a process to operate

- **A target condition for a manufacturing process should include the following four categories of information.**
- **No verbs in a target condition. That's for how to get there.**
- **You must include a target date for achieving the target condition.**

Used for improving

Achieve-By Date: (required)

(1) DESCRIBE PROCESS STEPS, SEQUENCE & TIMES

A pattern you can draw or chart (see example)

(2) OTHER PROCESS CHARACTERISTICS

Examples:
- **Number of operators**
- **Number of shifts**
- **Where 1x1 flow is planned, and where standard WIP (incl. quantity) is to be located**
- **Leveling sequence**

(3) PROCESS METRIC(S) ***(Measurement in the moment)***

For checking process condition in real time

Examples:
- **Time for each step, piece, pitch, etc.**
- **Degree of time fluctuation from cycle to cycle**

Used to check outcomes

(4) OUTCOME METRIC(S)

To check outcome of improvement efforts

Examples:
- **Number of pieces per hour or shift**
- **Leveling sequence attainment**
- **Productivity**

WHERE DOES A TARGET CONDITION COME FROM?

To start learning the improvement kata pattern you can establish a target condition just from analyzing the current condition of the process.

As the learner progresses, the process target conditions should also tie to the surrounding value-stream design.

Use the future-state value stream loop as a challenge to give direction to the process target conditions in that loop.

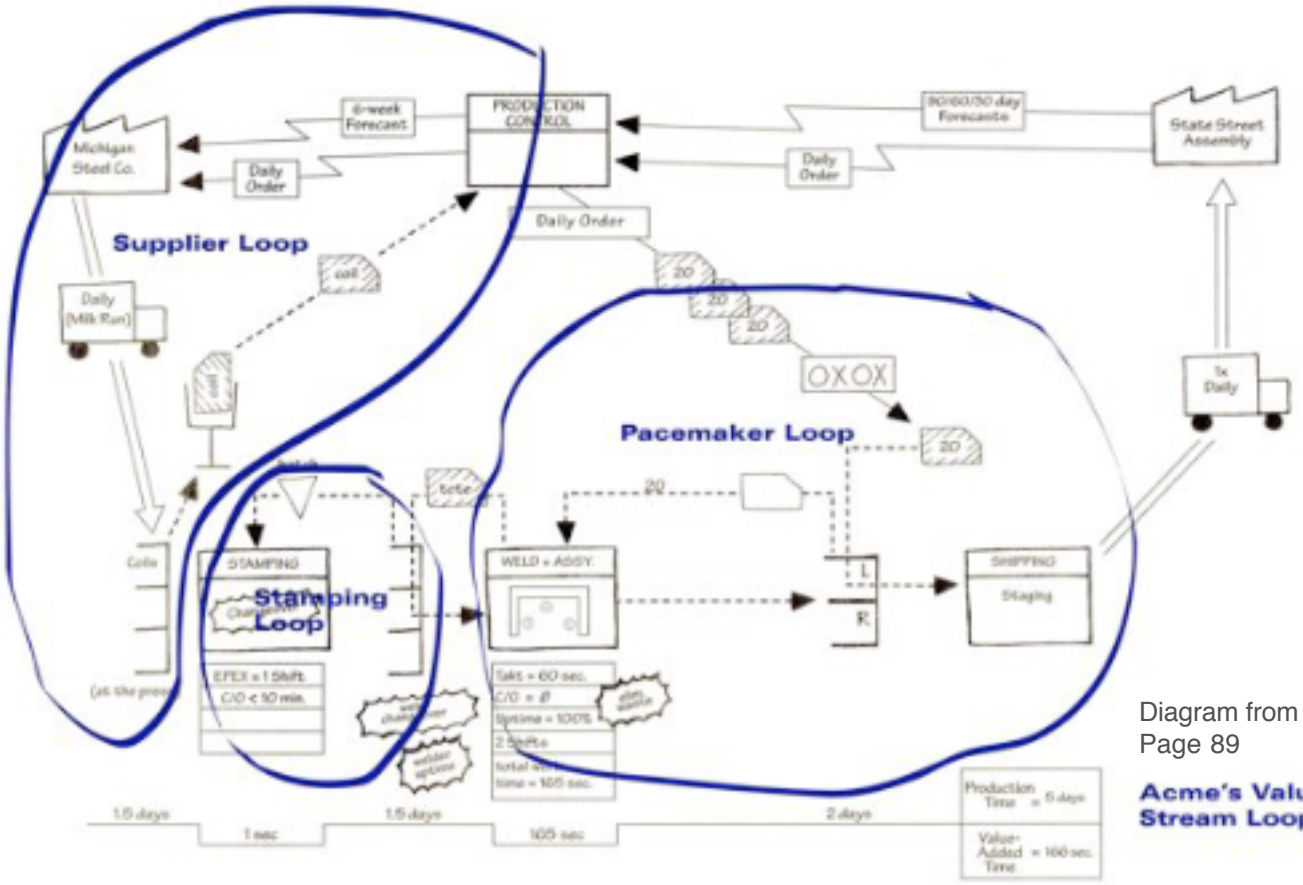
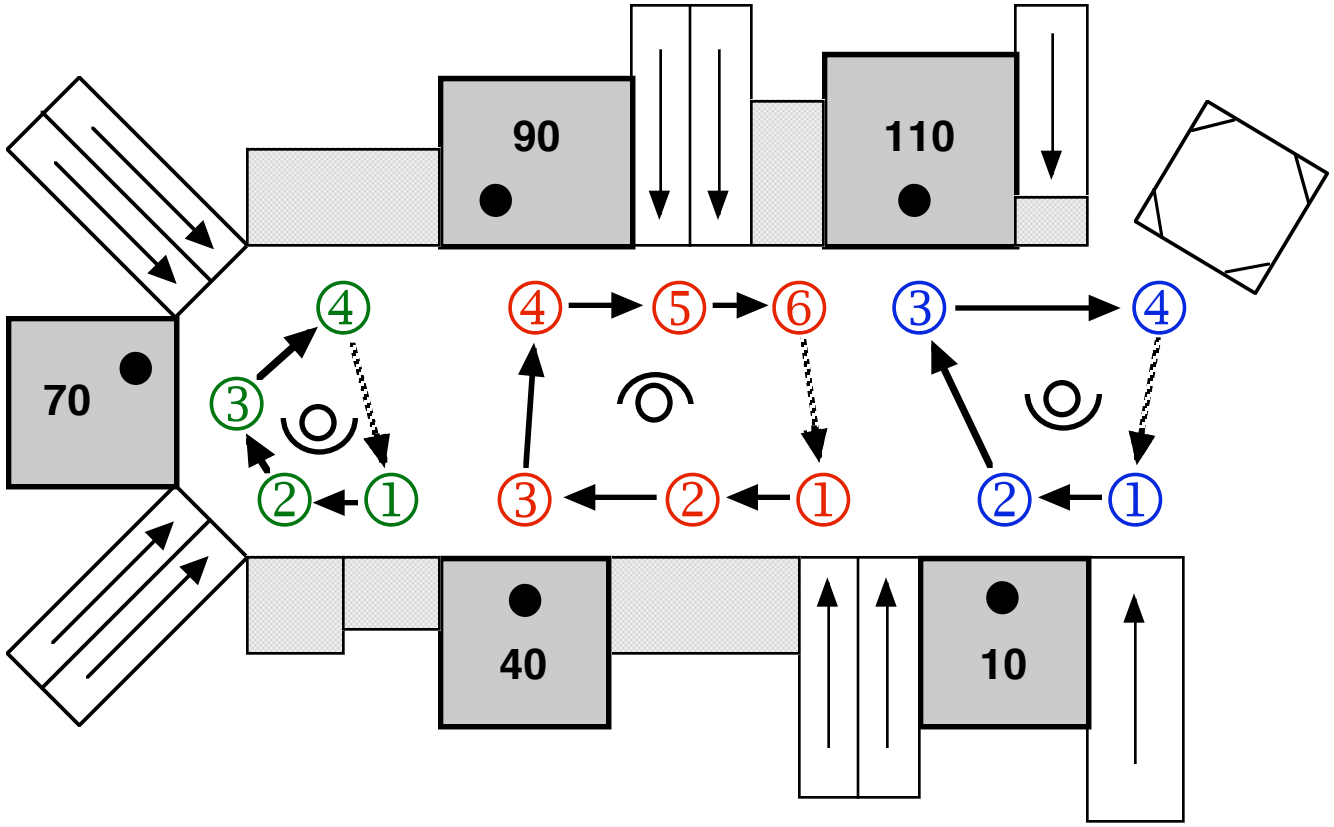


Diagram from *Learning to See* Page 89

Acme's Value-Stream Loops

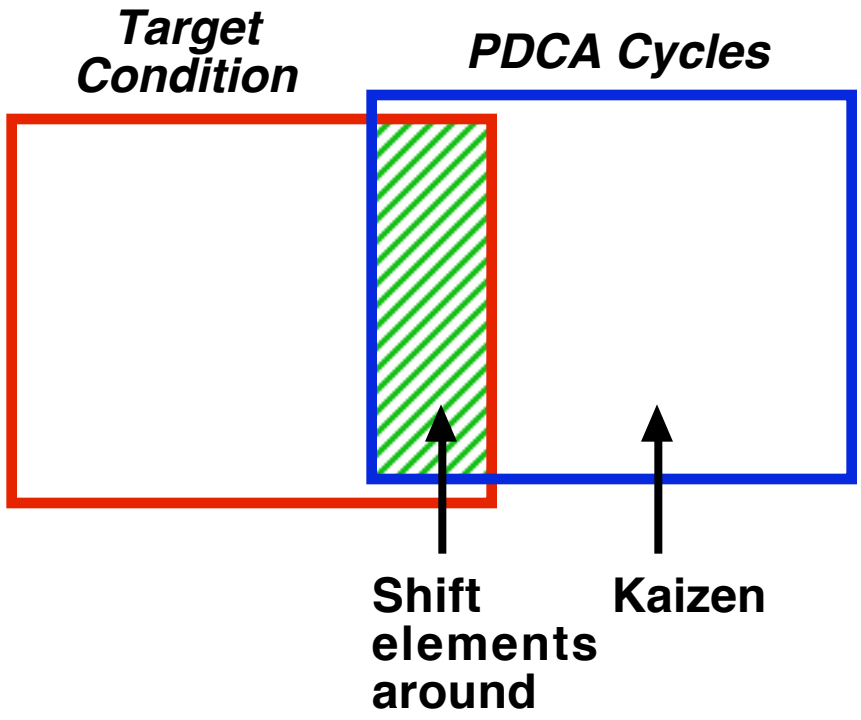
YOU MUST DEFINE THE TARGET PROCESS STEPS, SEQUENCE & TIMES



This will be a hypothesis that you repeatedly test against in order to find obstacles, by repeatedly asking: *"What is preventing us from working according to the target pattern?"*

BUT... YOU WON'T ALWAYS HAVE DETAILED PROCESS STEPS/SEQUENCE/TIMES AT THE START

In many cases the detailed process steps and sequence are developed along the way



You shouldn't change a target condition once it's been defined. But it's fine to add detail to the target condition as you move forward. The target condition is fleshed out as you PDCA (experiment) and your knowledge of reality increases.

THIS ITERATIVE APPROACH IS MORE SCIENTIFIC THAN YOU MAY THINK

What we may think *scientific* is

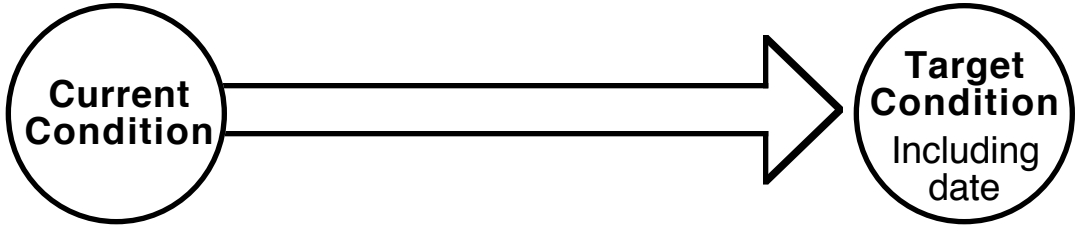
- Quantification and precision
- Objective and certain
- Reveals what is there

What *scientific* really is

- Involves uncertainty, ambiguity & incompleteness
- Never free from error
- A process of discovery, via systematic trial and error

You can define the operator steps, sequence and times via a time study or a predetermined motion-time system like MTM, but that's only a beginning point.

EXAMPLE TARGET CONDITION

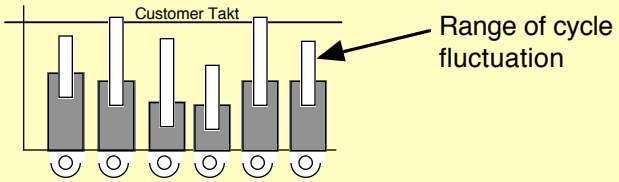


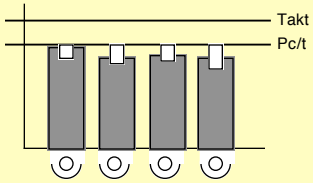
Describes how you want the process to function.

Not everything is changed.

Customer Takt 30 sec	**Customer Takt 30 sec**
Planned cycle time 25 sec	**Planned cycle time 25 sec**
Two shifts + overtime →	**Two shifts, no overtime**
Small, varying WIP between workstations →	**1x1 Flow from stations 10 --> 110, 3 pieces SWIP after station 110**
6 Operators, underutilized →	**4 Operators**

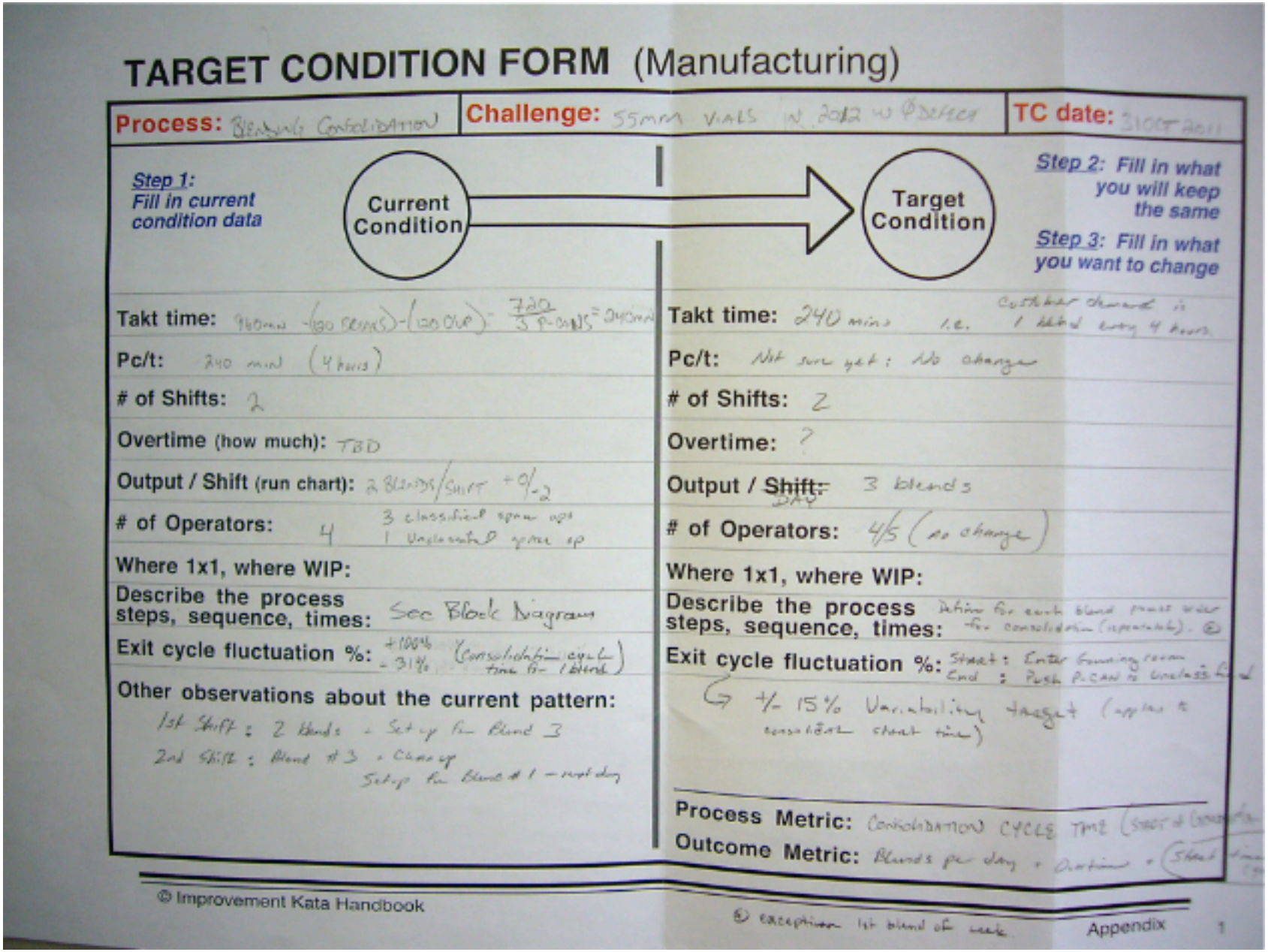
(incl. steps, sequence, times)





Oper. cycle fluctuation +/- 100% →	**Oper. cycle fluctuation +/- 10%**
Output cycle fluctuation +/- 70% →	**Output cycle fluctuation +/- 10%**
Lot size 3 days	**Lot size 3 days**
Output = 650-750 / shift →	**Output = 850 pieces per shift**

EXAMPLE



TARGET CONDITION FORM (Manufacturing)

Process: Blending Consolidation | **Challenge:** 55mm vials in 2012 w/ 0 defects | **TC date:** 31 Oct 2011

Step 1: Fill in current condition data

Current Condition → Target Condition

Step 2: Fill in what you will keep the same

Step 3: Fill in what you want to change

Current Condition	Target Condition
Takt time: 960 min - (120 breaks) - (120 QUA) = 720 / 3 P-cans = 240 min	**Takt time:** 240 mins i.e. Coffee break is 1 blend every 4 hours
Pc/t: 240 min (4 hours)	**Pc/t:** Not sure yet: No change
# of Shifts: 2	**# of Shifts:** 2
Overtime (how much): TBD	**Overtime:** ?
Output / Shift (run chart): 2 blends/shift +0/-2	**Output / ~~Shift:~~ DAY** 3 blends
# of Operators: 4 (3 classified spray op's, 1 Unclassified spray op)	**# of Operators:** 4/5 (no change)
Where 1x1, where WIP:	**Where 1x1, where WIP:**
Describe the process steps, sequence, times: See Block Diagram	**Describe the process steps, sequence, times:** Admin for each blend process under for consolidation (separate). ©
Exit cycle fluctuation %: +100% -31% (Consolidation cycle time for 1 blend)	**Exit cycle fluctuation %:** Start: Enter Gowning room. End: Push P-CAN to Unclassified +/- 15% Variability target (applies to consolidation start time)

Other observations about the current pattern:

1st Shift: 2 blends - Set up for Blend 3

2nd Shift: Blend #3 - Clean up. Set up for Blend #1 – next day

Process Metric: Consolidation cycle time (start of Gowning)

Outcome Metric: Blends per day + Overtime + (5 blend time cycle)

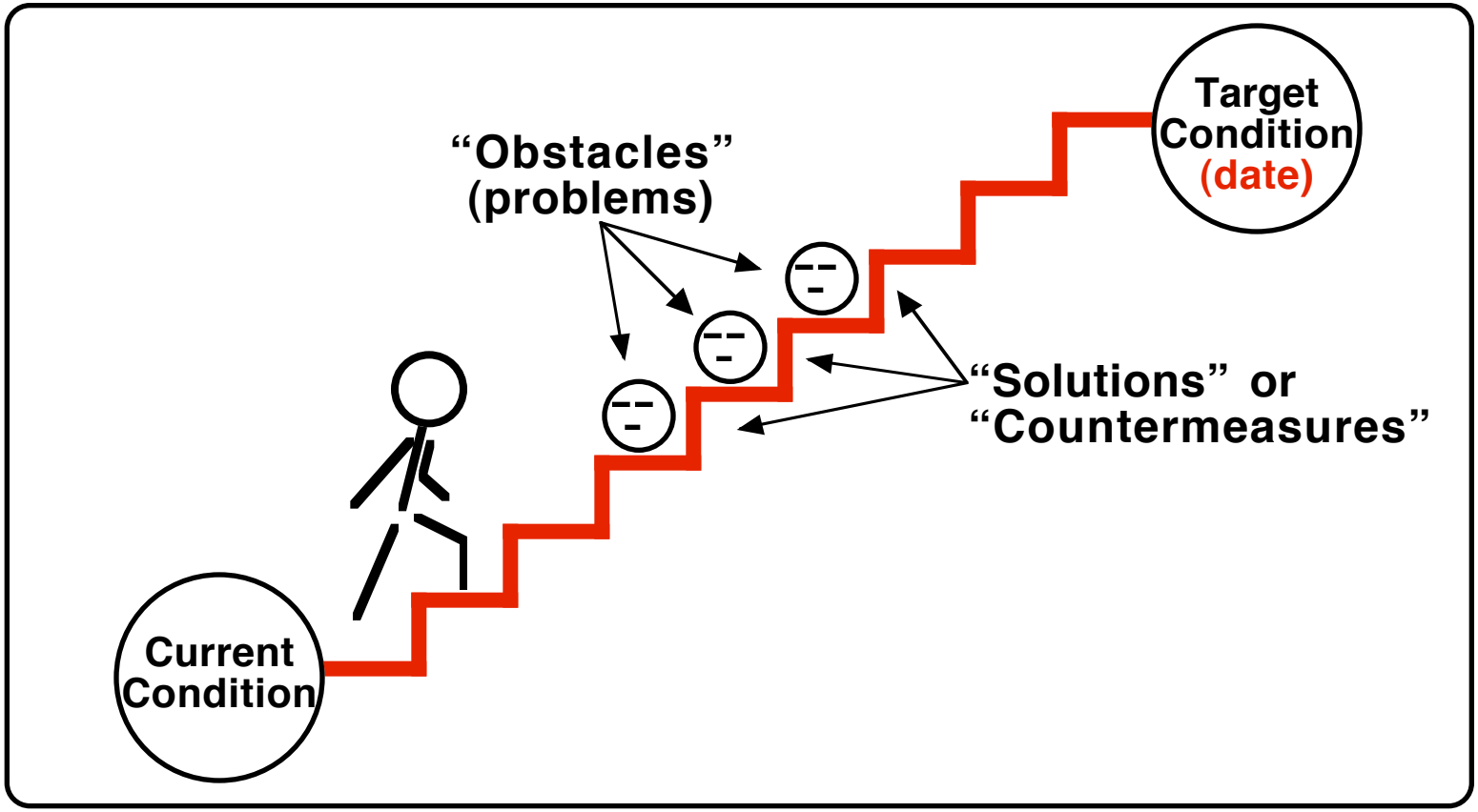
© Improvement Kata Handbook

© exceptions 1st blend of week

Appendix 1

TERMINOLOGY

- A *target condition* is not a *solution*. It's something you are striving to reach
- What you do to overcome *obstacles* (problems) on the way to a target condition are *solutions* or *countermeasures*
- *Adaptiveness* happens as you strive toward something



THE TARGET CONDITION MUST BE CHALLENGING

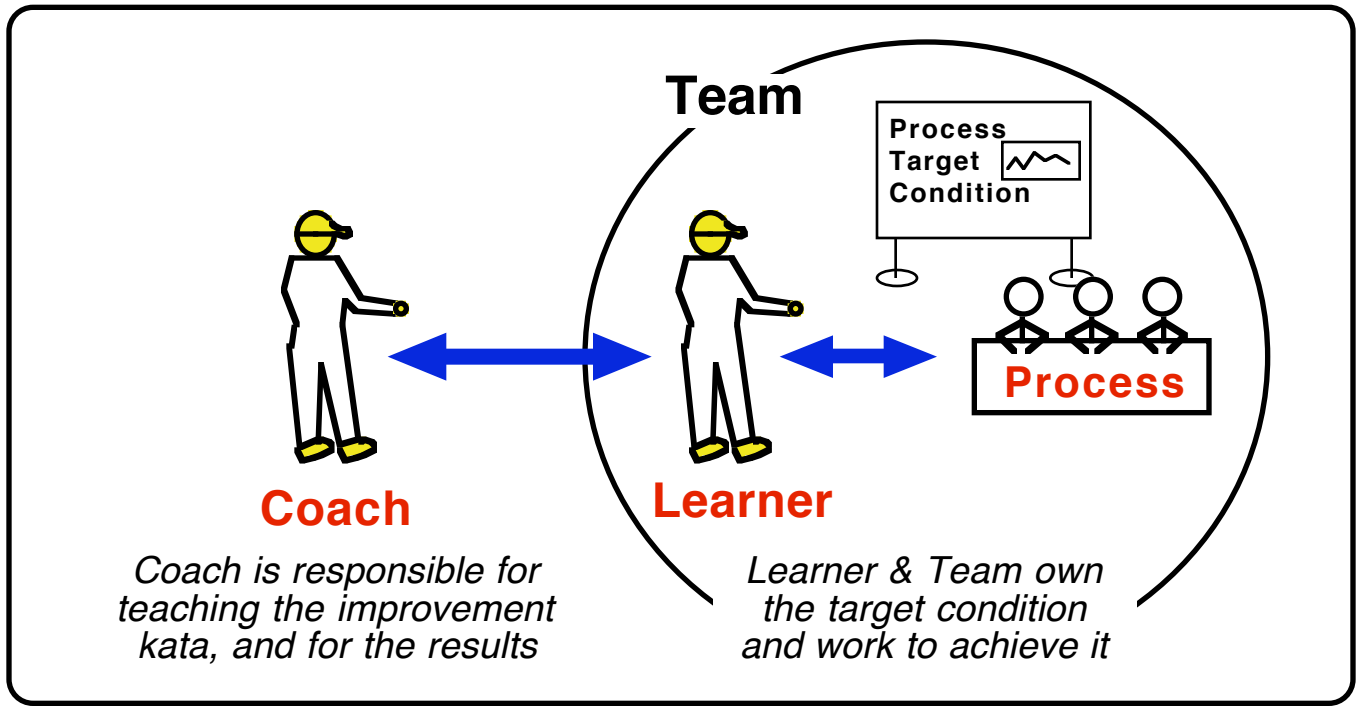
A target condition is achievable, but how to achieve it should be unknown

Do not make the target condition too easy and comfortable. Better to fail to achieve a target condition than to stay in the comfort zone.

A good target condition brings you to the current limits of your knowledge and forces you to learn, grow and adapt

COACH'S ROLE IN SETTING A TARGET CONDITION

The coach ultimately determines how much of a stretch the next target condition should be. The coach wants learners to practice just over the edge of their capability, since making progress requires reaching and making small failures.



Note, however, that the coach also accompanies and supports the learner during the effort to achieve the target condition. The learner is responsible for the doing, but the coach is responsible for the results. This helps ensure that the coach doesn't leave the learner alone.

DEGREE-OF-CHALLENGE GUIDELINE

Not a rigid rule. For the coach to use, not the learner

Based on the Dreyfus Model of Skill Acquisition

Learner's Skill Level	Characteristics of the skill level	Time horizon*
Novice	Adherence to rules or plans Little situational perception No discretionary judgement	**Target condition 1 week out**
Advanced Beginner	Action based on attributes or aspects Situational perception still limited All aspects are given equal importance	**Target condition ≤ 2 weeks out**
Competent	Copes with crowdedness Sees actions partially in terms of LT goals Has standardized and routinized procedures	**Target condition ≤ 1 month out**
Proficient	Sees what is most important in a situation Perceives deviations from the normal pattern Maxims vary according to situation	**Target condition ≤ 3 months out**
Expert	No longer relies on rules / guidelines / maxims Grasp of situations & decision making intuitive Vision of what is possible	**??**

* ***How long the coach thinks the learner will take to achieve the target condition.***

Table adapted from: Dreyfus, Stuart E., *Formal Models vs. Human Situational Understanding: Inherent Limitations on the Modelling of Business Expertise*, University of California, Berkeley, 1981

TARGET CONDITION FORM

(on the following two pages)

Form 1 = for manufacturing processes

Form 2 = for any type of process

To complete the form:

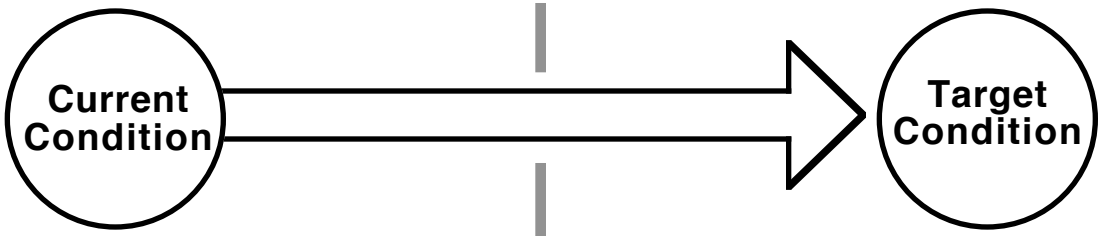
Step 1: Fill in current condition data (left side)

Step 2: Fill in what you will keep the same (right)

Step 3: Fill in what you want to change (right)

Process:	Challenge: Theme of this TC:	TC date:

Step 1: Fill in current condition data



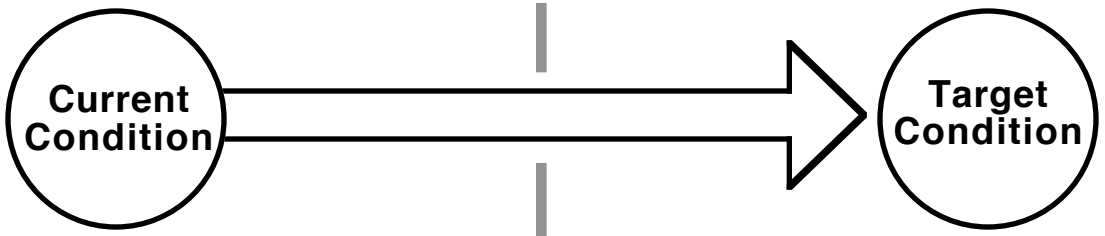
Step 2: Fill in what you will keep the same

Step 3: Fill in what you want to change

Current Condition	Target Condition
Takt time:	Takt time:
Pc/t:	Pc/t:
# of Shifts:	# of Shifts:
Overtime (how much):	Overtime:
Actual output / shift (run chart):	Target output / shift:
# of Operators:	# of Operators:
Where 1x1, where WIP:	Where 1x1, where WIP:
Describe the process steps, sequence, times:	Describe the process steps, sequence, times:
Exit cycle fluctuation %:	Exit cycle fluctuation %:
Other observations about the current pattern:	
	Process Metric: Outcome Metric:

Process:	Challenge:	TC date:
	Theme of this TC:	

Step 1:
Fill in current condition data



Step 2: Fill in what you will keep the same

Step 3: Fill in what you want to change

Process Metric:

Outcome Metric:

Target Condition Appendix:

ESTABLISHING A TARGET CONDITION FOR PROCESSES WITH VARIABLE WORK CONTENT

**Any process can (and should) have a target condition.
But it can be difficult to establish a target condition
for processes where the work content varies. Suggestions:**

- **Keep in mind that all you are trying to do is define a *pattern* of working to strive to achieve.**

- **A key to establishing a target pattern for non-repetitive processes is *clumping* the work. Instead of releasing work to the process by customer order -- whereby the amount of work can vary from order to order -- release work in equal portions, for example to fill a standard time increment or "pitch."**

  The trick is to find a process attribute to use as a unit of measure: the number of racks that can be painted per hour, number of bends that can be made per hour; something like that.

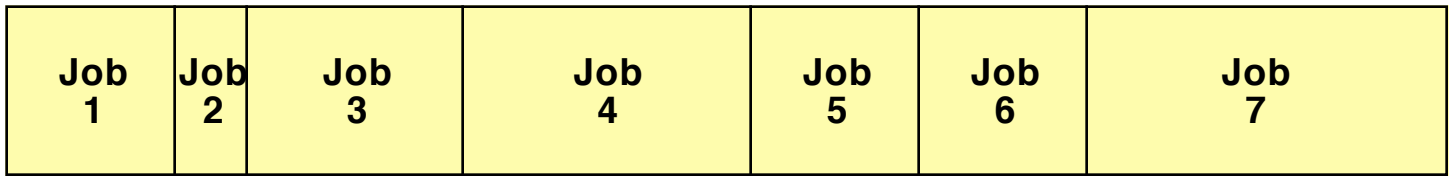
- **Once you have a first basic pattern it's a matter of applying PDCA to break through the obstacles preventing you from getting there. As you do that you'll find further patterns in the work, which you can use in the next target condition.**

ESTABLISHING A TARGET CONDITION WHEN THE WORK CONTENT VARIES

Try to define a *target pattern*

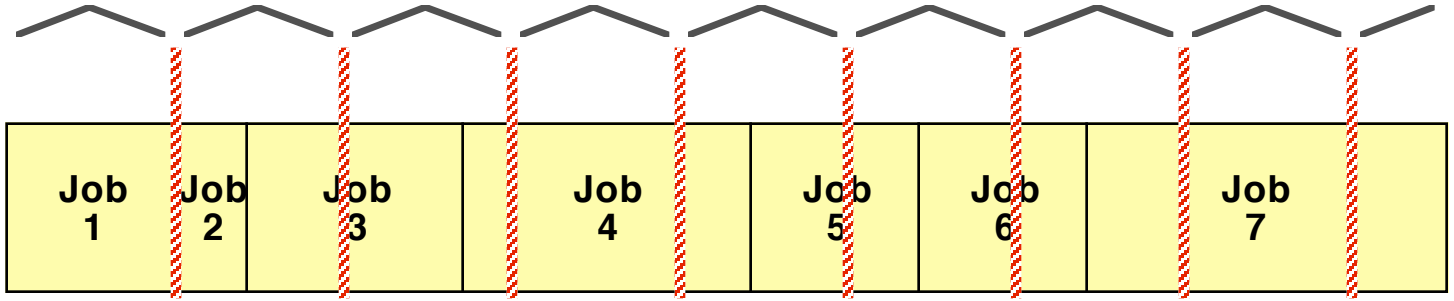
Pattern hard to see

How the work arrives



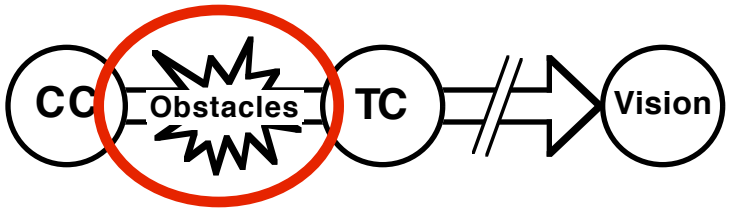
Target pattern

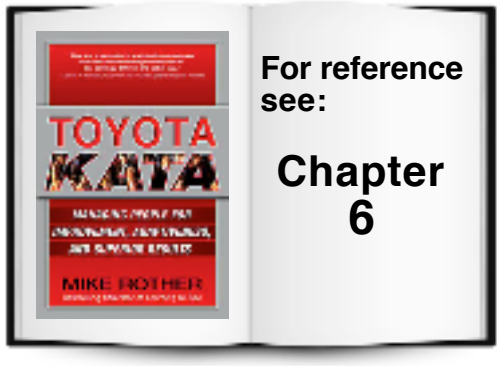
Work is 'clumped'



4. PDCA TOWARD THE TARGET CONDITION

Practice this Routine

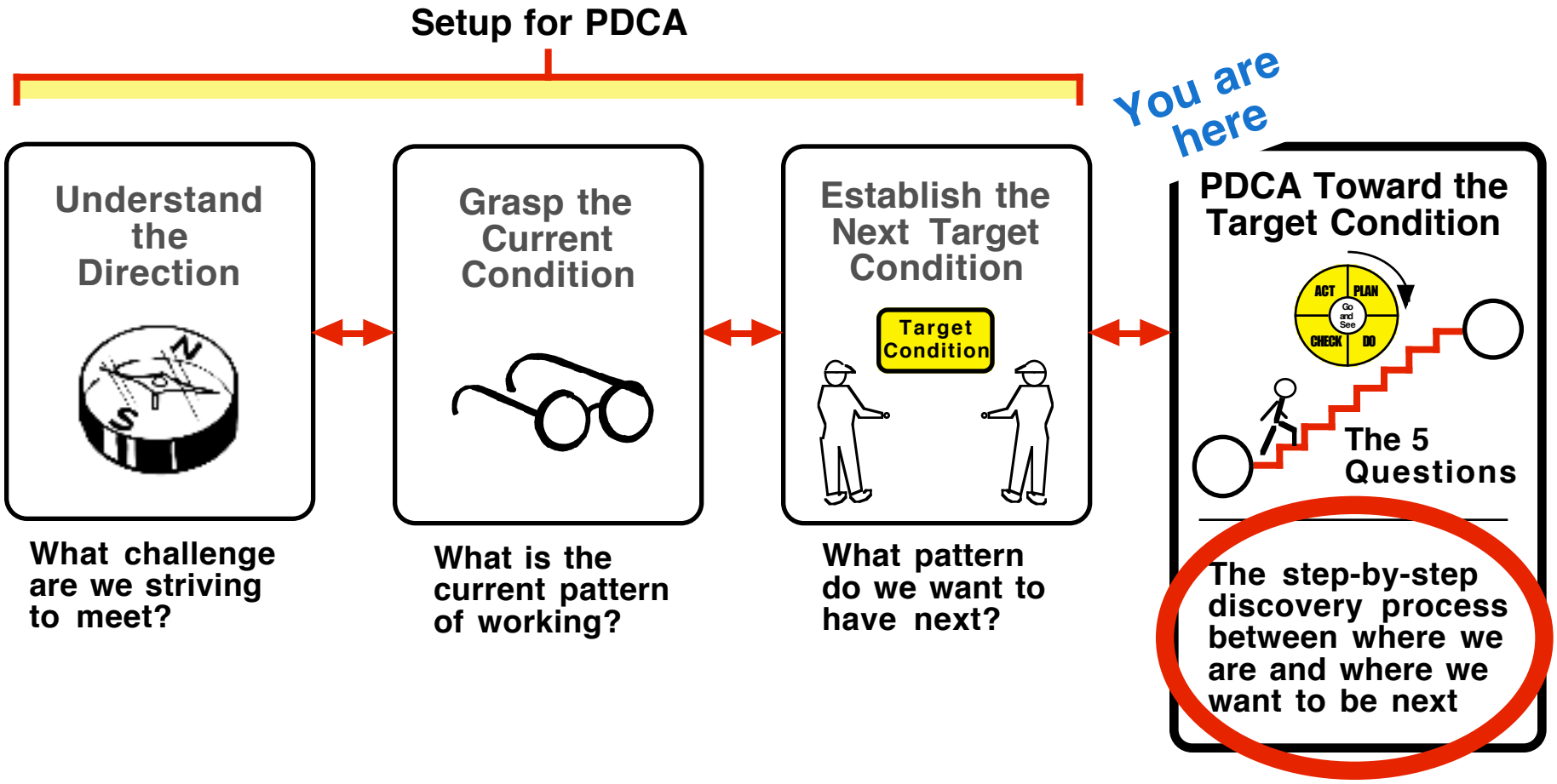




For reference see:

Chapter 6

ORIENTATION

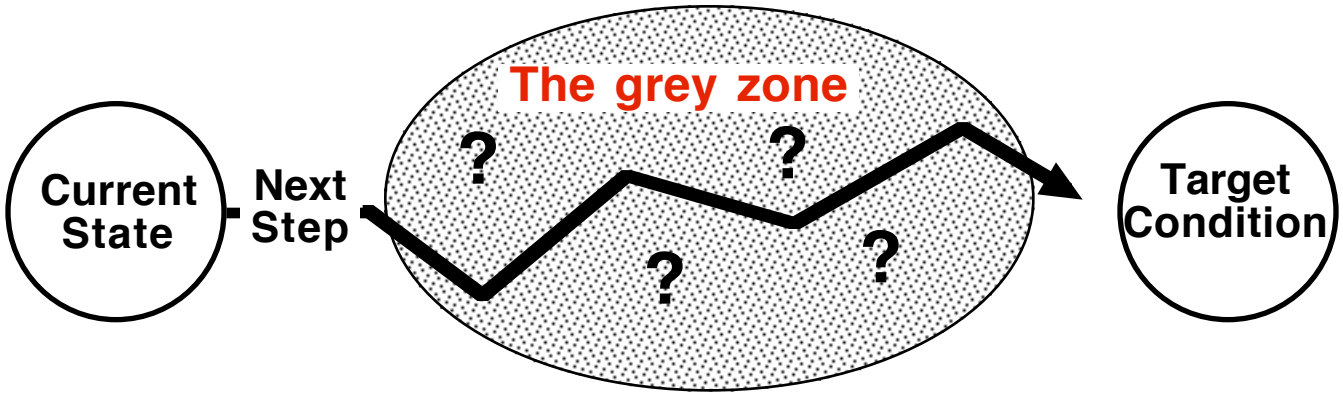


NOW THAT YOU'VE ESTABLISHED A TARGET CONDITION, HOW DO YOU GET THERE?

Most Important:
ASSUME THE PATH IS UNCLEAR

We make a plan and intend to execute the plan. But reality is neither linear nor predictable enough for this alone to be an effective means for achieving our target conditions.

With complex systems we cannot plan or aim so well up front as to hit the target condition. Regardless of how well you planned, the path to achieving the target condition is somewhat of a grey zone.



A target condition is a setup for experimenting

SO PUT ON YOUR SCIENTIST HAT

WHAT IS SCIENTIFIC THINKING?

Learn from and utilize your successes and failures along the way to the target condition

Because the path to a target condition cannot be predicted with exactness, we have to find that path by experimenting like a scientist. With each insight a scientist adjusts his/her course to take advantage of what has been learned.

What we may think *scientific* is

- **Quantification and precision**
- **Objective and certain**
- **Reveals what is there**

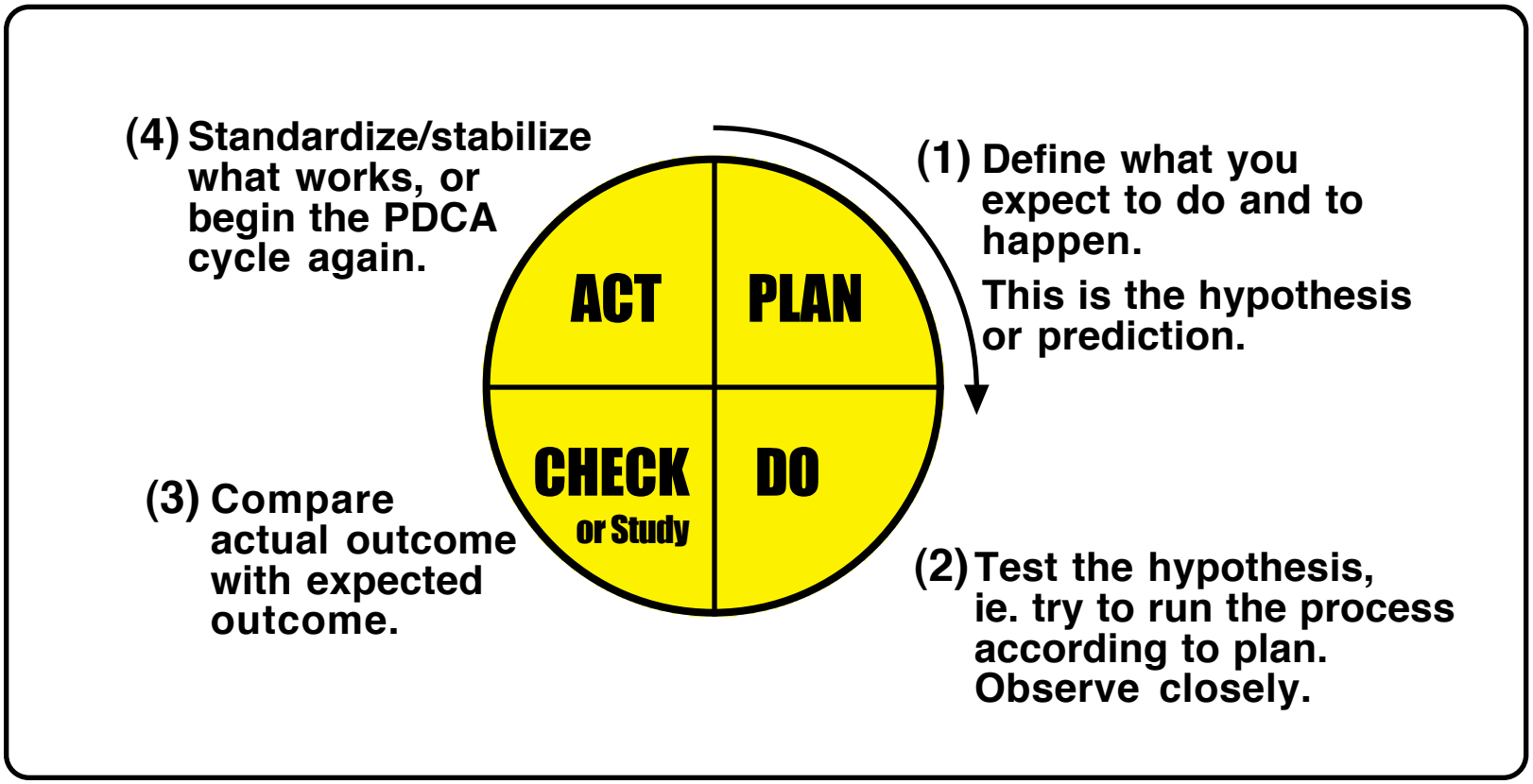
Eg: *We have made the right plan*

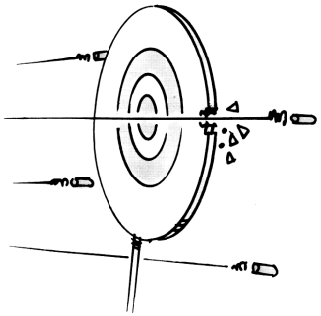
What *scientific* really is

- **Involves uncertainty, ambiguity & incompleteness**
- **Never free from error**
- **A process of discovery, via systematic trial and error**

Eg: *Our plan is a hypothesis*

THIS IS THE WELL-KNOWN PDCA CYCLE



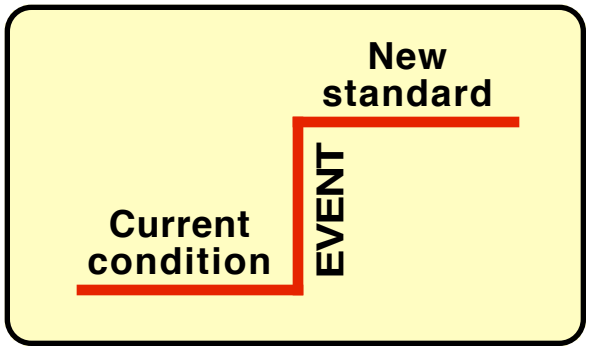


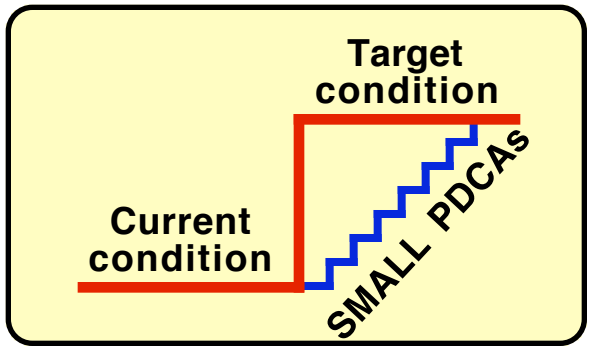
The steps of PDCA constitute a scientific process of acquiring knowledge. PDCA provides us with a practical means of attaining a target condition. It's how to work through the grey zone, and is what characterizes a learning organization.

BUT WHEN SHOULD YOU *CHECK*?

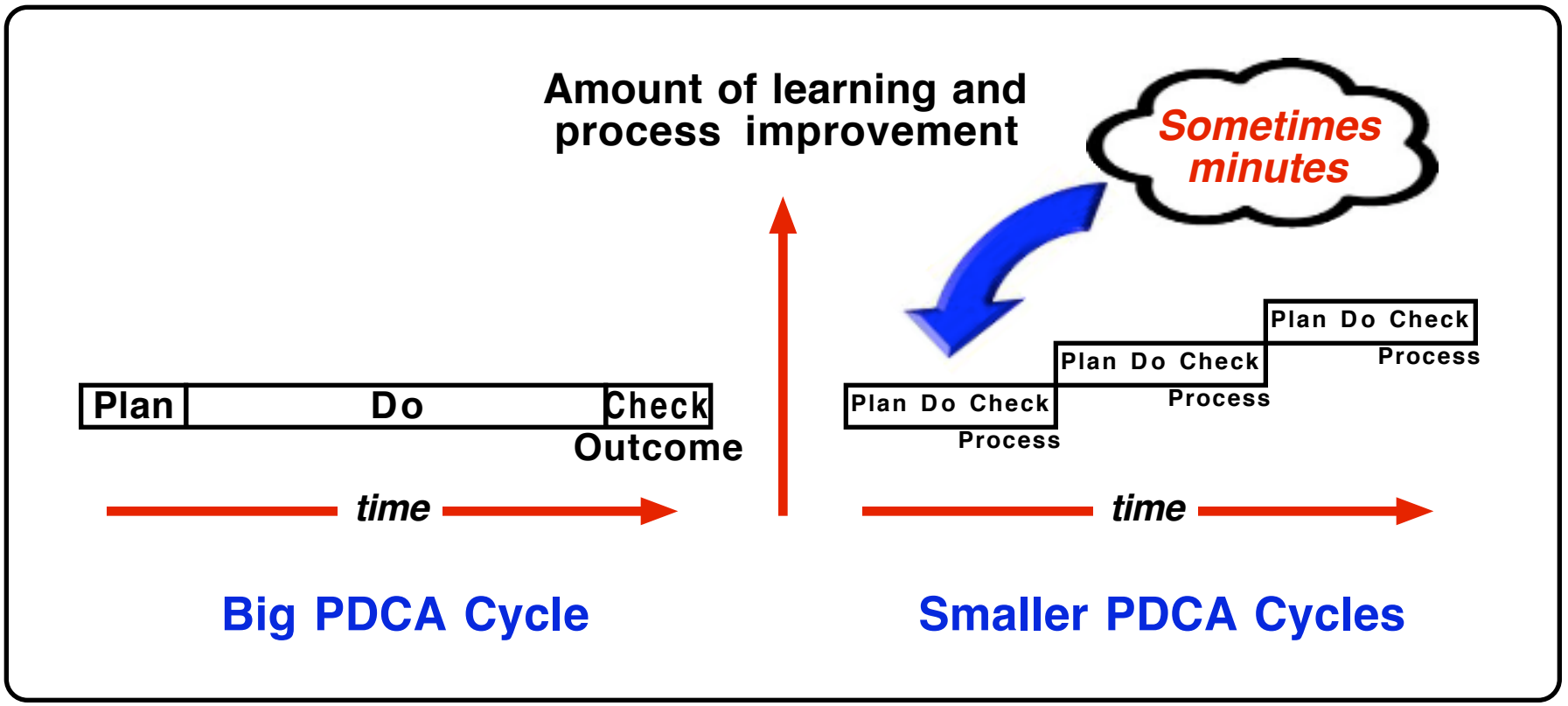
With the improvement kata, PDCA cycles are often about daily experiments and learning in short cycles

Old Way	Improvement-Kata Way
• Check at end of event or project • One big step	• Check at each step • PDCA cycles short and frequent (sometimes minutes)



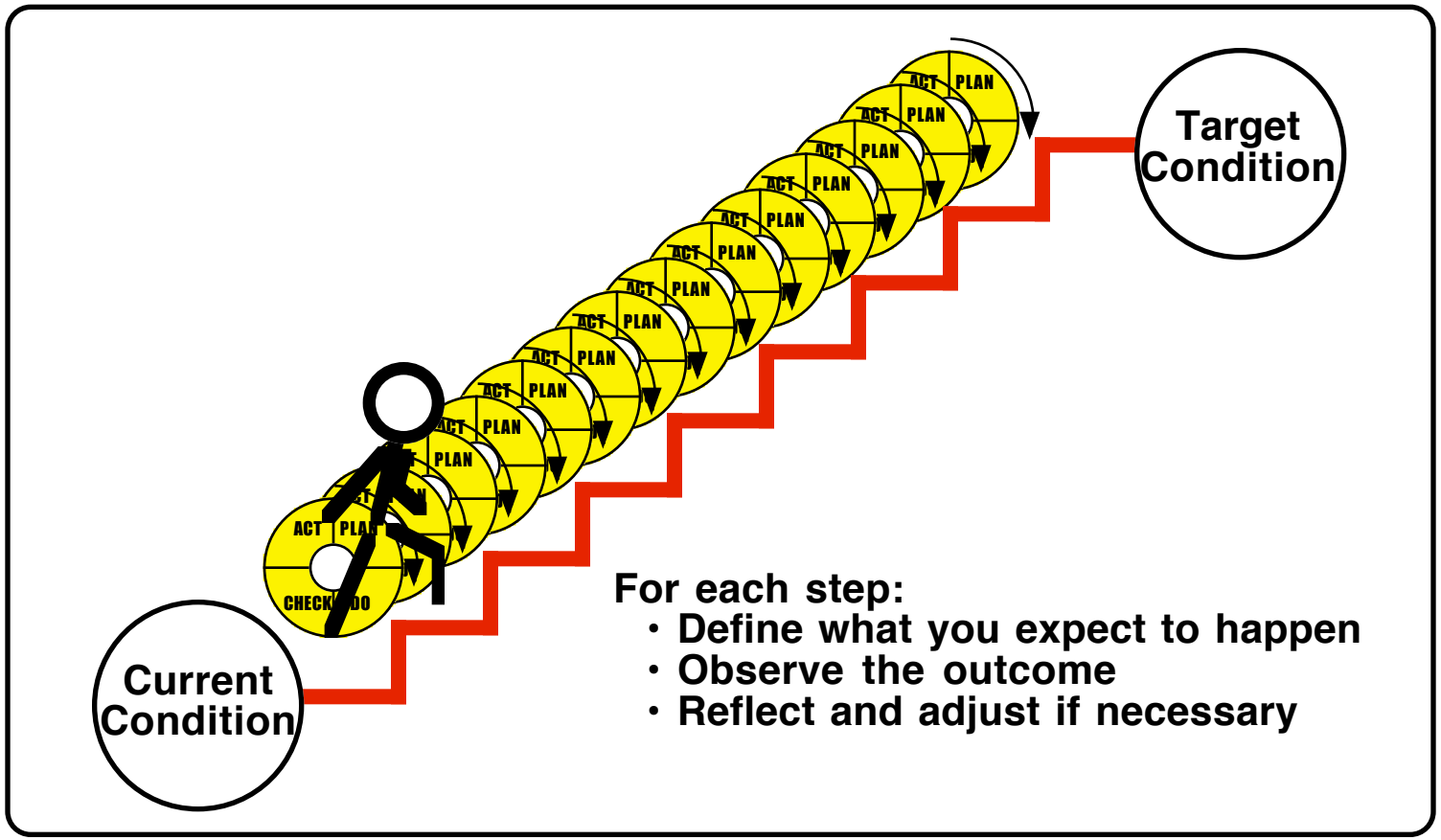


BIG PDCA CYCLES DON'T PRODUCE MUCH DETAILED LEARNING



With big PDCA cycles there may be too many variables in play to make learning possible. Short, frequent (daily) PDCA cycles are the level at which the "learning organization" becomes a reality.

SO EACH STEP = A PDCA CYCLE

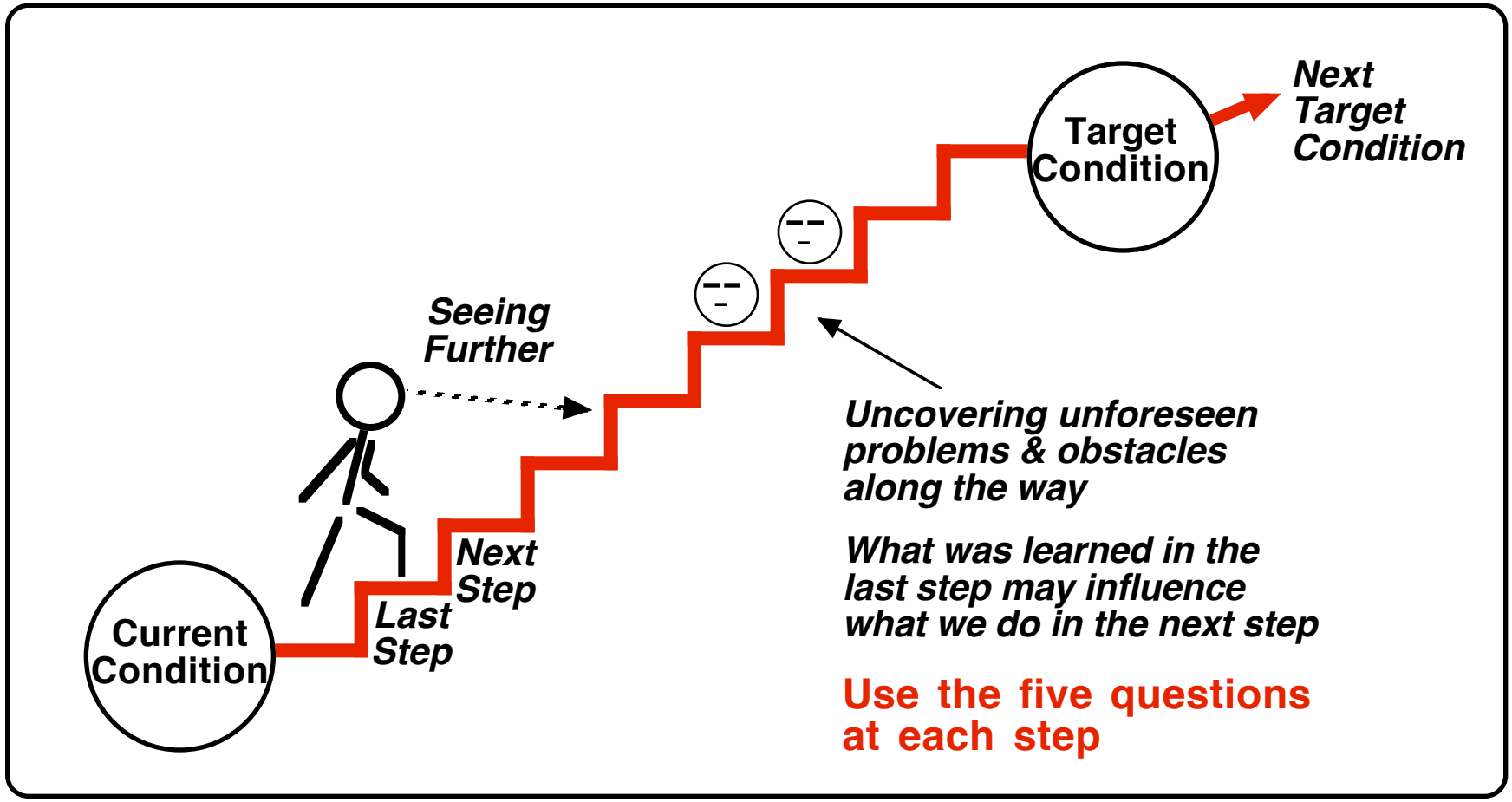


A PDCA cycle may take only minutes. Suppose we decide, in pursuit of a target condition, to move some work elements from one operator to another.

We take that step, observe that the outcome is not what we expected, but then recognize something else that could generate the desired effect. That was a PDCA cycle.

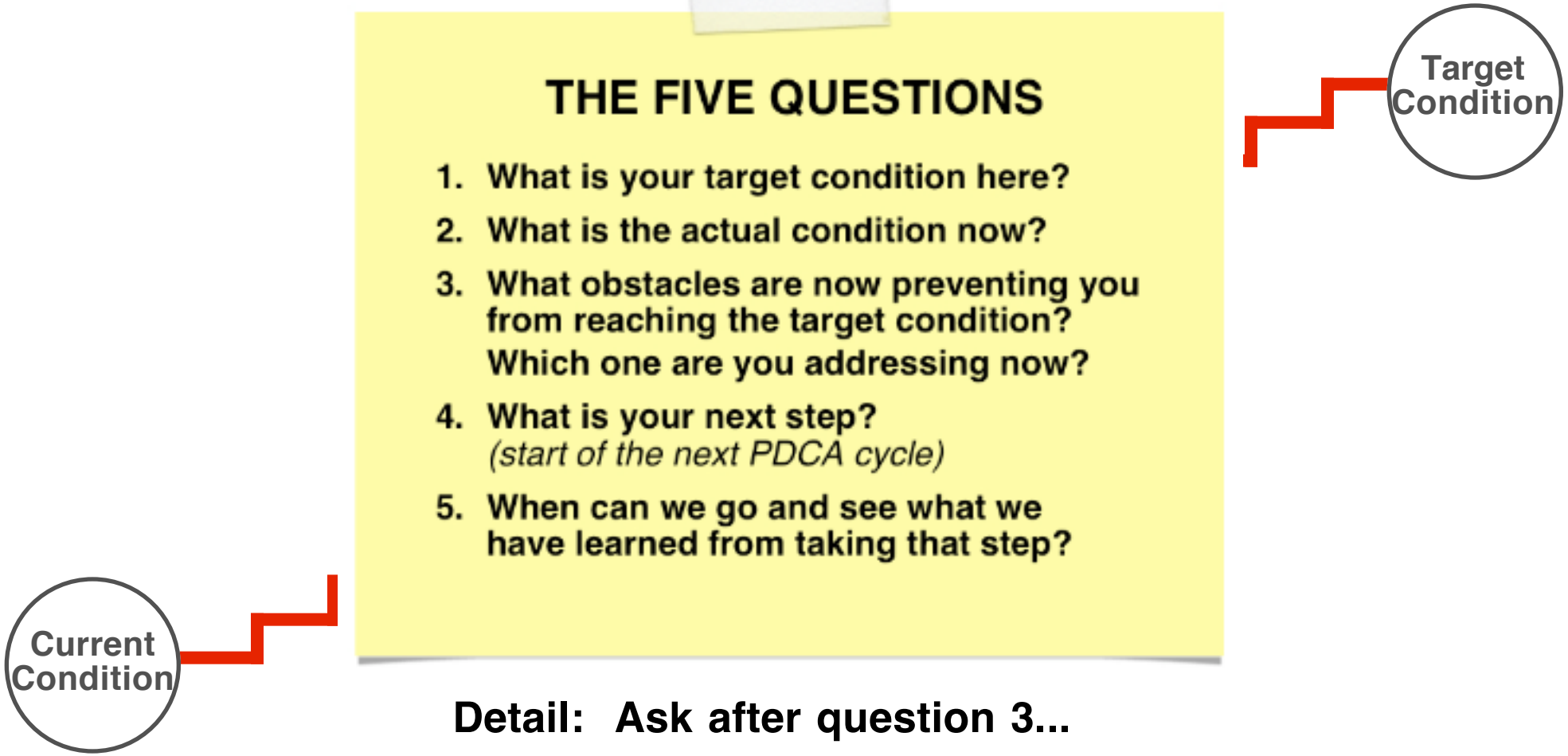
HOW TO WORK TOWARD A TARGET CONDITION

Step at a time, with learning and adjustment along the way



Note: Your PDCA experiments should be done in a way that doesn't harm the customer. Another reason to keep them small if possible.

ASK THE 5 QUESTIONS AT EACH STEP



Detail: Ask after question 3...

What did you learn from the last step?

- **What did you expect to happen?**
- **What did happen?**

PDCA CYCLES RECORD

Date: _____

Process: _____

Be sure to keep measuring your process metric while you are experimenting

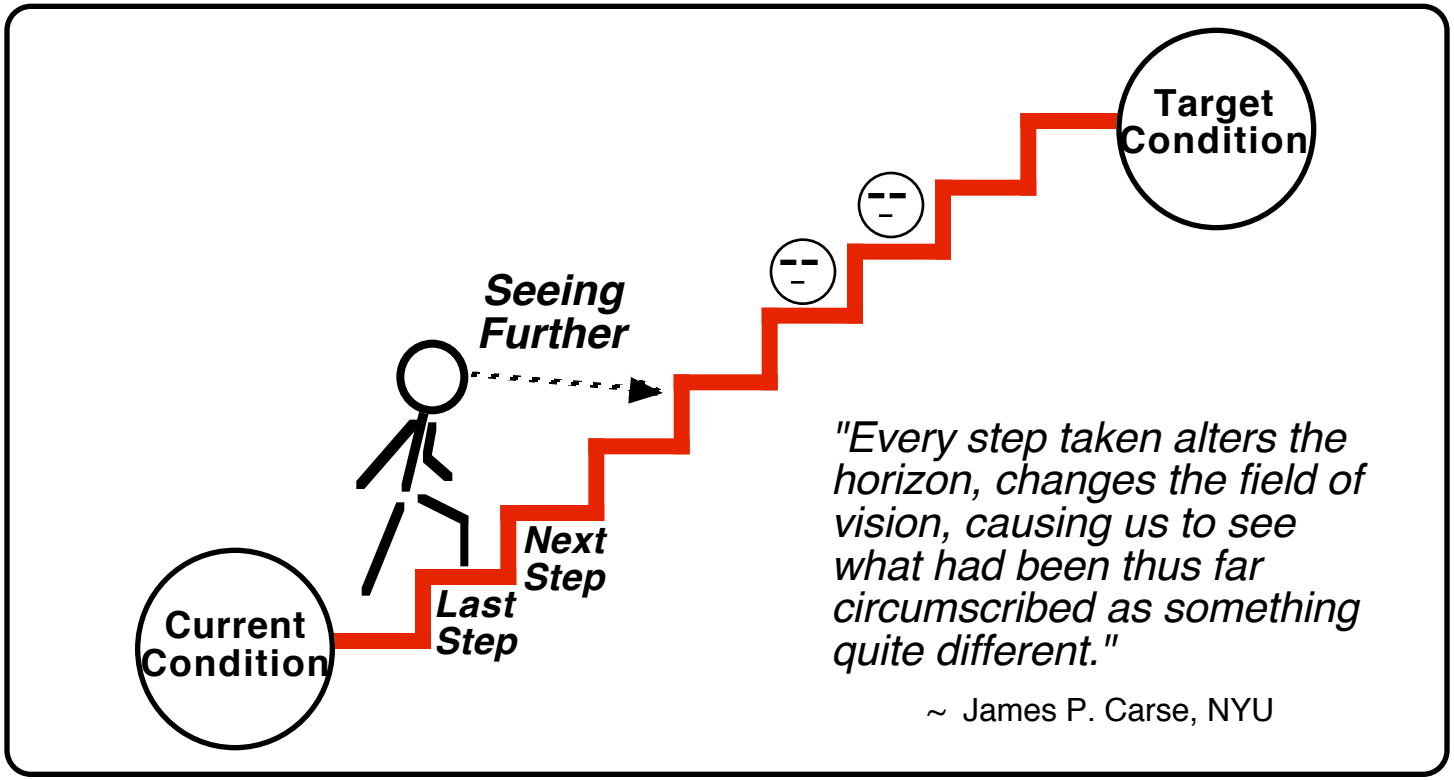
Process Metric	

Step	What do you expect?	Result	Observe closely	What We Learned
1 →		2 →		3
4				

Think of this as a *chain of PDCA cycles*, where one step builds on what was learned in the last step. Only your first step is free.

When you experiment
TRY NOT TO THINK TOO FAR AHEAD

You don't actually know what the result of the next step will be. So concentrate on the next step, because what you learn from that may influence the step after that.



Once you have a target condition, relax and focus on the next step. Be in the moment, and apply PDCA.

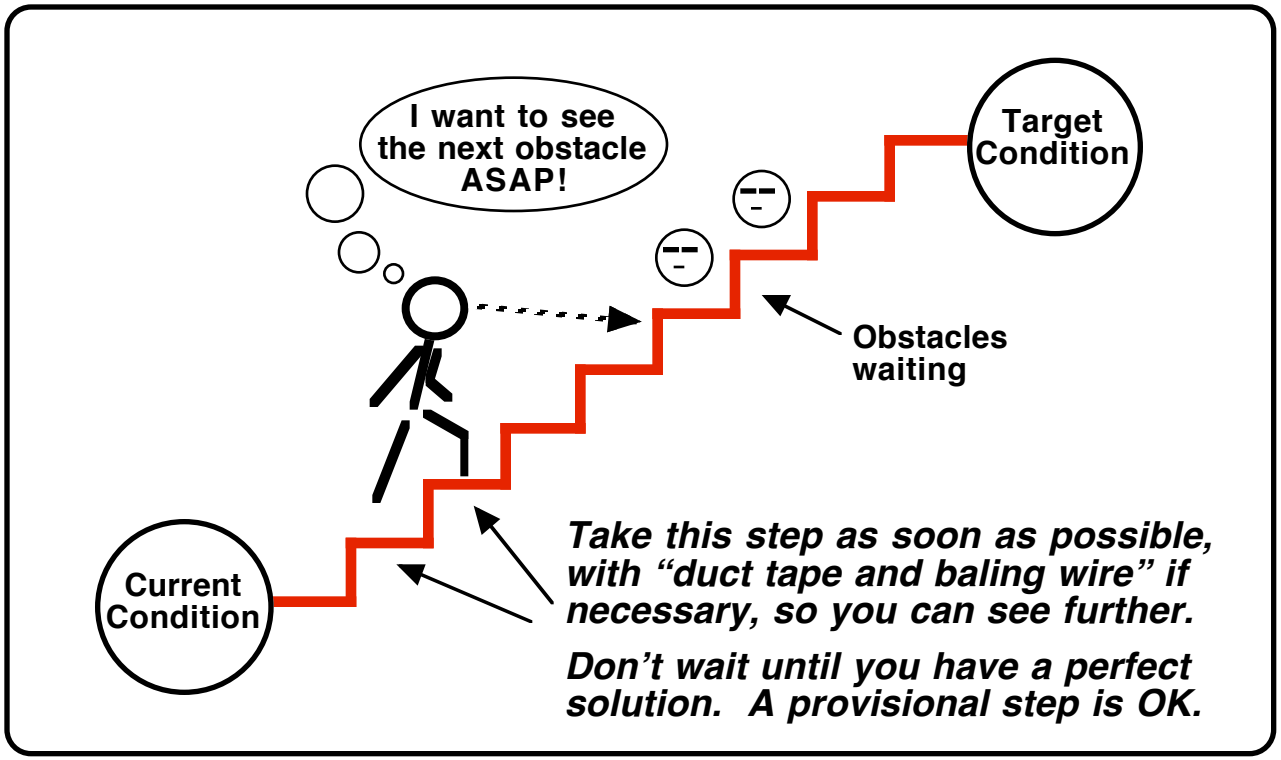
You'll only see the full path in hindsight. And you're probably not going to be taking the most direct route to the target condition.

DO THE EXPERIMENT NOW WITH WHATEVER YOU HAVE

Since it is refuted hypotheses (problems, abnormalities, unexpected results) that help us see the way forward, we are interested in seeing the next problem or obstacle ASAP. But since we can only see the next obstacle after we take a step, try to take that step ASAP.

Furthermore, single-factor experiments are too slow if each cycle takes a long time.

For these reasons individual PDCA cycles are turned as quickly as possible, sometimes even taking only minutes for one cycle.



KEEP IN MIND WHY WE EXPERIMENT

It's not: ***"Let's see if this target condition will work"***

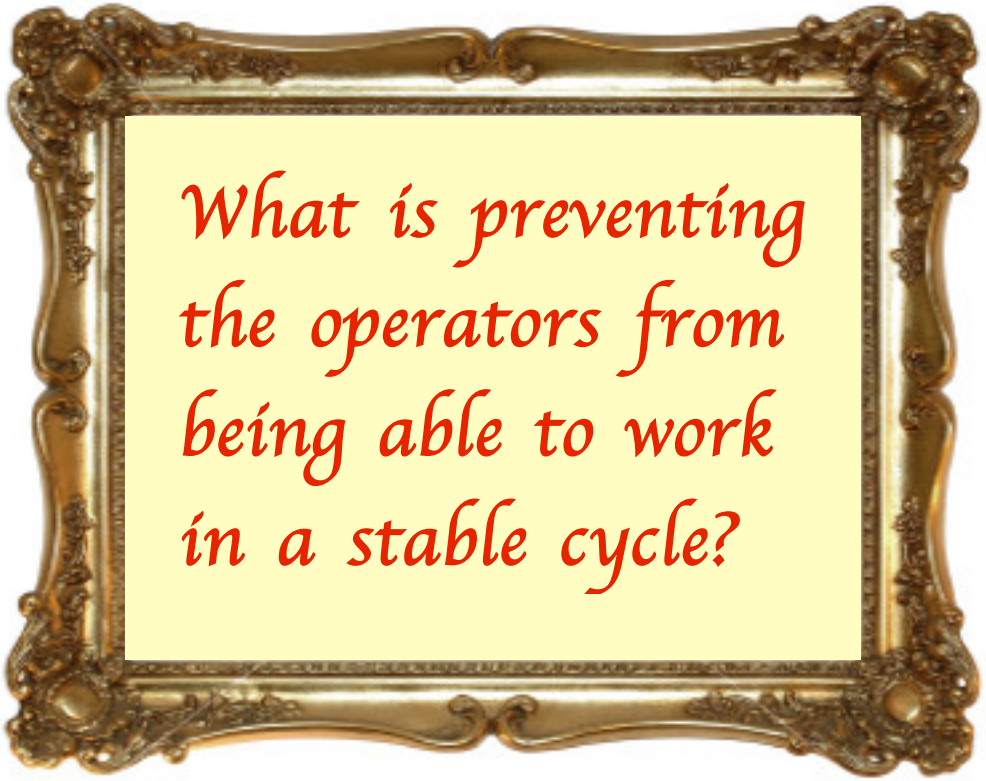
- but rather -

"Let's see what we need to do to make it work"

This is what many of us may think experimenting is about

"We already know it won't work at first. We're interested in seeing what doesn't go as planned, so we can learn what we need to work on."

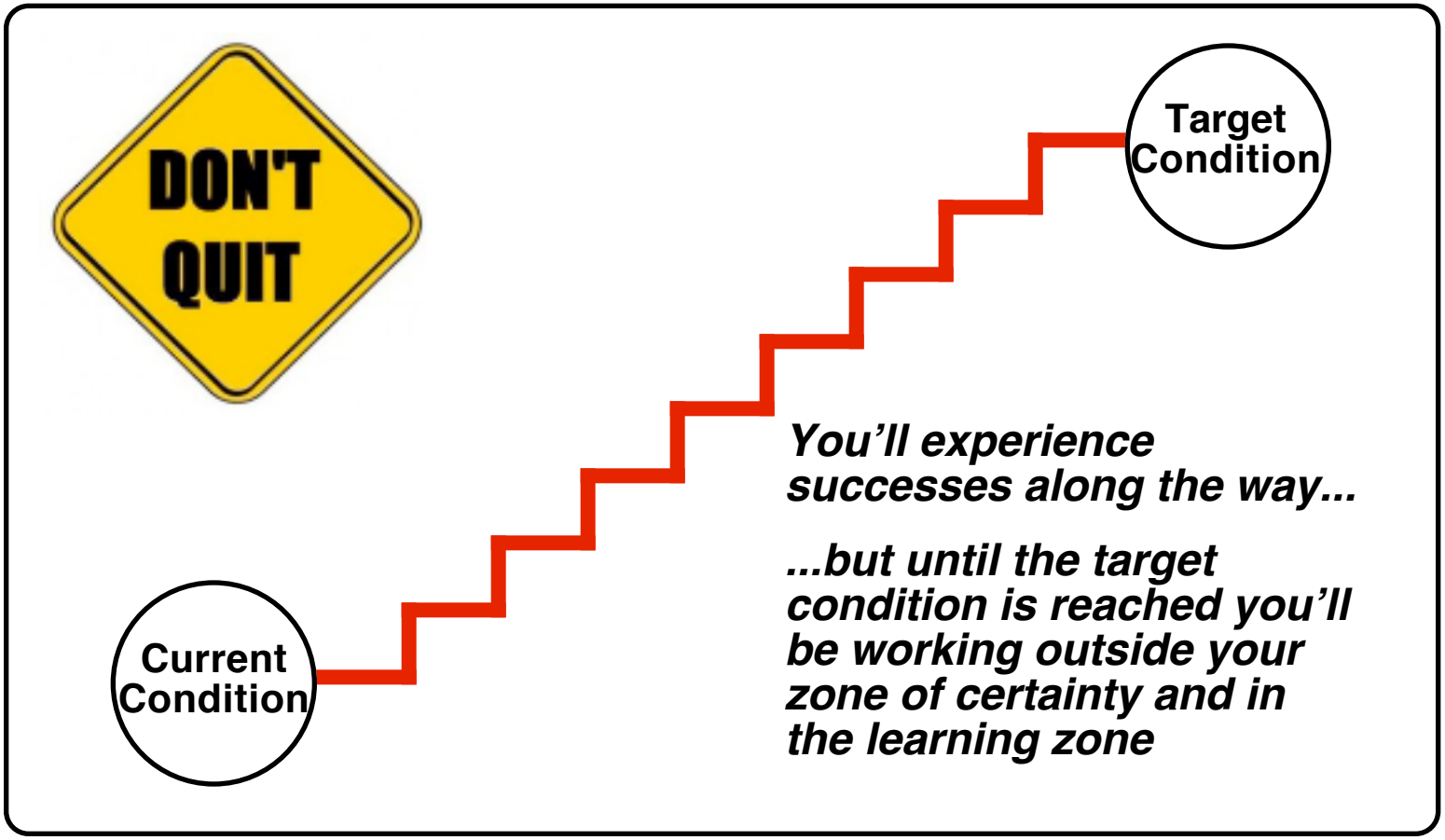
AND KEEP THIS QUESTION IN MIND



This perspective will keep you focused on the work process and help you work as a team

GET USED TO BEING IN THE *LEARNING ZONE*

It's where improvement, adaptiveness and innovation happen



Don't give up on the target condition! **The failures and obstacles you encounter are not reasons to abandon the target condition. They are the things you have to figure out and work through.**

PLEASE DEFINE YOUR FIRST EXPERIMENT ON THE WAY TO YOUR TARGET CONDITION

Step	What do you expect?

Note: A good first step is often just to try to run the process as described in the target condition, and observe what obstacles arise. Then you are on the way!

Teaching the Improvement Kata

THE COACHING KATA (Coaching Cycles)

Practice this Routine

WHAT TYPE OF COACHING IS THIS?

This is coaching for developing specific skills. The coach has a pattern in mind that s/he is trying to teach and turn into a habit.

THE COACHING KATA

This chapter is about how to run a mentor/mentee process in your organization, to coach people in the improvement kata method

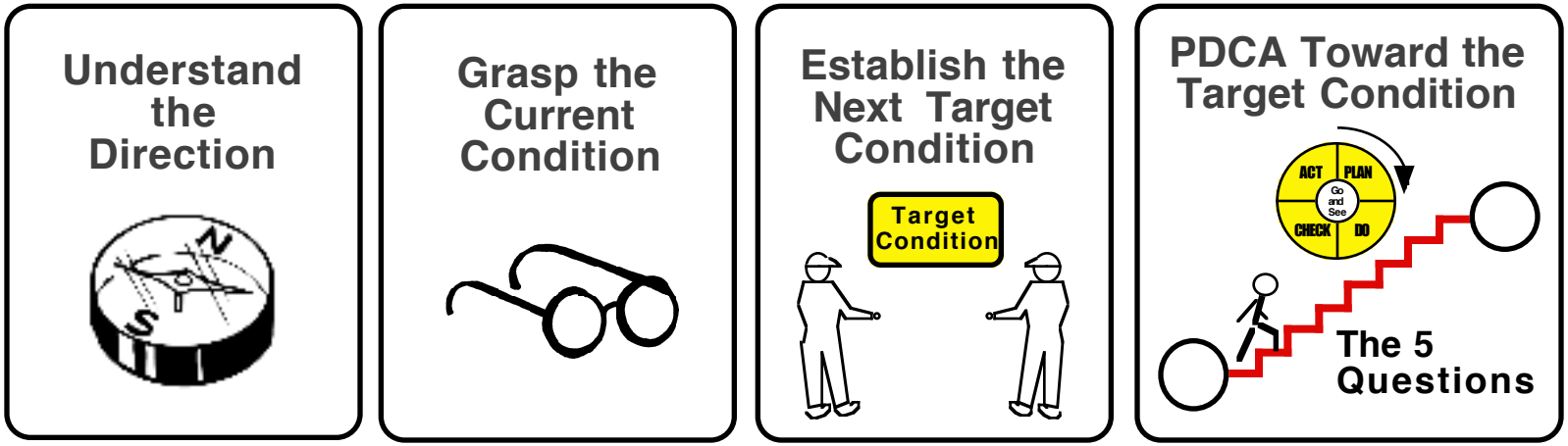
The routine of the improvement kata isn't inherently difficult, but it can be difficult to practice, because we're not used to it and default to the familiar.

As in sports and music, practicing a skill should be done under periodic observation and guidance of an experienced coach. Without coaching we lose our way and don't practice the right pattern, or practice ineffectively. Without coaching, a change in the learner's mindset is unlikely to occur.

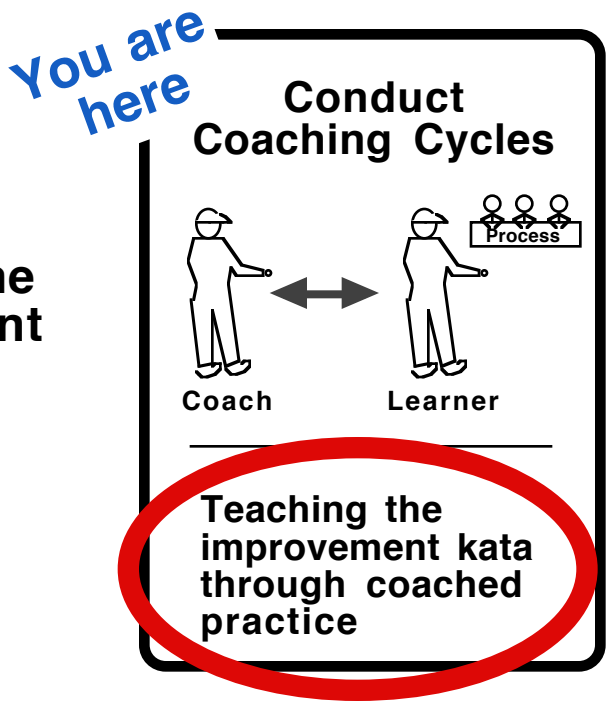
So there is a need for a coaching kata to compliment the improvement kata. That's what coaching cycles are.

ORIENTATION

The improvement kata

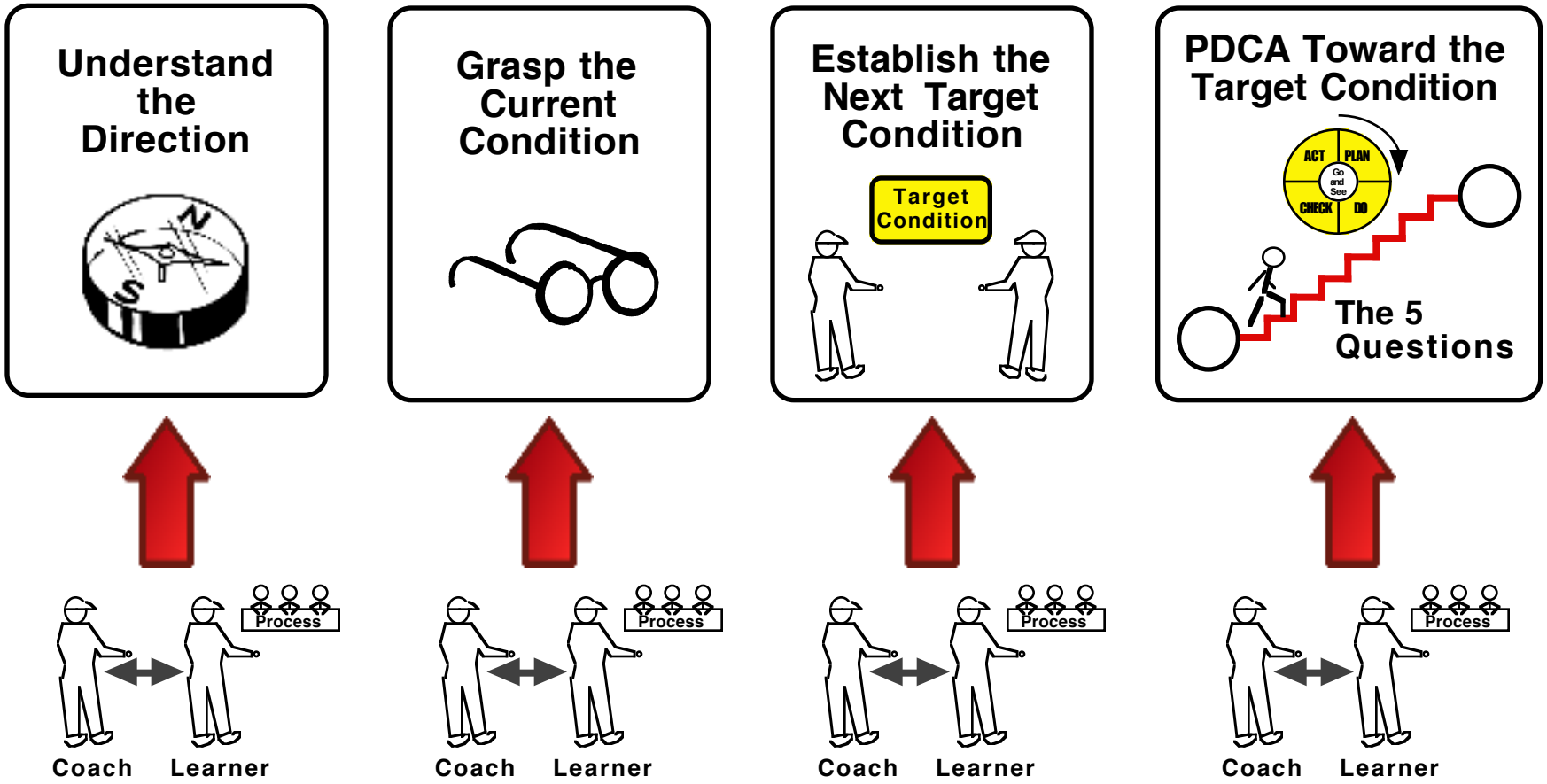


Teaching the improvement kata

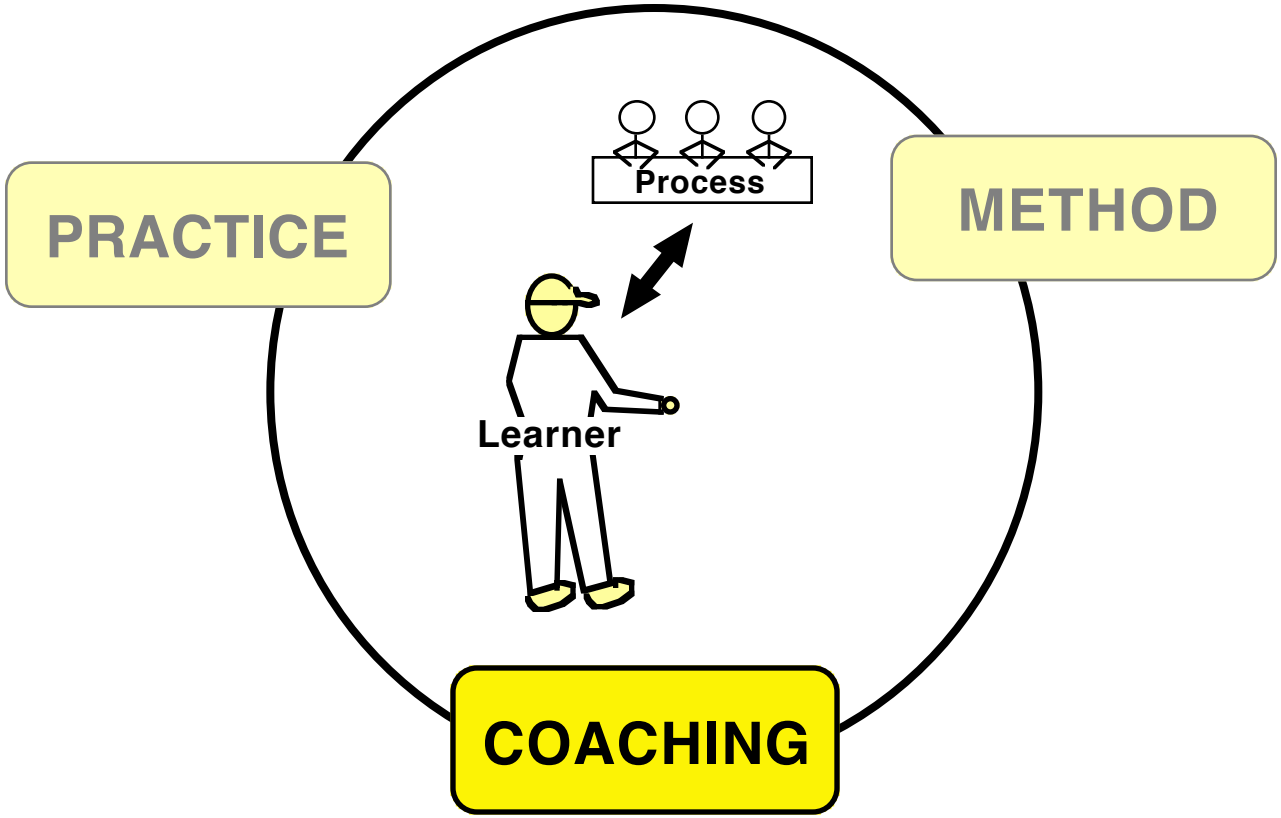


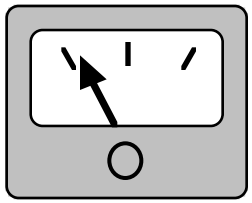
APPLICABILITY

Coaching cycles can be used at any stage of the improvement kata, although the "target condition" will differ from stage to stage



COACHING IS THE KEY VARIABLE





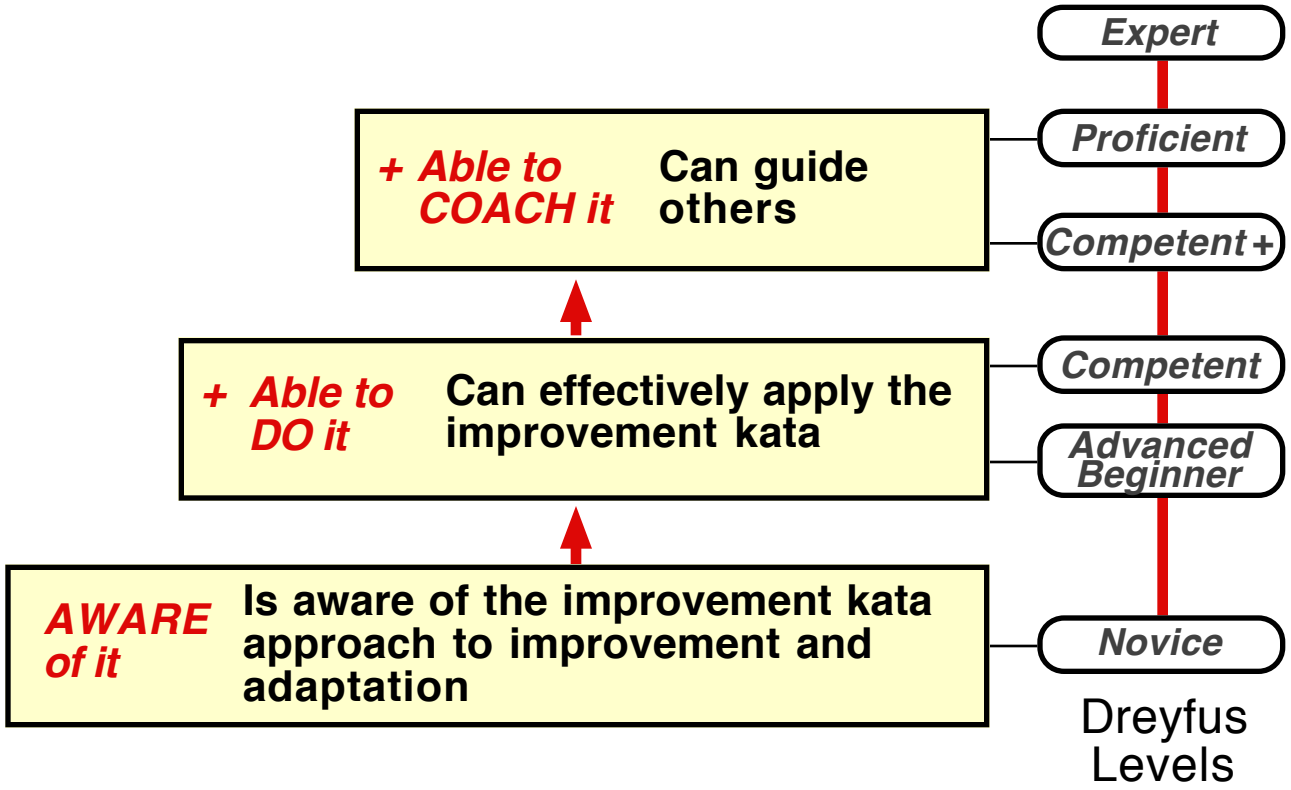
If the learner is not learning the improvement kata or if the process target condition is not being reached, examine the content of the coaching

QUALIFICATION FOR COACHING

Skilled coaching is essential

In order to guide learners through the improvement kata, the coach must have experience carrying out the improvement kata him or herself. Dreyfus level 3 (*Competent*) seems to be a minimum skill level for effective coaching.

Coaches also use the improvement kata themselves.

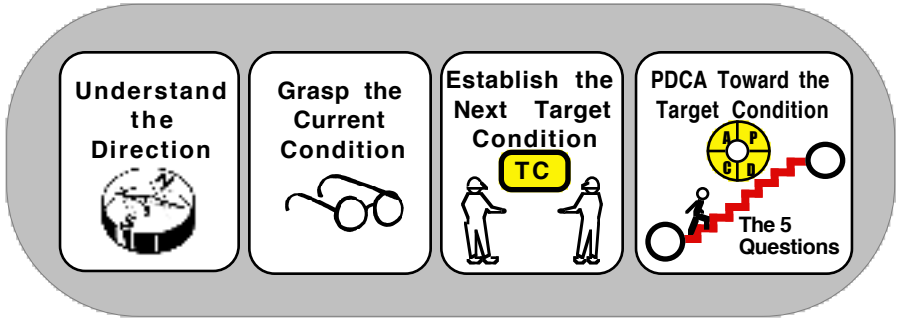


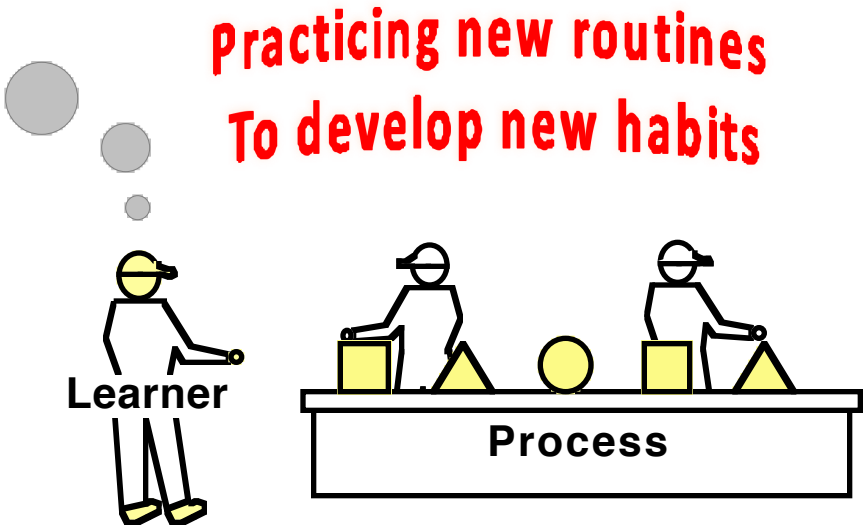
DEVELOPING PEOPLE WITH COACHING CYCLES

Coaching cycles are a management routine

Coaching cycles give you a standardized approach for facilitating improvement-kata skill development in daily work. The purpose of coaching cycles is to teach the improvement kata:

- **Coaching cycles are used to guide a learner through the steps of applying the improvement kata to a real work process.**
- **Coaching cycles are a way to guide and give feedback to learners in their improvement kata practice**





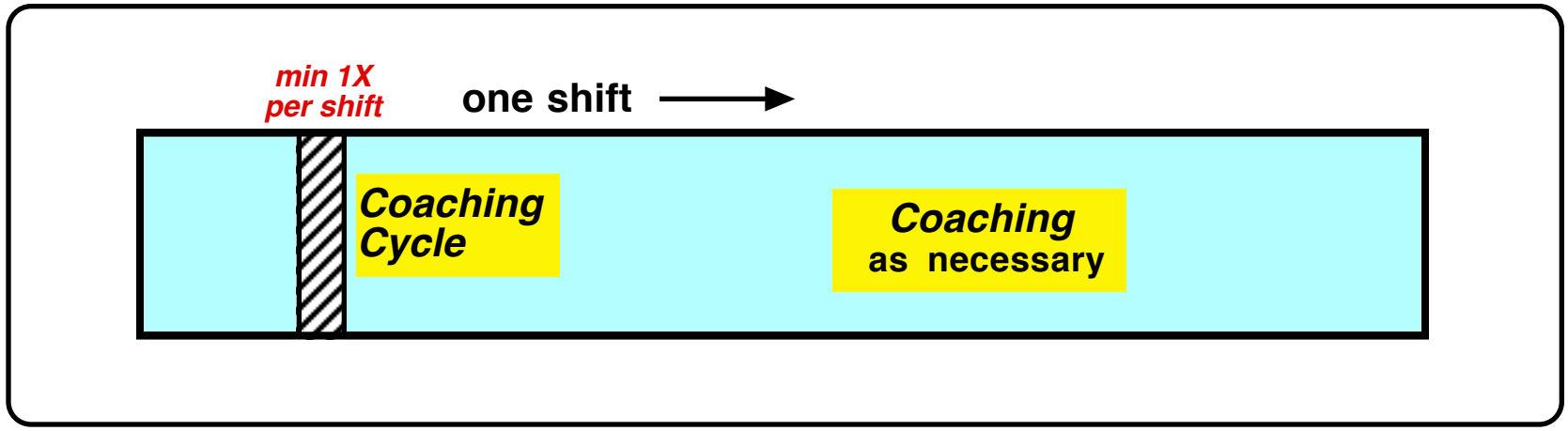
COACHING CYCLES FOR DAILY IMPROVEMENT KATA TRAINING PRACTICE

One coaching cycle involves a coach asking the learner the five questions, while at the process. I usually strive for this to be done at least once every shift, taking 10-15 minutes.

Note: it takes practice to get to 10-15 minute coaching cycles that are not just a formality.

Coaching cycles are conducted at regularly-scheduled times + spontaneously when the need arises. Coaching cycles should be incorporated into the manager's normal activities.

As necessary, after a coaching cycle the coach may opt to accompany the learner - which would be *coaching* - or simply to return for the next coaching cycle.



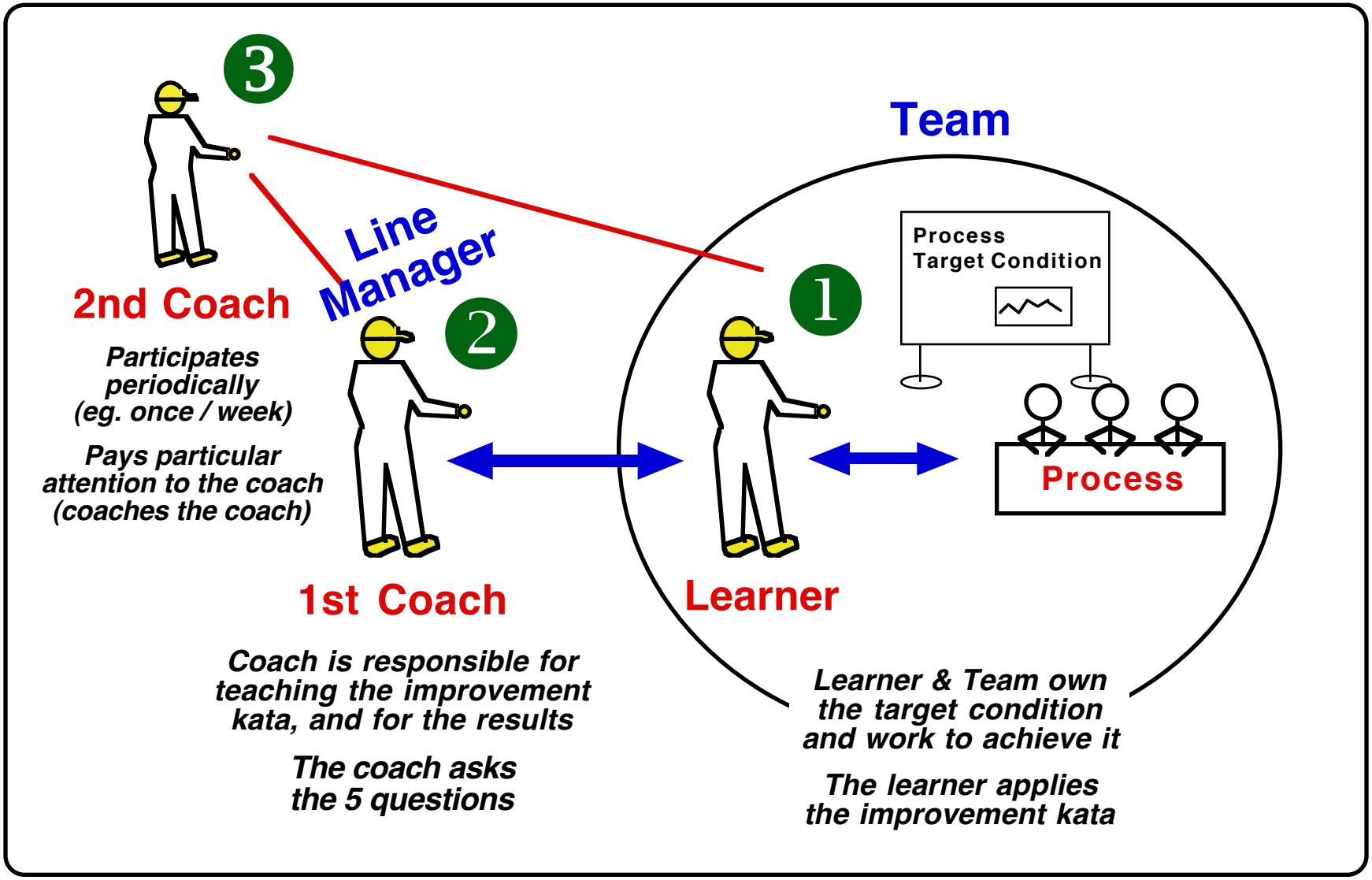
ONE COACHING CYCLE = THE 5 QUESTIONS

THE FIVE QUESTIONS

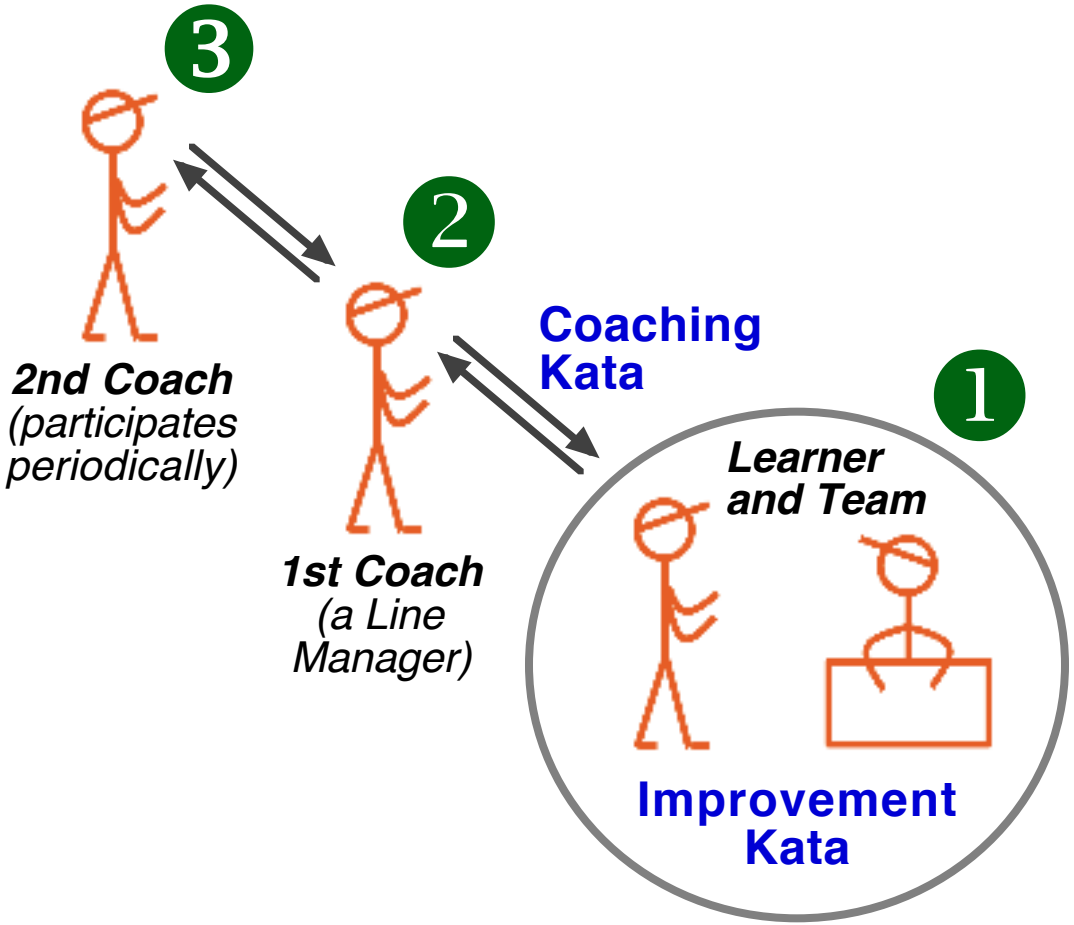
1. What is your target condition here?
2. What is the actual condition now?
3. What obstacles are now preventing you from reaching the target condition?
   Which one are you addressing now?
4. What is your next step?
   (start of the next PDCA cycle)
5. When can we go and see what we have learned from taking that step?

See *Toyota Kata*, pages 155 and 246-249

THE PLAYERS


3
Team
Line Manager
2nd Coach
Participates periodically (eg. once / week)
Pays particular attention to the coach (coaches the coach)
2
1
Process Target Condition
Process
1st Coach
Learner
Coach is responsible for teaching the improvement kata, and for the results
The coach asks the 5 questions
Learner & Team own the target condition and work to achieve it
The learner applies the improvement kata

THE ROLES



2nd Coach *(Master Coaches)*:
Coaches the coach. Helps the manager develop his or her coaching skills. hecks that coaching occurs daily according to the coaching kata. Ensures that the environment (time, organizational structure, etc.) is supportive.

1st Coach / Line Manager *(The Teachers)*:
Responsible for teaching the improvement kata and for the team's results. Conducts coaching cycles frequently using the 5 questions. Ensures the learner is working and practicing scientifically and experimentally according to the improvement kata. The coach's job is to develop the learner, not to improve the process.

Learner and Team *(The Process Owners)*:
Responsible for required performance in the required time and quality, and for improving the process with the improvement kata. Learner conducts experiments with PDCA and develops solutions, in dialogue with process operators and 1st Coach.

GUIDELINES FOR SKILL-BUILDING PRACTICE

1) **First get a picture of the whole skill**
2) **Then break the skill (the kata) into elements** ***(Chunking)***
   - **Identify the important elements / routines to be practiced**
3) **Repeatedly practice an element** ***(Spaced repetition)***
   - **Short daily practice is better than massed practice**
4) **Practice at the edge of your capability**
   - **Learning a skill involves making small errors and working on those points**
5) **Practice slowly at first** ***(Slow down to speed up)***
   - **Learn the basic routine / pattern first. As you learn to do the routine without thinking about each step, speed will come.**
   - **Beginners should try to follow the form closely. As you move up in skill level, then you can adjust how the routine is applied. (See the *Dreyfus Levels*)**
6) **Get feedback (periodic, not constant) from your coach**
   - **You have to be able to detect your errors**
7) **You have to want to learn the skill**
   - **You have to be motivated in order to weave new neural pathways, although that motivation may come along the way**

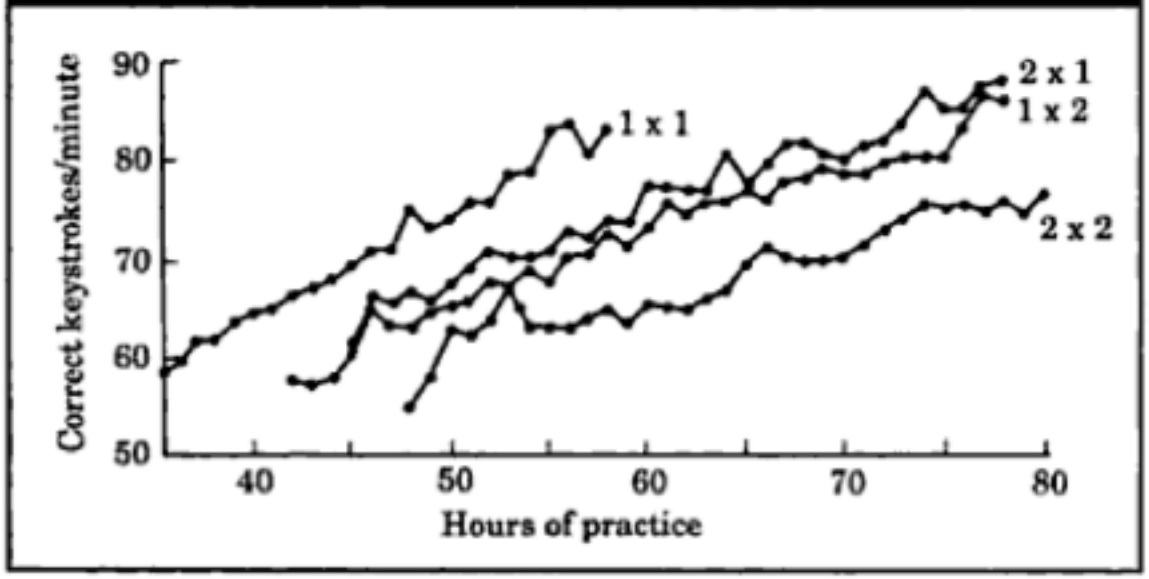
Sources: *The Talent Code* by Daniel Coyle, *Talent is Overrated* by Geoff Colvin, *Human Memory: Theory and Practice* by Alan Baddeley, Bjork Learning and Forgetting Lab (UCLA)

SPACED REPETITION DEVELOPS SKILLS AND HABITS

To develop new habits and maintain them, it is generally better to train for a short time frequently, than in massed training sessions.

Example

Rate of learning a keyboard in 4 groups of learners



Human Memory: Theory and Practice by Alan Baddeley, page 110

Practice schedules:

1 x 1 = 1 hour per day

2 x 1 = 1 hour twice a day

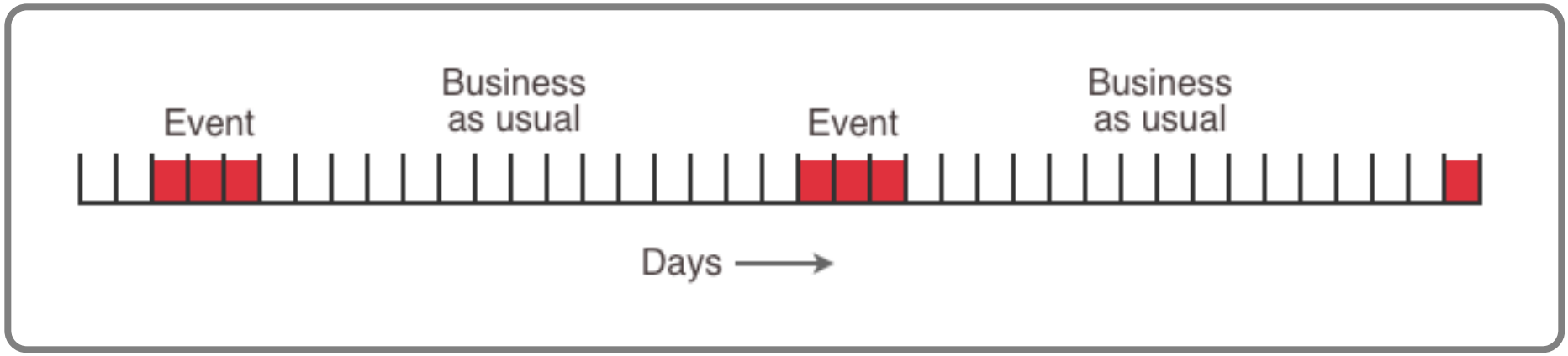
1 x 2 = 2 hours once a day

2 x 2 = 2 hours twice a day

Generally, skills are best learned when practiced little and often

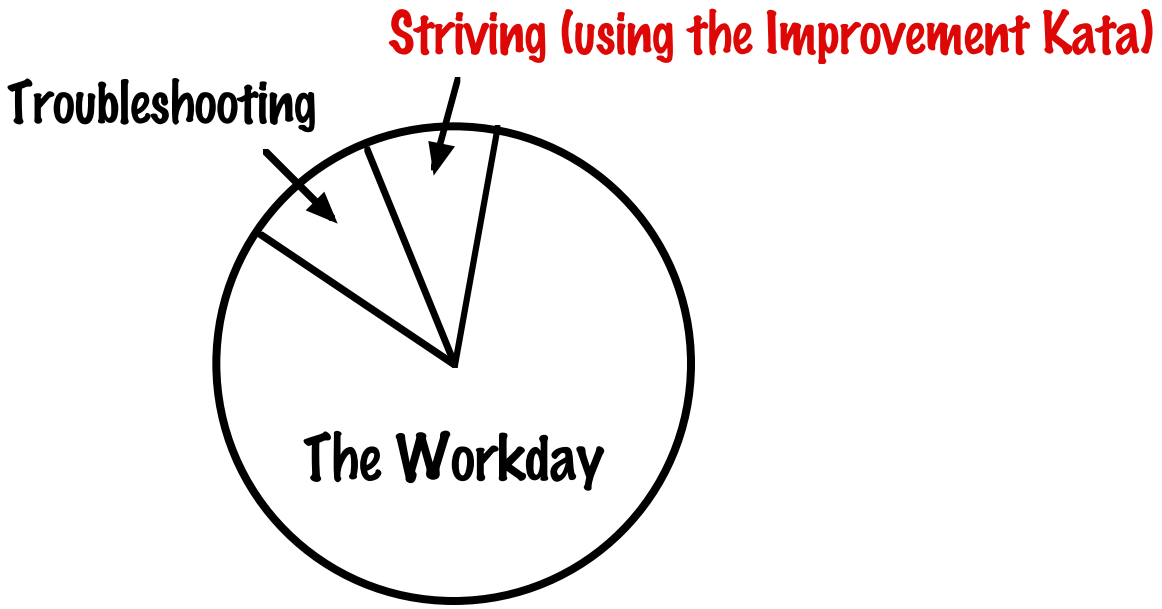
SO THE PRACTICING SHOULD BE PART OF EVERY DAY'S WORK

According to the neuroscience, if you only periodically conduct a training event or only episodically work on improvement, and the rest of the time it's business as usual, then what you are actually teaching is business as usual.



This leads to a shift in emphasis, from periodic improvement led by lean staff to daily improvement coached by line managers

BUT THE PRACTICING ONLY HAS TO BE A SLICE OF THE DAY



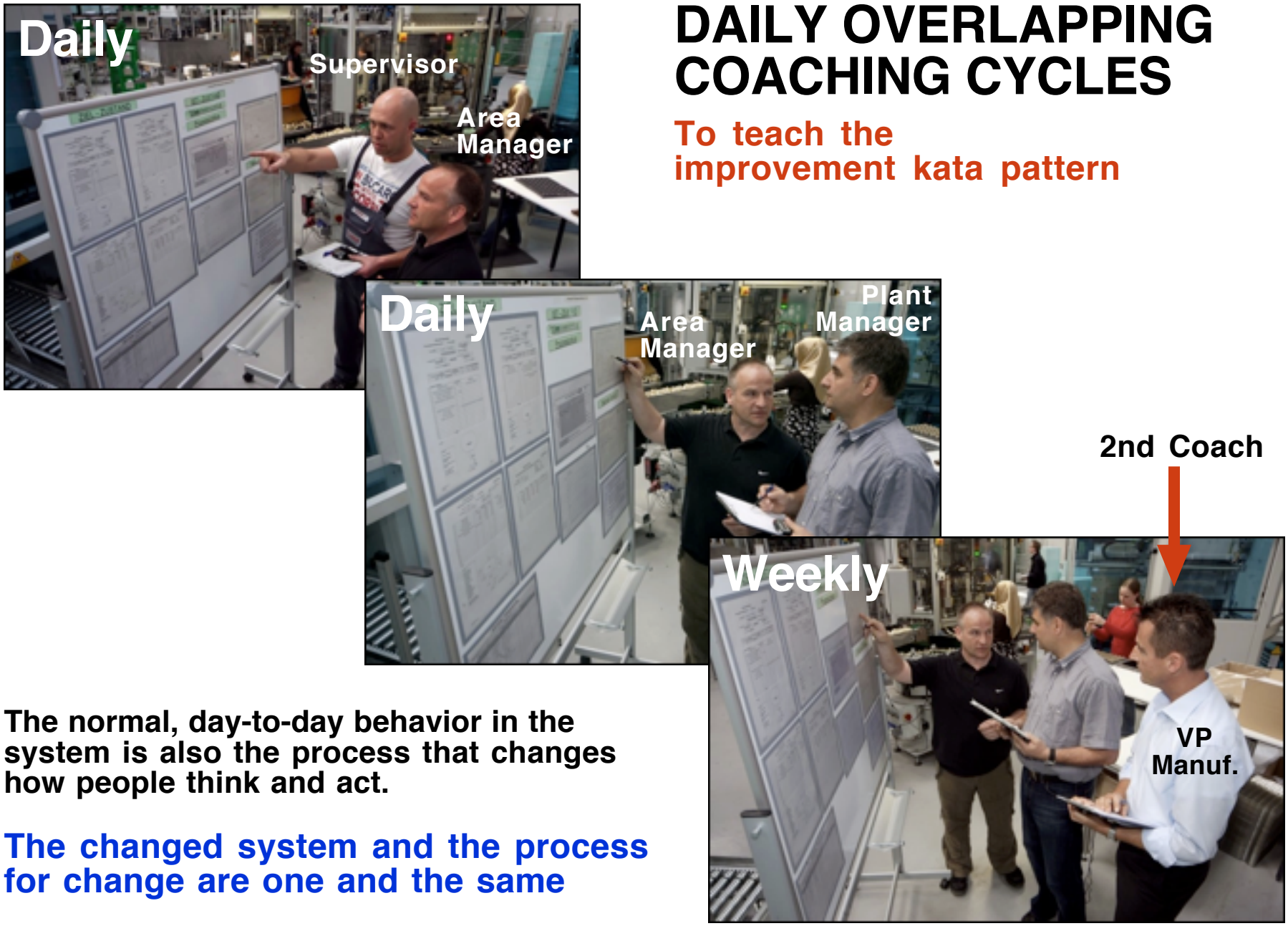
You only need to ensure:

- **That a portion of everyone's workday involves striving for a target condition**
- **That an associated coaching cycle takes place at least once per day**

A COACHING CYCLE

DAILY OVERLAPPING COACHING CYCLES

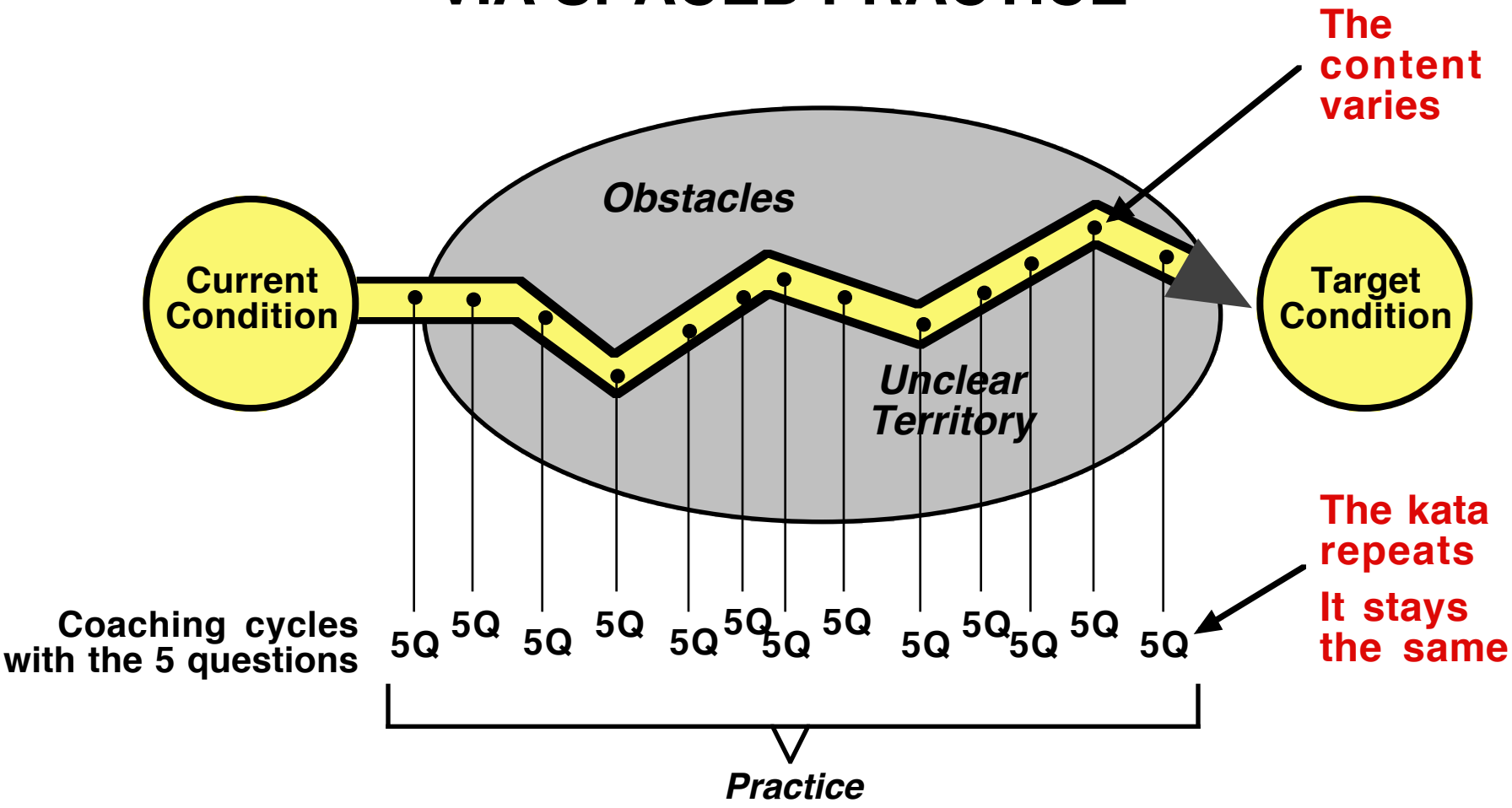
To teach the improvement kata pattern



The normal, day-to-day behavior in the system is also the process that changes how people think and act.

The changed system and the process for change are one and the same

What You Are Doing with Coaching Cycles:
DEVELOPING IMPROVEMENT KATA HABITS VIA SPACED PRACTICE



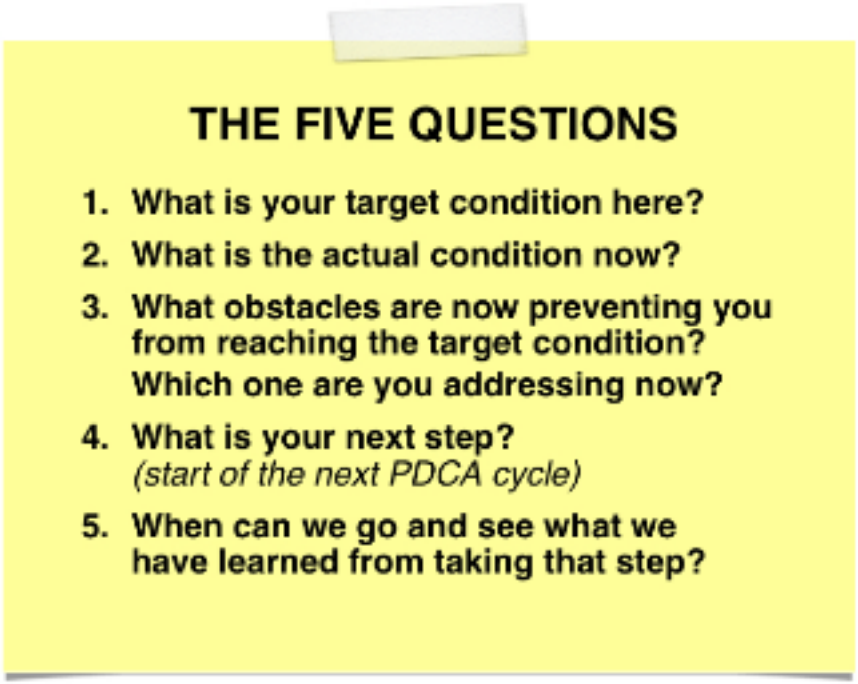
The pattern of the improvement kata is what is being taught

INSTRUCTIONS

FOR CARRYING OUT COACHING CYCLES

OVERVIEW - About Coaching Cycles

- The five questions provide a roadmap appropriate for any situation.



- The coaching cycle does not judge success or failure.
- Schedule coaching cycles early in the day, so the learner can take the next step (do the next experiment) that day.
- Coaching cycles typically take 10-15 minutes. But it requires practice and PDCA to get them to be effective and that short.

About Coaching Cycles

- **A coaching cycle is an interaction, not an audit or surprise check. The learner knows when the coach is coming, what s/he will ask (the 5 questions) and prepares the information in advance of the coaching cycle.**

  Coaching cycles should be framed as dialogues, not lectures or debates. Novice learners may perceive coaching as meaning they did something wrong, but the purpose is *not* to control or to get people to do what they say.

  There should be a genuine interest in both parties in the target condition you are trying to achieve, what you are learning and what will be the next experiment on the way.

It's not:

"Let's see if s/he got it done"

But rather:

To learn what we need to work on next to achieve the target condition

and

To see if the learner is operating in the corridor of the improvement kata

FOCUS OF A COACHING CYCLE

Coaching cycles focus on teaching the improvement kata and on striving toward a target condition, not merely on audit and compliance

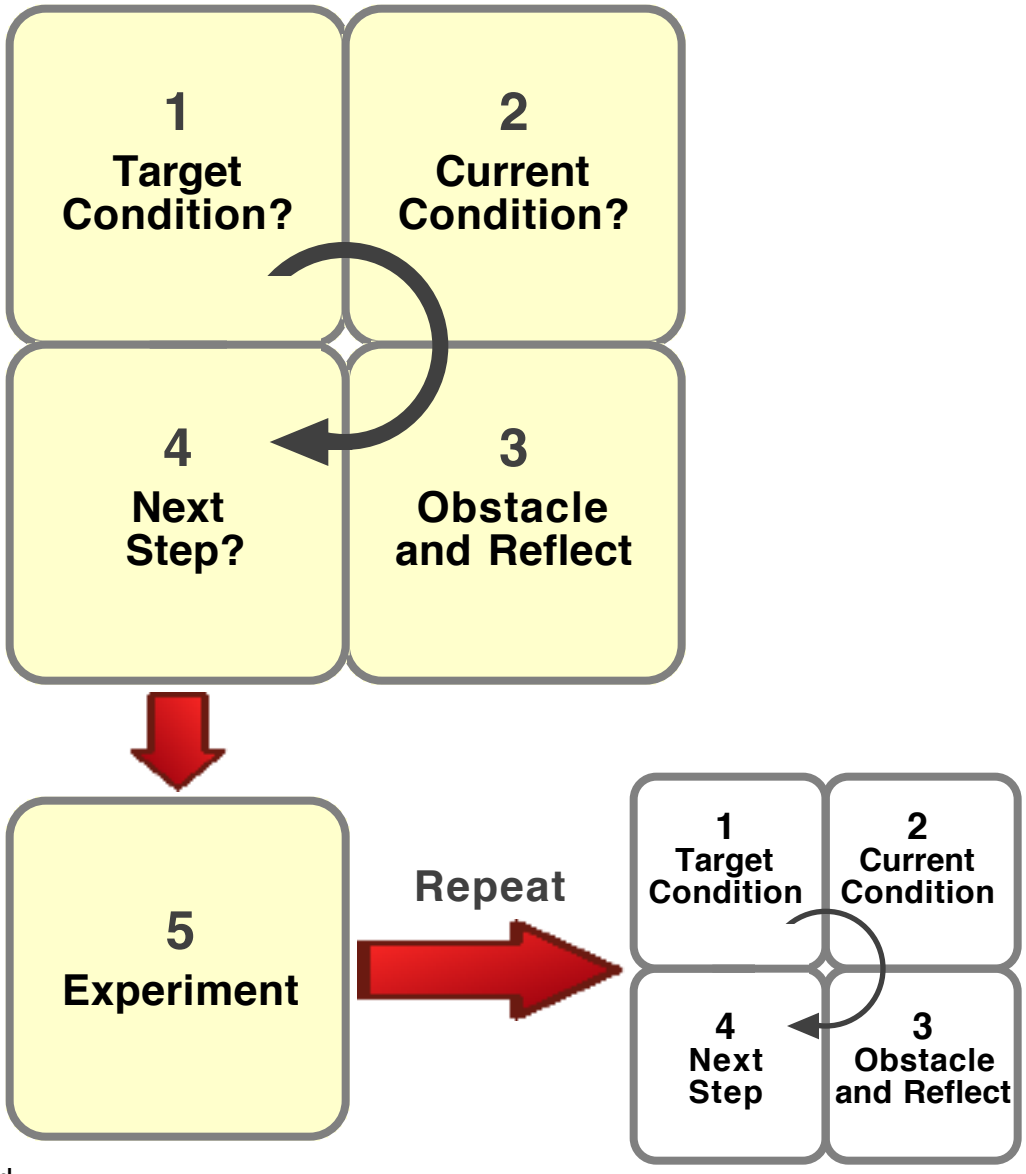
It's this...

...not just this

OVERVIEW - About the Coach

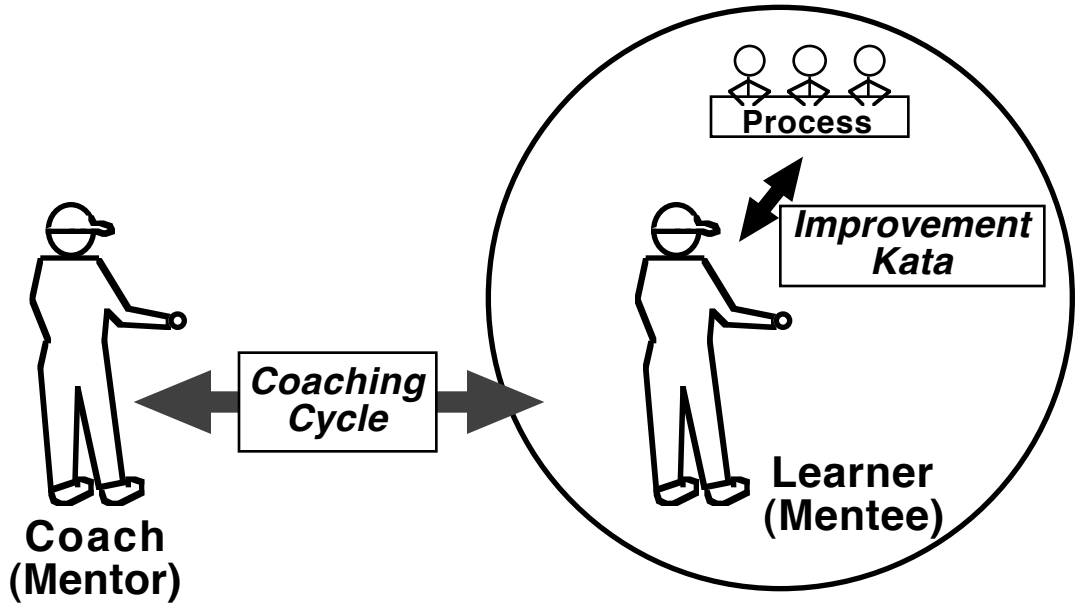
- **The improvement kata demands of the manager/coach a willingness to adopt a different approach to their staff. The manager may even face initial resistance from some of their people, who are wary of a departure from traditional management.**
- **Coaches require several skills:**
  - **They must know the pattern of the improvement kata from personal experience**
  - **They must be good observers and discussion leaders**
  - **They must be knowledgeable about the work process being improved**
- **The coach asks questions but without causing defensiveness.**
- **The coach should guide the coaching cycle, rather than direct it.**
- **The coach should remain unbiased throughout the coaching cycle.**
- **The coach should not dominate the coaching cycle or lobby for preferred solutions.**
- **Part of the coach's role is to give the novice learner a level of comfort with the unpredictable path to the target condition, by accompanying the learner and teaching the systematic, scientific improvement kata approach.**

THE COACHING-CYCLE PATTERN



Based on a diagram by Don Clark
http://nwlink.com/~donclark/leader/leader.html

PURPOSE OF A COACHING CYCLE



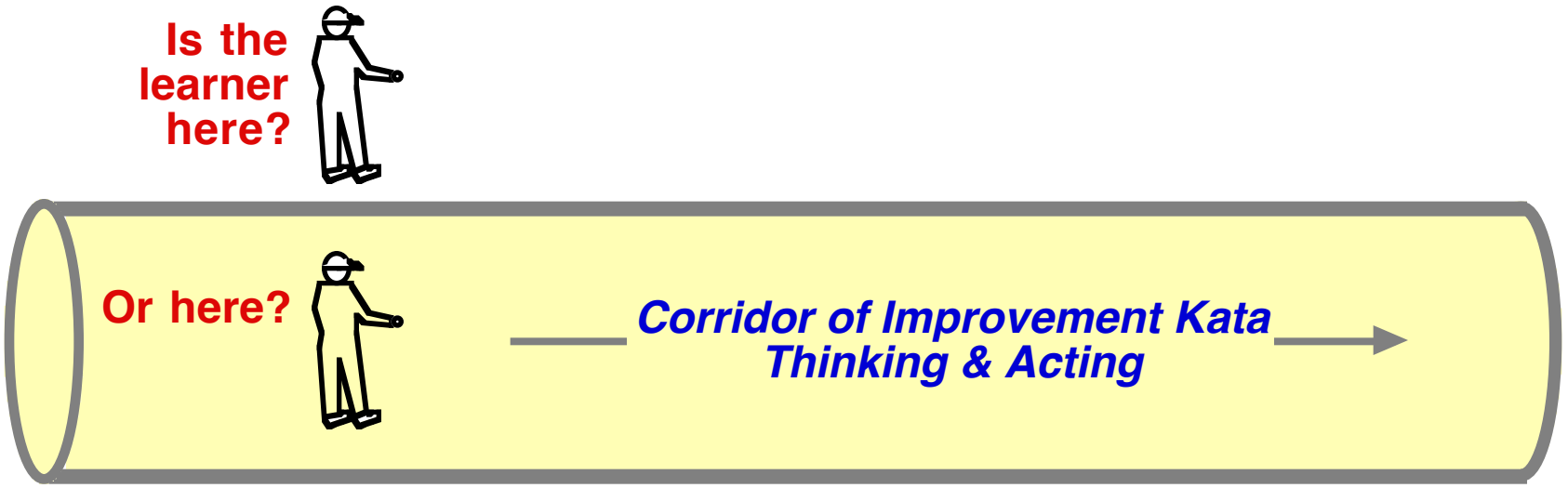
- For the coach to assess the current status of
  --> the process
  --> the learner (& provide guidance as necessary)
- To find the current knowledge threshold and have the learner build a chain of PDCA cycles (what is learned from one PDCA cycle leads to the next PDCA cycle)
- To help teach the improvement kata pattern through repeated practice

WHERE IS THE LEARNER? (1)

The coach is checking that the learner is using the IK correctly.
The 2nd coach is checking that the coach is teaching the IK correctly.

One of the coach's tasks is to determine whether or not the learner is operating within the corridor of thinking and acting prescribed by the improvement kata.

The coach does this by asking questions and by observing the learner in action. The coach is comparing the learner's pattern of thinking and action with the pattern of the improvement kata.



If the learner is outside the improvement kata corridor, the coach either provides an input or allows a small failure to occur and then provides input.

WHERE IS THE LEARNER? (2)

The coach is watching for the current knowledge threshold

There is always a *knowledge threshold*.

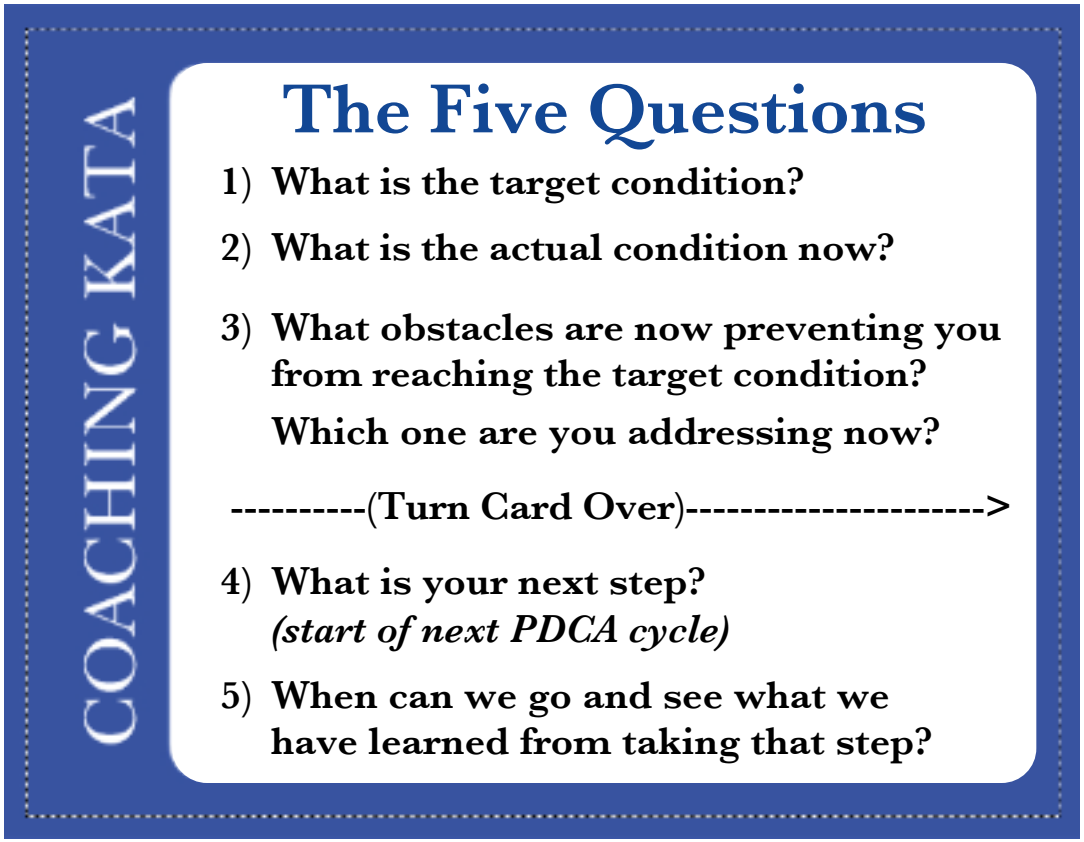
At any point in asking the five questions the coach may notice that a knowledge threshold has been reached.

When answers become imprecise ("I think" / "maybe" / "could") it's a signal that a knowledge threshold has been reached.

The knowledge threshold is the "learning edge." This is often where the next experiment (next PDCA cycle) lies.

Don't try to move beyond a knowledge threshold via conjecture. That becomes theoretical and wastes time. See further by experimenting.

COACHING KATA REFERENCE CARD



BACK OF CARD

Reflect on the Last Step Taken

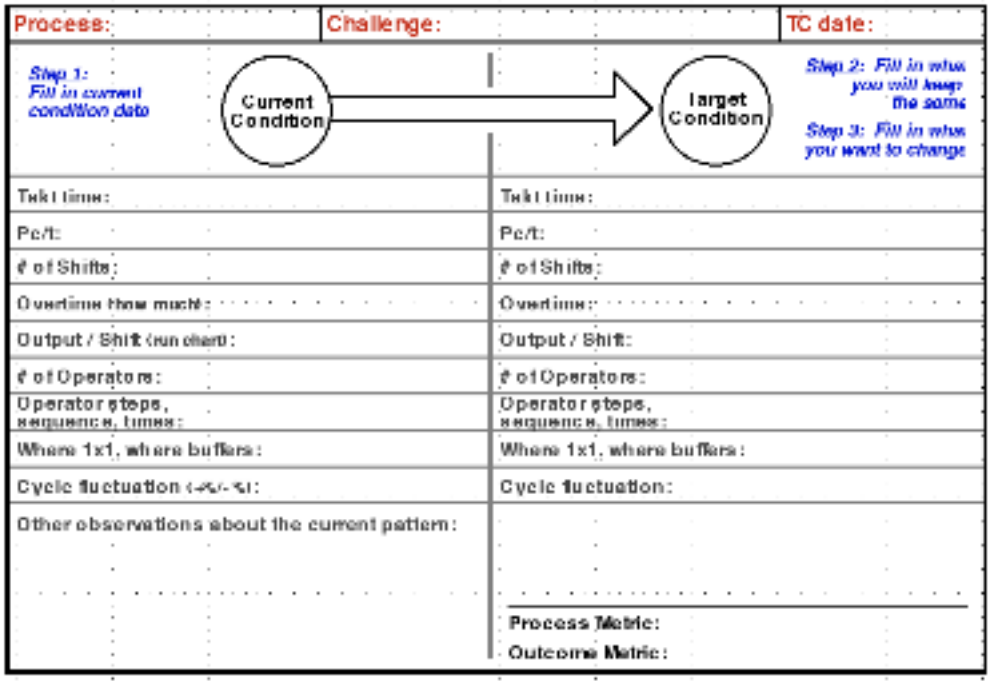
1) **What was your last step?**
2) **What did you expect?**
3) **What actually happened?**
4) **What did you learn?**

---------->
Return

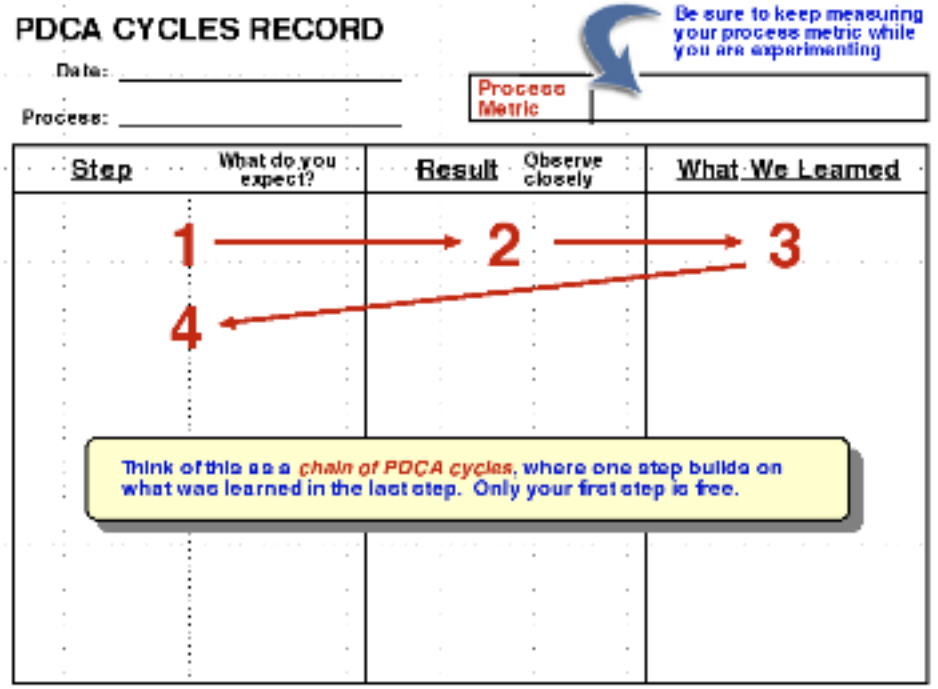
DOCUMENTS USED IN COACHING CYCLES

Refer to at least these 5 items in your coaching cycles, + other data you need

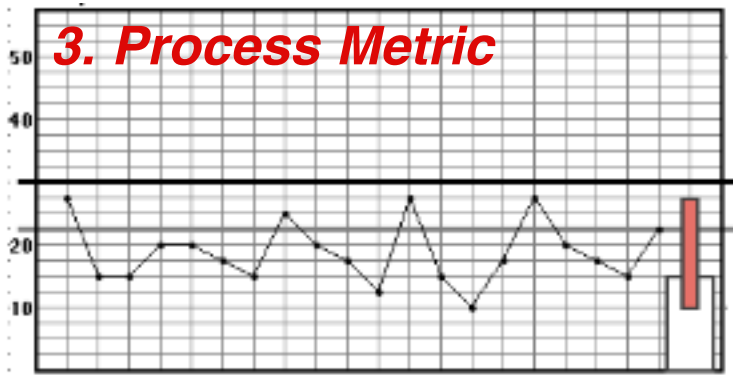
1. Target Condition Form



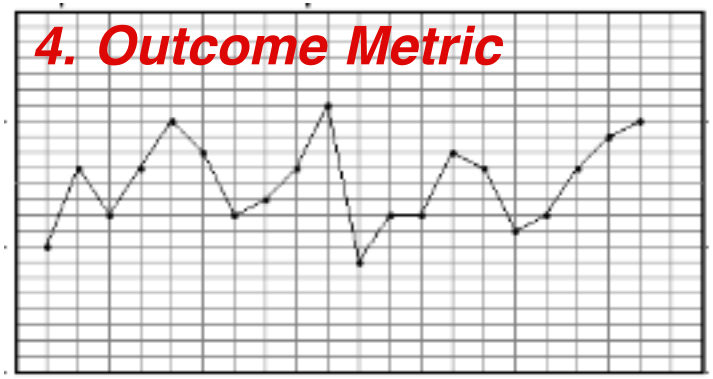
2. PDCA Cycles Record



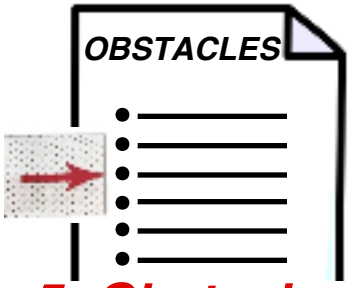
3. Process Metric



4. Outcome Metric



5. Obstacles Parking Lot

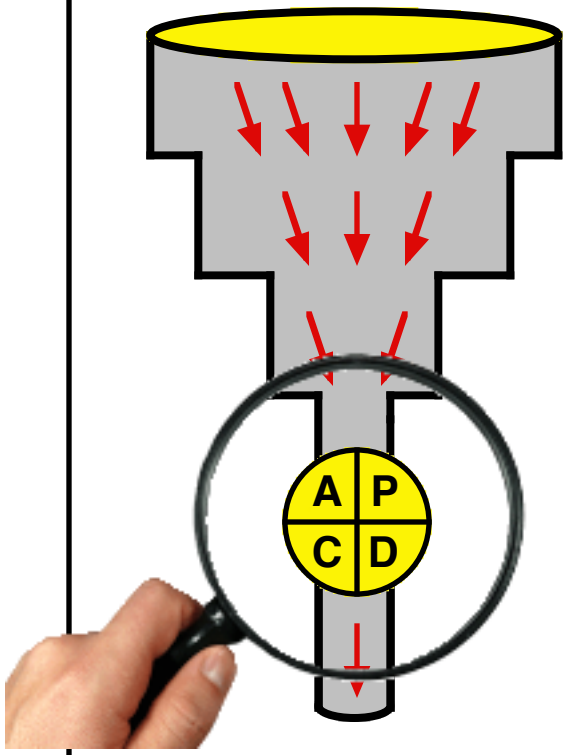



The
1 2 3 4 5
Questions
In Detail

A COACHING CYCLE SHOULD LEAD TO SOME KIND OF EXPERIMENT

The coach guides the learner into making a chain of PDCA cycles, where one step builds on what was learned in the last step.

In most cases the dialog of one coaching cycle should focus down to one PDCA cycle. (That PDCA cycle may be as simple as "go and see.")



1) What is the target condition?
2) What is the actual condition now?

Framing questions

3) What obstacles are now preventing you from reaching the target condition?

   Which one are you addressing now?

Focus & reflect

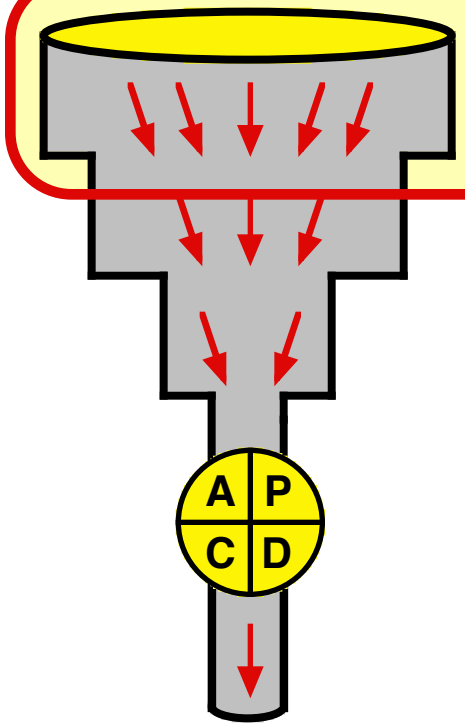
4) What is your next step? (start of next PDCA cycle / experiment)

The next experiment

5) When can we go and see what we have learned from taking that step?

Prep for next cycle

ORIENT YOURSELVES



1) What is the target condition?

2) What is the actual condition now?

3) What obstacles are now preventing you from reaching the target condition?

   Which one are you addressing now?

4) What is your next step?
   (start of next PDCA cycle / experiment)

5) When can we go and see what we have learned from taking that step?

TIPS FOR QUESTIONS 1 & 2

Target Condition / Current Condition

- **Consensus on both the target condition (question 1) as well as current actual performance (question 2) is essential to avoiding endless debates.**

- **Question 2 requires a good grasp of the actual current condition, which is more difficult to obtain than it appears.**

  The coaching-cycle dialog should rely on current facts and data as much as possible, which the learner collects and prepares *before* the coaching cycle.

- **Don't skip over questions 1 & 2. Even if it seems a bit like play-acting, go through all 5 questions in each coaching cycle.**

- **At the start learners usually set target conditions that are too ambitious.**

  It's a good idea limit a novice learner's first target condition to a target date of 1 week out or less (see *Establishing a Target Condition* in this handbook), so the learner can experience the entire improvement kata pattern and have some success.

  As the learner moves up in the Dreyfus levels the target condition can have a longer horizon.

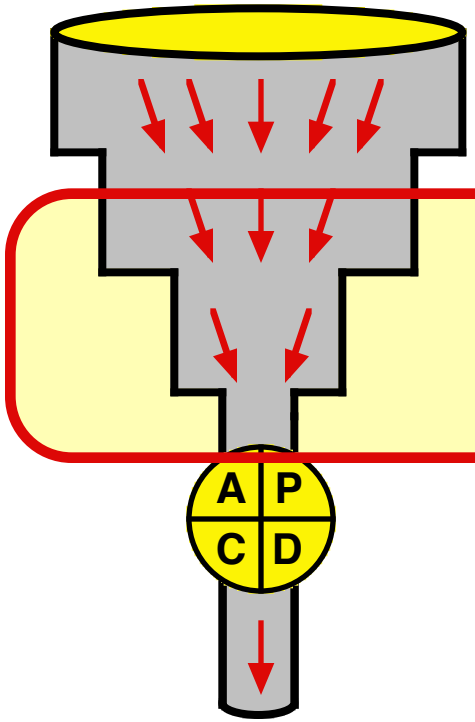
TIPS FOR QUESTIONS 1 & 2

Target Condition / Current Condition

- **Question 1: Some good phrases to use are:**
  - ***"Show me the desired steps, sequence and times."***
  - ***"What is the process metric?"***
  - ***"What is the outcome metric?"***

- **Question 2: A good phrase to use is:**
  - ***"Show me current facts and data."***

FOCUS AND REFLECT



1) What is the target condition?

2) What is the actual condition now?

3) What obstacles are now preventing you from reaching the target condition?

Which one are you addressing now?

4) What is your next step?
(start of next PDCA cycle / experiment)

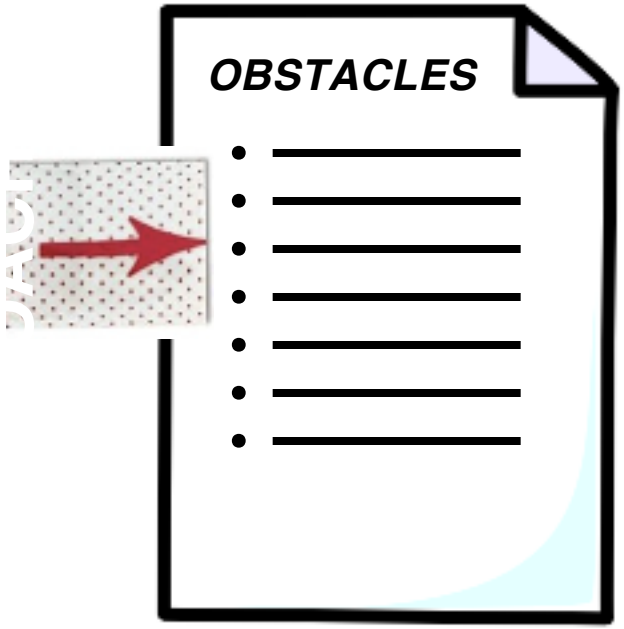
5) When can we go and see what we have learned from taking that step?

Once you get going, do this after Q3:

Reflect on the last step taken

USE AN OBSTACLES PARKING LOT

Coach and learner should use an Obstacles Parking Lot to record obstacles encountered on the way to the target condition



- **Do not Pareto this list. This is not an action-item list. It's simply a place to record obstacles you may or may not address.**
- **Use a Post-It arrow to indicate the obstacle currently being addressed.**

TIPS FOR QUESTION 3

Focus and reflect

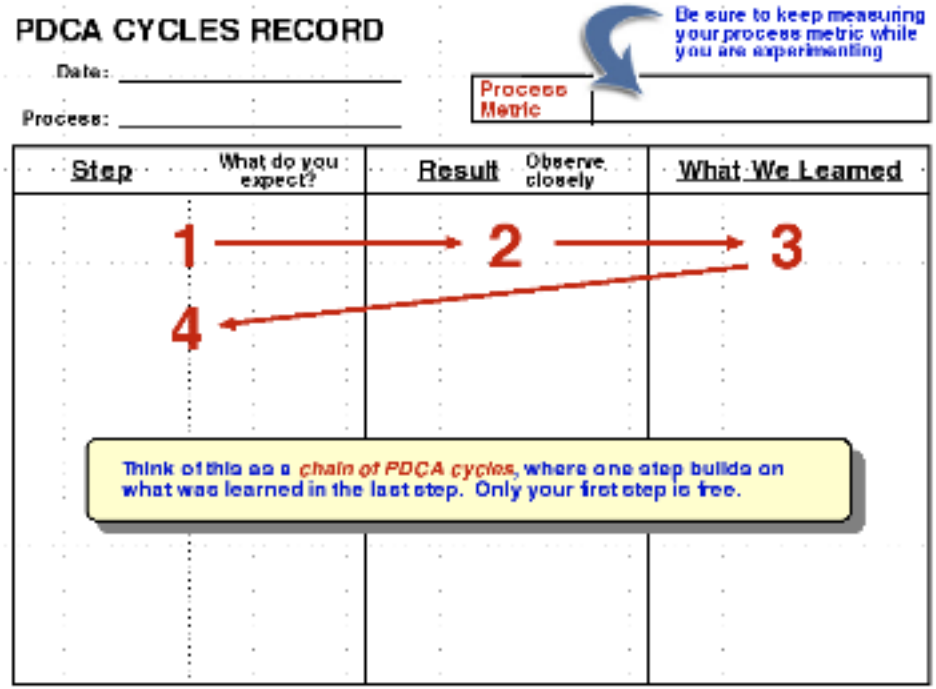
- There are always obstacles. Focus on one at a time.
- Don't worry about selecting the biggest or most important obstacle. Just get started. The path will unfold as you experiment.
- Don't focus on what you *think* are obstacles. Try out a hypothesis and see what obstacles *actually* arise. Ideally the focus obstacle will come from a prior experiment, wherein you compared what a pre-defined expectation (hypothesis) with what actually happened.
- Novice learners often view obstacles as a reason to change the target condition. This is a critical junction, and the coach should ask, *"Is that a reason not to pursue our target condition, or only an obstacle to it?"*
- The solution to an obstacle comes along the way. You find it by iteratively trying, failing, adjusting and trying again. It's in the doing that the idea comes.

REFLECTING ON THE LAST STEP TAKEN

Once the focus obstacle is determined or reiterated, the coach asks the following questions

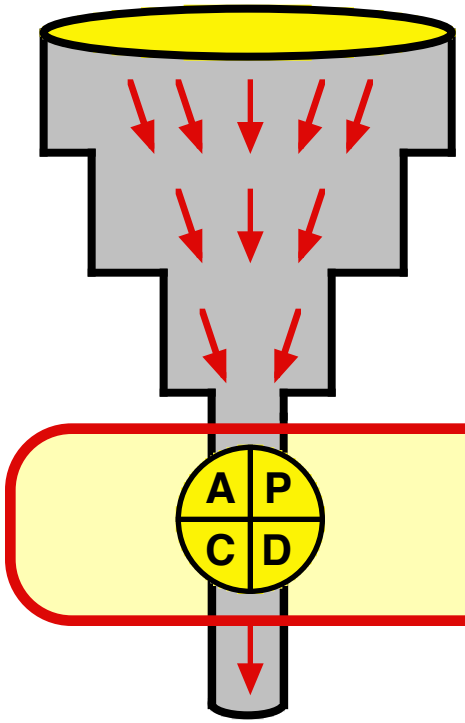
1) ***What was your last step?***
2) ***What did you expect?***
3) ***What actually happened?***
4) ***What did you learn?***

Refer to the PDCA Cycles Record when asking these questions



SET UP THE NEXT EXPERIMENT

Spend time planning the details of the next experiment.
Set up a good PDCA.



1) What is the target condition?

2) What is the actual condition now?

3) What obstacles are now preventing you from reaching the target condition?

   Which one are you addressing now?

4) What is your next step?
(start of next PDCA cycle / experiment)

5) When can we go and see what we have learned from taking that step?

TIPS FOR QUESTION 4

The next experiment

- **Deciding what the next experiment toward the target condition should be is a great place to get people's ideas.**

- **Mistakes, unexpected results and blind alleys are a part of the improvement kata process, and you should expect them in your experiments. That's completely normal.**

  The learner must make mistakes in order to learn about both the application of the improvement kata and what activities will be necessary to reach the target condition.

  Set up your experiments so that mistakes and unexpected results will not adversely affect the customer.

- **At the start, nearly everyone makes PDCA cycles too big. If the coaching cycles are too infrequent, the steps get too big (see the *PDCA cycles* section of this handbook).**

- **As soon as the next step (not a list of steps) is clear, the coaching cycle is over. There is no need for long discussions. Longer coaching cycles are not better coaching cycles.**

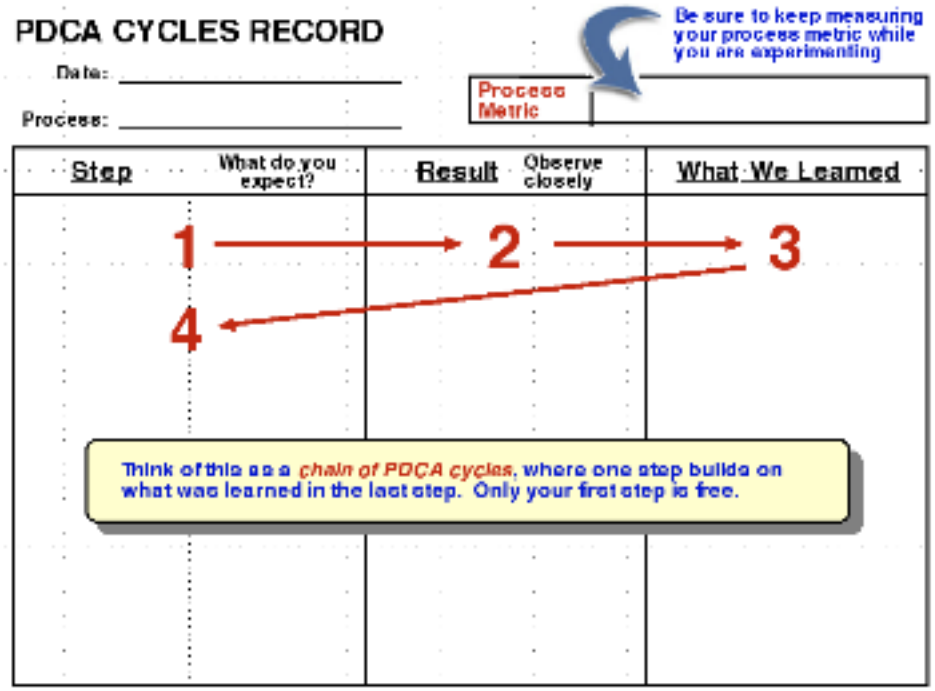
- **Note that activities such as "laying out the next step," "further analysis" or "go and see" can be the next step.**

TIPS FOR QUESTION 4

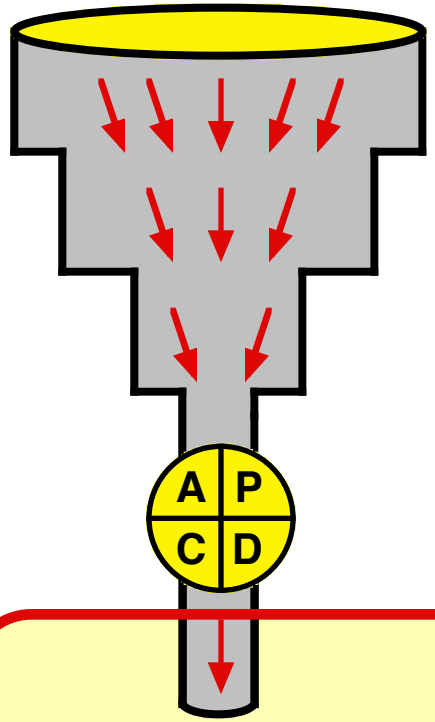
The next experiment

- **Some good phrases to use are:**
  - ***"Having learned that, what is your next step?"***
  - ***"Now that you've learned that, what will you do next?"***
  - ***"The data would lead you to believe..."***

Refer to the PDCA Cycles Record when asking these questions



PREPARE FOR THE NEXT COACHING CYCLE



1) What is the target condition?

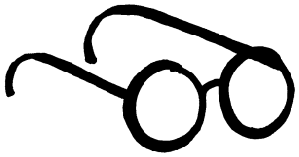
2) What is the actual condition now?

3) What obstacles are now preventing you from reaching the target condition?

   Which one are you addressing now?

4) What is your next step? (start of next PDCA cycle / experiment)

5) When can we go and see what we have learned from taking that step?



TIPS FOR QUESTION 5

Prepare for the next cycle

- **Question 5 can be tricky. New coaches may think they are asking, *"When will you have it done?,"* which is incorrect. Question 5 is more about finding out, *"What are we learning?"***

  Caution! Even when the coach asks question 5 with the correct intention, the learner may still think s/he is being asked, *"When will you have it done?"*

- ***Can we take this step right now?* Experiments should be done as cheaply and as quickly as possible.**

- **You don't actually know what the result of the next step will be. So keep an open mind and open eyes!**

HOW DO YOU KNOW WHEN THE TARGET CONDITION HAS BEEN REACHED?

You won't arrive at a target condition 100% as described, because problems & variability are inherent in any system.

So when are you there?

When you reach a state where you are only reacting to deviations and abnormalities, rather than still striving to reach a target condition, then it is time to define the next target condition.

If you stay in the only-reacting state, entropy will creep in.

But... before you define a next target condition, be sure to reflect on what you learned this time around!

- **What are the key learnings from using the TK method?**
- **How might you improve and be even more effective?**

This section of the handbook is under construction

TOOLS
FOR COACHING CYCLES

This section of the handbook is under construction

THREE THINGS TO MEASURE

❶ Progress toward process target conditions

Every work process should have a target condition that it's team is striving to achieve, and the relevant metric(s) can be taken right from that.

❷ Learner's skill development

How coaches are doing in developing improvement kata skill in their learners. You can assess skill level per learner with the Dreyfus levels.

❸ Frequency and duration of coaching cycles

The frequency and duration of the coaching cycles conducted by your line managers with their direct reports. (Longer is not necessarily better.) For each coach, track the start and stop times of their coaching cycles.

Remember: If the learner is not learning the improvement kata or if the process target condition is not being reached, examine the content of the coaching

A WAY TO MEASURE SKILL DEVELOPMENT

The Dreyfus Model of Skill Acquisition

Stage	Characteristics	Standard of Work	Autonomy
Novice	Adherence to rules or plans Little situational perception No discretionary judgement	Unlikely to be satisfactory unless closely supervised	Needs close supervision or instruction
Advanced Beginner	Action based on attributes or aspects Situational perception still limited All aspects are given equal importance	Straightforward tasks likely to be completed to an acceptable standard	Able to achieve some steps using own judgement, but supervision needed for overall task
Competent	Copes with crowdedness Sees actions partially in terms of LT goals Has standardized and routinized procedures	Fit for purpose, though may lack refinement	Able to achieve most tasks using own judgement
Proficient	Sees what is most important in a situation Perceives deviations from the normal pattern Maxims vary according to situation	Fully acceptable standard achieved routinely	Able to take full responsibility for own work, and coach others
Expert	No longer relies on rules / guidelines / maxims Grasp of situations & decision making intuitive Vision of what is possible	Excellence achieved with relative ease	Able to take responsibility for going beyond existing standards and creating own interpretations

Able to Coach

Table adapted from: Dreyfus, Stuart E., *Formal Models vs. Human Situational Understanding: Inherent Limitations on the Modelling of Business Expertise*, University of California, Berkeley, 1981

Keep in mind: This model measures skill, not the person

IMPROVEMENT KATA SKILL ASSESSMENT

Typical learner characteristics (under construction)

Dreyfus Level	Understand the Direction	Grasp the Current Condition	Establish the Next Target Condition	PDCA Toward the Target Condition
Novice				
Advanced Beginner				
Competent				
Proficient				
Expert				

COACHING CYCLE DO'S AND DON'TS

(under construction)

Schedule daily coaching cycles	**Conduct coaching cycles only infrequently or irregularly**
Proceed systematically by following the 5 questions	**Permit unstructured, meandering disorganized discussions**
Determine whether or not the learner is operating within the corridor of the improvement kata	**Ask questions to monitor if the learner is doing what they said they'd do**
	Ask questions to get the learner to implement the coach's preconceived solution

COACH ASKING MISTAKES

(under construction)

Asking Mistake	Description	Countermeasure
1. Closed Question	Can be answered simply *yes* or *no*.	Start question with "what" or "how."
2. Solution-Oriented Question	Advice disguised as a question.	Broaden the question.
3. Seeking the 1 True Question	Trying to ask the perfect question.	You only need to help the learner to the next step (next PDCA).
4. Rambling Question	Asking the same question repeatedly in different ways.	Be silent for a moment or two while you formulate your question.
5. Interpretive Question	Too much interpretation of what the learner said.	Incorporate the learner's words in your question.
6. Rhetorical Question	Statement of coach's opinion posed in question form.	Change your viewpoint.
7. Leading Question	Pointing the learner to an option the coach has in mind,	Add options.
8. Failure to Interrupt	Being too timid to interrupt and refocus the dialog.	Interject with a question that brings the coaching cycle back to focus.
9. Interrupting	Commenting while the learner is talking.	Count 2 seconds after learner stops speaking.
10. Confrontational *"Why"* Question	Challenging the learner's motive and actions.	Replace "why" with "what."

Excerpted from *Coaching Questions: A Coach's Guide to Powerful Asking Skills*, by Tony Stoltzfus, Pegasus Creative Arts, 2008

Table by Emiel van Est

COACHING PROBLEMS (under construction)

Observed Issue	Possible Coaching Problem	Potential Countermeasure
Learner seems defensive	Coach asking interpretive question	Incorporate mentee's words in question
	Coach asking leading question	Use open questions
	Coach asking rhetorical question	Find out why coach judges; change viewpoint.
	Coach asking solution-oriented question	Ask about the mentee's remark that triggered your solution
	Coach asking too many WHY questions	Try rephrasing using WHAT
Learner seems frustrated or confused	Coach is interrupting too much	Count 2 seconds before asking or replying
	Coach is rephrasing question over & over	It's OK to be silent; it's OK to think before talking, it's OK when question is not fully understood. Just see what happens.
Learner seems silent	Coach asking closed question	Use WHAT / HOW to start an open question
	Coach asking leading questions	Use open questions
	Coach asking rhetorical questions	Find out why coach judges; change viewpoint.
	Coach asking solution-oriented questions	Ask about the learner's remark that triggered your solution
	Coach asking too many WHY questions	Try rephrasing using WHAT
Coaching-cycle progress is slow	Coach asking interpretive questions	Incorporate mentee's words in question
	Coach is not interrupting to refocus	Figure out good way to interrupt and refocus learner
	Coach is rephrasing question over & over	It's OK to be silent; it's OK to think before talking, it's OK when question is not fully understood. Just see what happens.
	Coach is trying too much to ask the one true question	Use simple questions like Show me; Tell me more; What else.

COACHING CYCLE OBSERVATION FORM (for the 2nd Coach)

Process:	Date:	Start:	Stop:	Minutes:

	Coach	Learner
Q1		
Q2		
Q3		
Q4		
Q5		

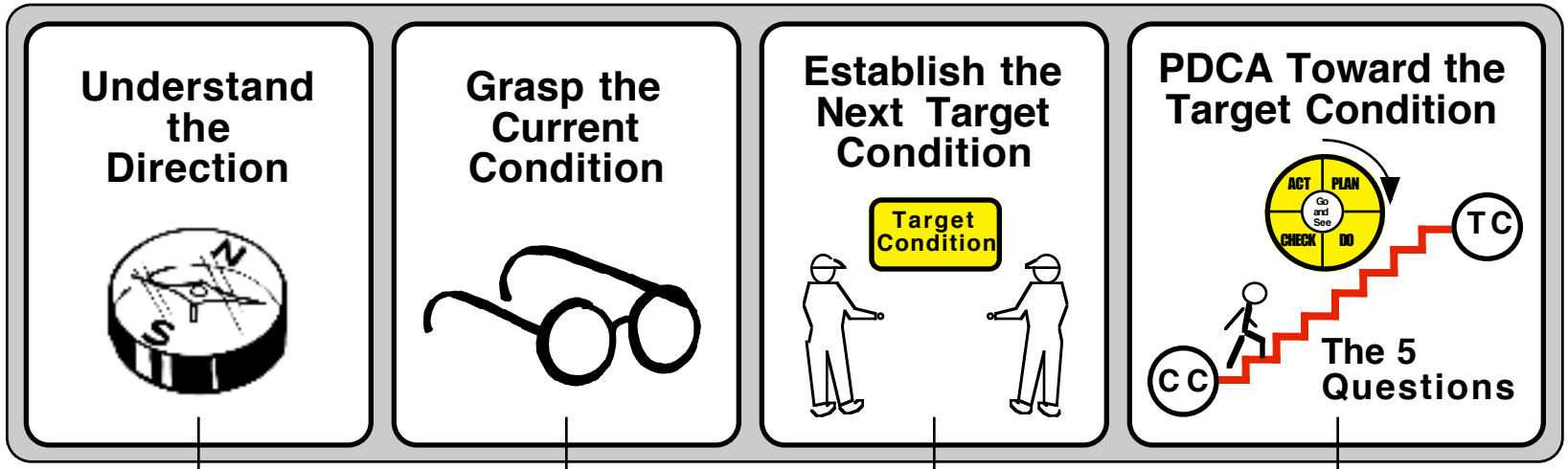
APPENDIX - KEY FORMS

1) **The Improvement Kata**
2) **The Roles**
3) **Process Analysis Steps Table**
4) **Worksheet for Timing Cycles**
5) **Information in a Target Condition**
6) **Dreyfus Levels Table** (for measuring skill level)

Coaching Cycle Forms:

- ❑ **Who Uses What Forms**
- ❑ **Target Condition Planning Form** (manufacturing)
- ❑ **Target Condition Planning Form** (general)
- ❑ **Target Condition Planning Form** (other)
- ❑ **Target Condition Form**
- ❑ **Description of Work Steps & Sequence**
- ❑ **Obstacles Parking Lot**
- ❑ **PDCA Cycles Record**
- ❑ **5 Question Card** (front)
- ❑ **5 Question Card** (back)
- ❑ **Coaching Cycle Plan / Tracking** (coach)
- ❑ **Coaching Cycle Observation Form** (2nd coach)

THE IMPROVEMENT KATA



What challenge are we striving to meet?

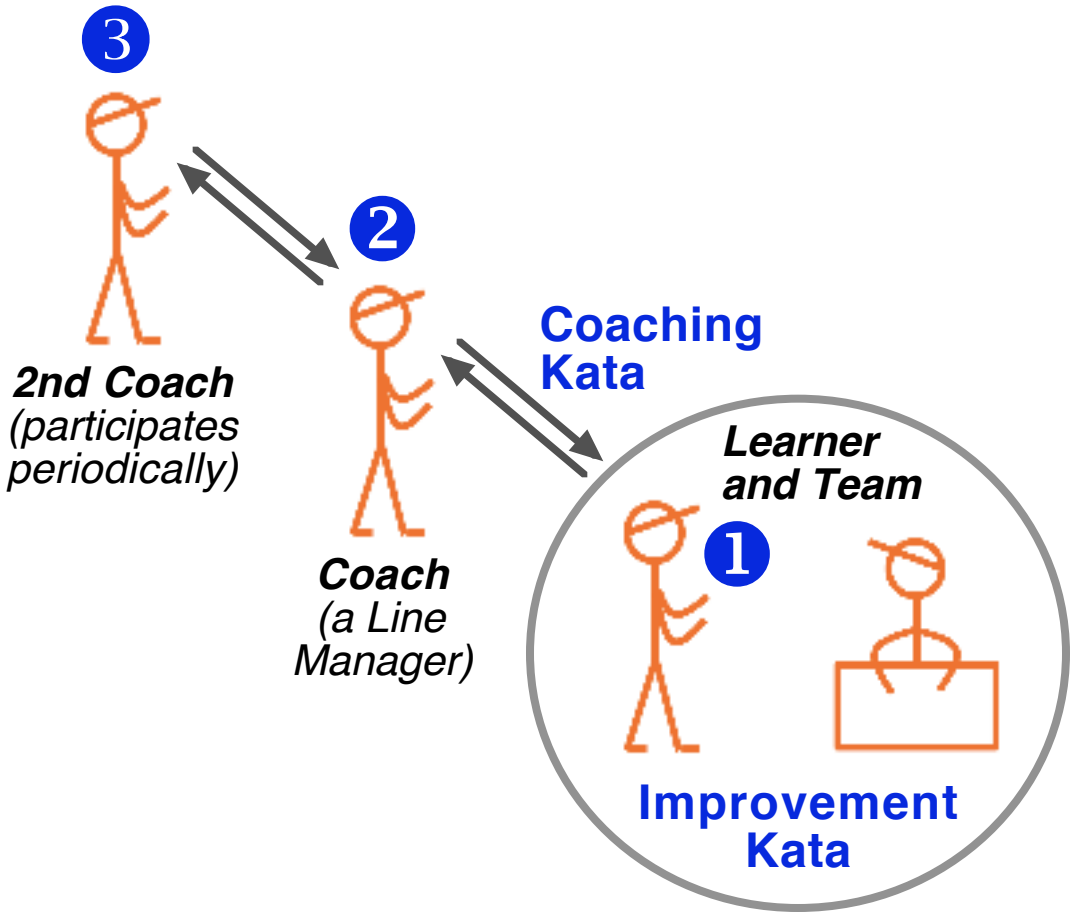
What does our future-state value stream map look like?

What is the current pattern of working?

What pattern do we want to have next?

The step-by-step discovery process between where we are and where we want to be next.

THE ROLES



Learner and Team *(The Process Owners)*:
Apply the 4 stages of the Improvement Kata, including working toward the target condition. Learner conducts experiments with PDCA and develops solutions to obstacles, in dialog with the process operators and the coach.

Coach / Line Manager *(The Teacher)*:
Conducts coaching cycles daily using the 5 questions. Ensures the learner is working and practicing scientifically and experimentally according to the improvement kata pattern. The coach's job is to develop the learner by guiding the learner on Improvement Kata procedure, not to improve the process.

2nd Coach:
Coaches the coach. Periodically observes coaching cycles and tracks progress of both coach and team. Helps the manager develop his or her coaching skills. Ensures that the team's target condition ties in to a larger challenge or future-state value stream design. Ensures that the environment (time, organizational structure, etc.) is supportive.

STEPS OF THE TK PROCESS ANALYSIS

Step ①

Customer Demand and Planned Cycle Time

- Customer takt
- Planned cycle time
- Number of shifts currently running

Step ②

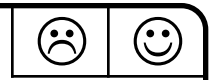
Characteristics of the Current Process

1) Get to know the process by sketching a block diagram of it
   - What are batch sizes? - Where does WIP accumulate?
2) How much does the process fluctuate?
   - Time and graph 20-30 exit cycles of each operator's work
   - Are each operator's work steps the same from cycle to cycle?
3) Note other details about the current operating pattern

Step ③

Equipment Capacity

- Can the automatic equipment support the planned cycle time?
- How close are we to our current machine capacity limit?
- What is the fastest Pc/t the equipment can currently support?



Step ④

Necessary Number of Operators (if the process were stable)

- Calculate number of operators

Step ⑤

Outcome Metrics

- Graph (a) output per shift, (b) overtime and any other desired outcome metrics

WORKSHEET FOR TIMING CYCLES

Unit of measure	

	Times	Notes
1		
2		
3		
4		
5		
6		
7		
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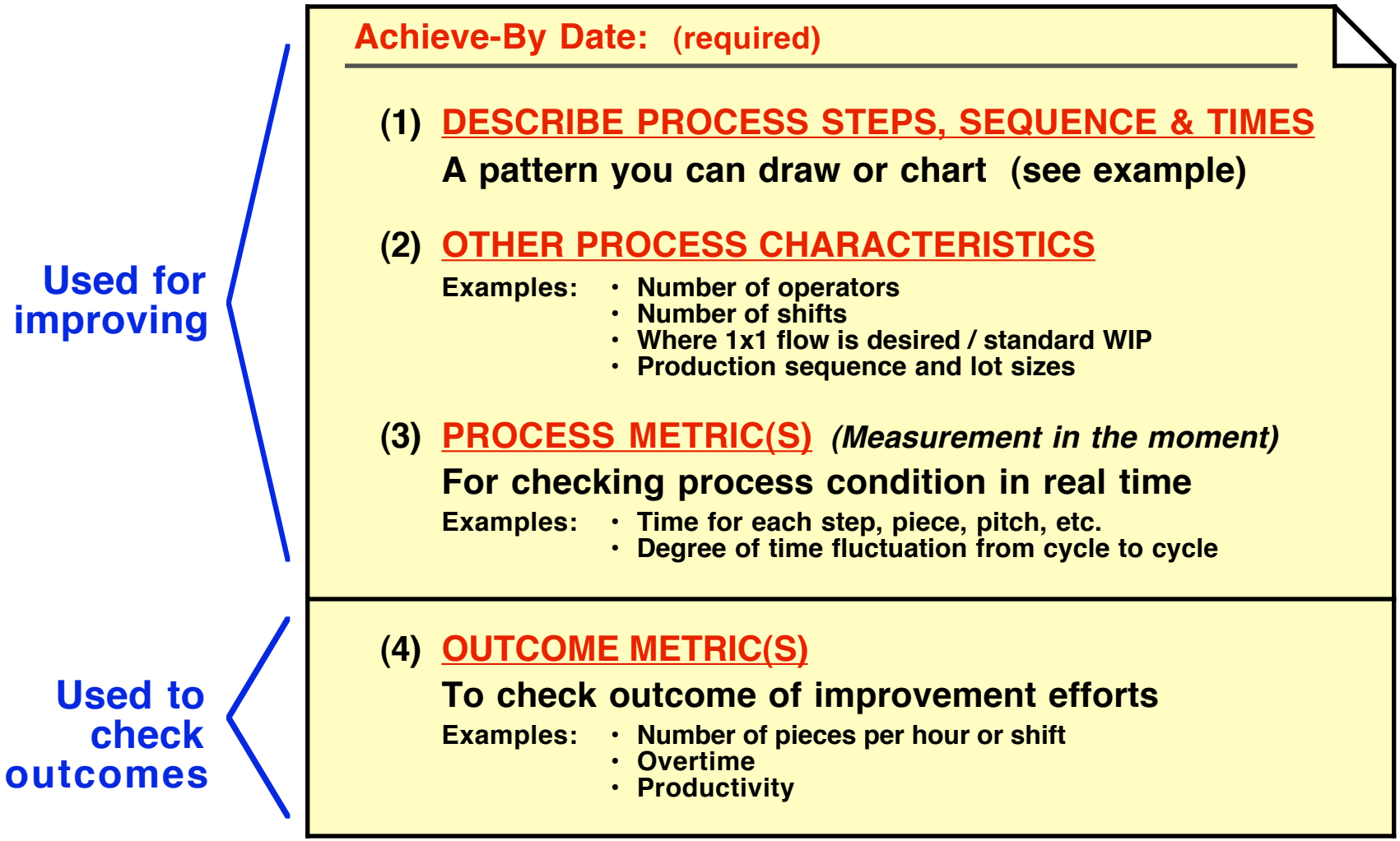
25		

INFORMATION IN A TARGET CONDITION



DREYFUS LEVELS TABLE
(for measuring skill level)

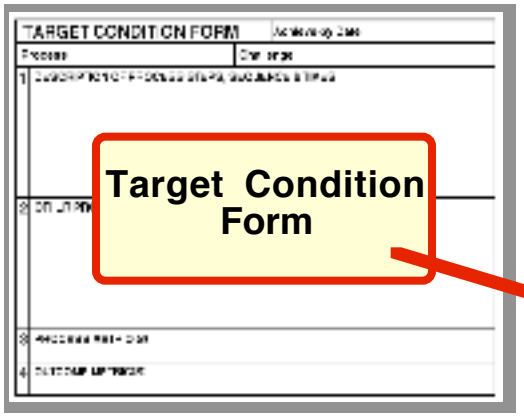
Able to Coach

Stage		Characteristics	Standard of Work	Autonomy
5	***Expert***	No longer relies on rules / guidelines / maxims Grasp of situations & decision making intuitive Vision of what is possible	Excellence achieved with relative ease	Able to take responsibility for going beyond existing standards and creating own interpretations
4	***Proficient***	Sees what is most important in a situation Perceives deviations from the normal pattern Maxims vary according to situation	Fully acceptable standard achieved routinely	Able to take full responsibility for own work, and coach others
3	***Competent***	Copes with crowdedness Sees actions partially in terms of LT goals Has standardized and routinized procedures	Fit for purpose, though may lack refinement	Able to achieve most tasks using own judgement
2	***Advanced Beginner***	Action based on attributes or aspects Situational perception still limited All aspects are given equal importance	Straightforward tasks likely to be completed to an acceptable standard	Able to achieve some steps using own judgement, but supervision needed for overall task
1	***Novice***	Adherence to rules or plans Little situational perception No discretionary judgement	Unlikely to be satisfactory unless closely supervised	Needs close supervision or instruction

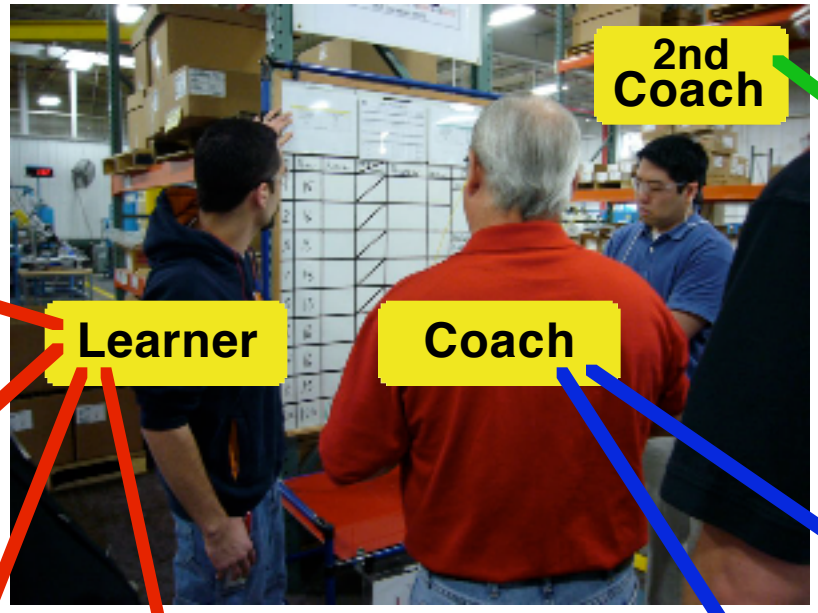
Adapted from: Dreyfus, Stuart E., *Formal Models vs. Human Situational Understanding: Inherent Limitations on the Modelling of Business Expertise*, University of California, Berkeley, 1981

Coaching Cycle Forms

WHO USES WHAT FORMS



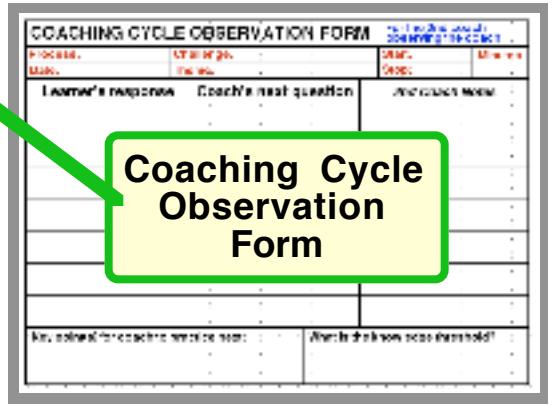
Target Condition Form



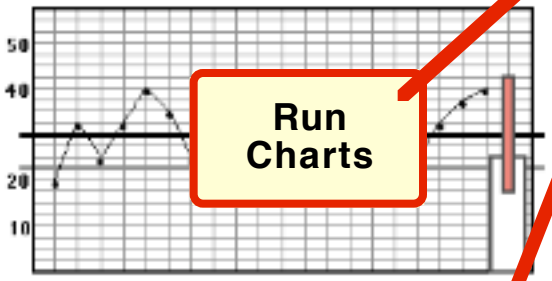
2nd Coach

Learner

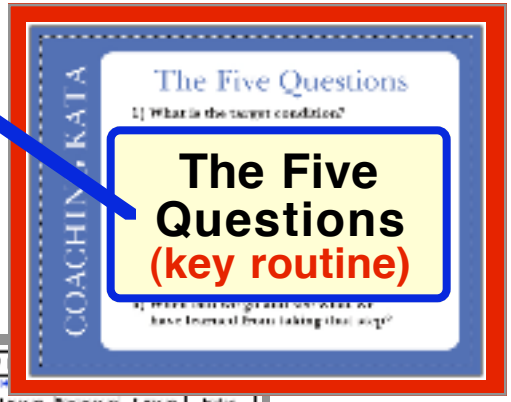
Coach



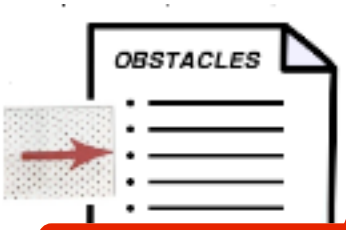
Coaching Cycle Observation Form



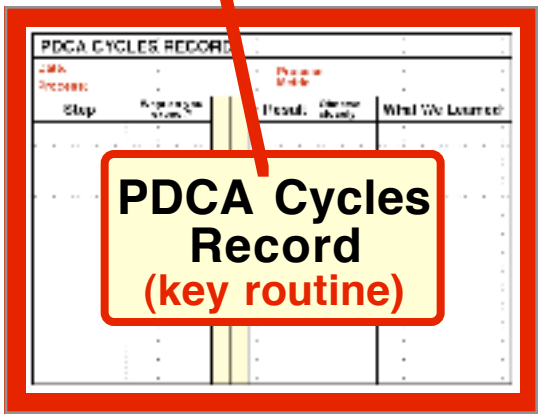
Run Charts



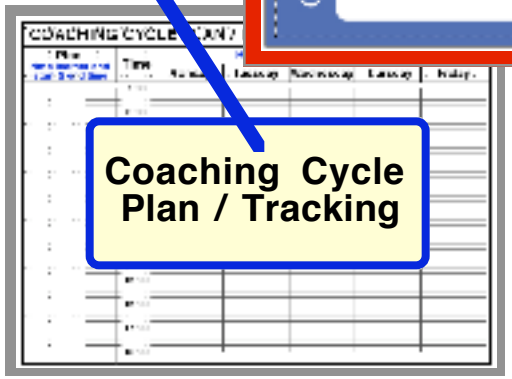
The Five Questions (key routine)



Obstacles Parking Lot



PDCA Cycles Record (key routine)



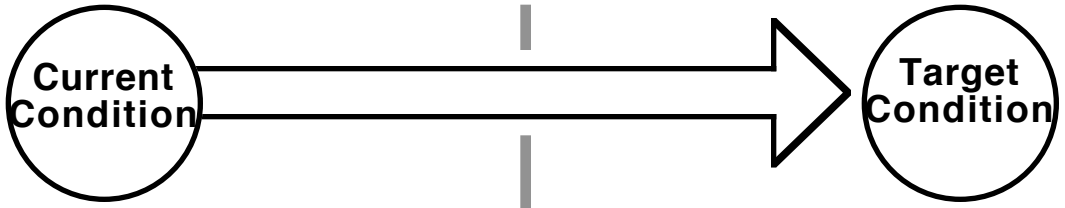
Coaching Cycle Plan / Tracking

TARGET CONDITION PLANNING FORM (Manufacturing)

Process Metric	Outcome Metric

Process	Challenge	Achieve-by Date

Step 1: *Fill in current condition data*



Step 2: *Fill in what you will keep the same*

Step 3: *Fill in what you want to change*

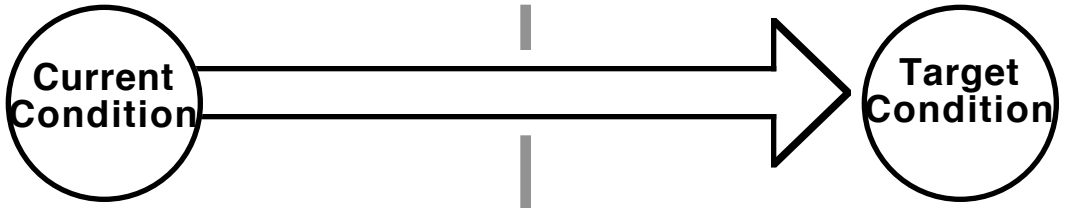
1	Takt time	
	Pc/t	
	# of Shifts	
2	Process steps, sequence, times	
	Batch size. Where WIP.	
	# of Operators	
	% exit cycle fluctuation	
	Other observations about the current pattern	
3	Equipment capacity	
4	# of Operators (calculated)	
5	Actual output / shift	
	Overtime	

TARGET CONDITION PLANNING FORM (General)

Process Metric	Outcome Metric

Process	Challenge	Achieve-by Date

Step 1: *Fill in current condition data*



Step 2: *Fill in what you will keep the same*

Step 3: *Fill in what you want to change*

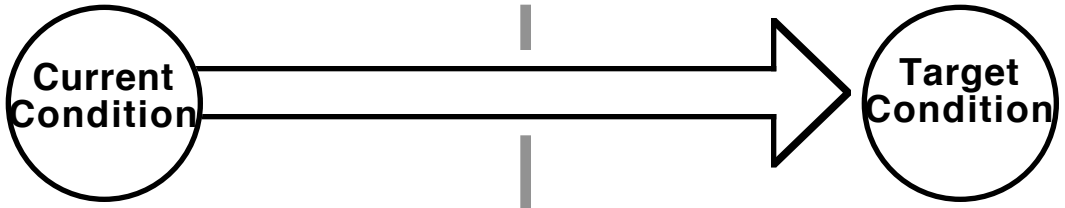
Task unit and time to complete	
Current operating patterns	
Equipment capacity	
Number of people required	
Performance data	

TARGET CONDITION PLANNING FORM (Other)

Process Metric	Outcome Metric

Process	Challenge	Achieve-by Date

Step 1:
Fill in current condition data



Step 2: ***Fill in what you will keep the same***

Step 3: ***Fill in what you want to change***

TARGET CONDITION FORM	Achieve-by Date
Process	Challenge

1	DESCRIPTION OF PROCESS STEPS, SEQUENCE & TIMES
2	OTHER PROCESS CHARACTERISTICS
3	PROCESS METRIC(S)
4	OUTCOME METRIC(S)

WORK STEPS & SEQUENCE				Process:			Date:
Operator	Operator	Operator	Operator	Work Sequence ① ② ③	Walking →	Return to Start ←- - -	Standard WIP ●

As you progress, you can develop a more detailed description of work steps for each operator, called a *Standard Work Chart*. For non-manufacturing processes you can use or develop a different depiction of work steps and sequence

OBSTACLES PARKING LOT

Use a label to indicate the obstacle currently being addressed

This is simply a place to record obstacles, which you may or may not address

PDCA CYCLES RECORD *(Each row = one experiment)*

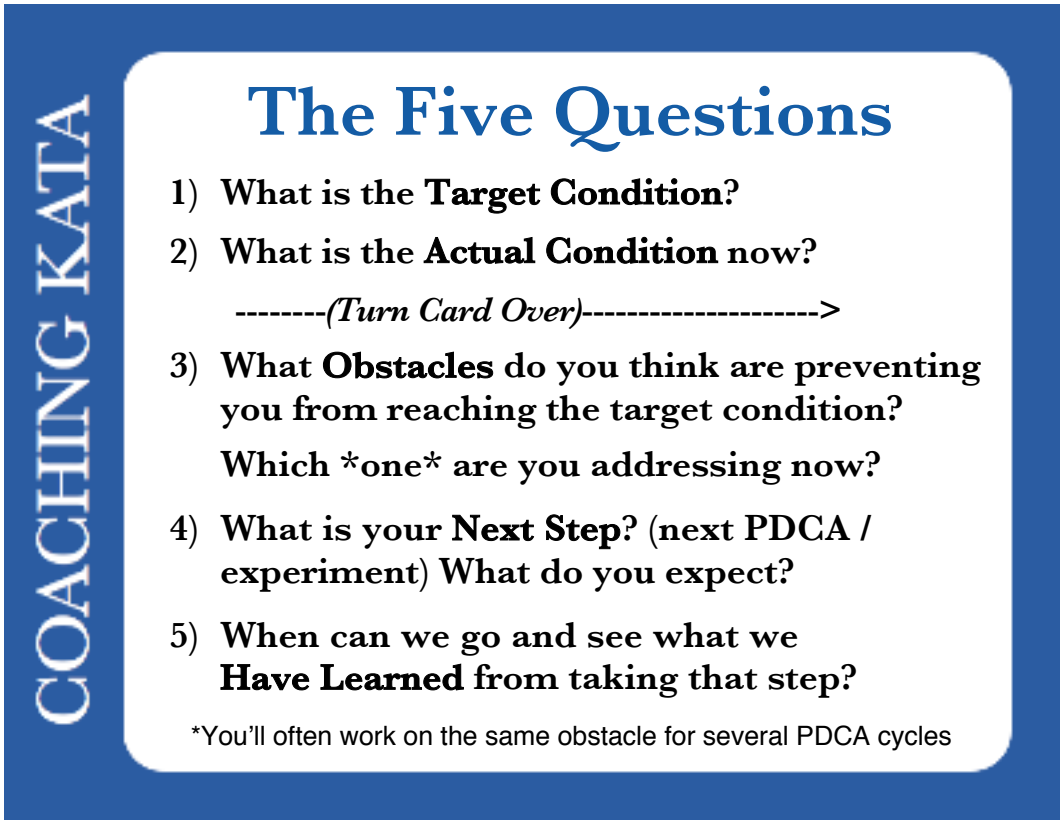
Date:

Process:

Process Metric

Step	What do you expect?	Coaching Cycle / EXPERIMENT	Result	Observe closely	What We Learned

5 QUESTION CARD (front)



5 QUESTION CARD (back)

Reflect on the Last Step Taken

Because you don't actually know
what the result of a step will be!

1) What was your **Last Step?**

2) What did you **Expect?**

3) What **Actually Happened?**

4) What did you **Learn?**

---------->
Return

COACHING CYCLE PLAN & TRACKING

Coach:

Dates:

Plan Note learner and start & end time	Time	Draw a dot for actual start and end times				
		Monday	Tuesday	Wednesday	Thursday	Friday
	7:00					
	8:00					
	9:00					
	10:00					
	11:00					
	12:00					
	13:00					
	14:00					
	15:00					
	16:00					
	17:00					
	18:00					

COACHING CYCLE OBSERVATION FORM

For the 2nd coach observing the coach

Process:	Challenge:	Date:
Coach:	Theme:	Start Time:

Coach	Time	QUESTION	Learner
		Q1 *What is the target condition?*	
		Q2 *What is the actual condition now?*	
		REFLECT *Last step? What happened? What learned?*	
		Q3 *What are the obstacles? Which 1 are you addressing?*	
		Q4 *What is your next step? What do you expect?*	
		Q5 *When can we go and see what we have learned?*	

What is the knowledge threshold?	Key point(s) for this coach to practice next:

Definitions, based on *Toyota Kata*

Management	*The systematic pursuit of desired conditions by utilizing human capabilities in a concerted way.*
Capability or Skill	*The ability to do something well. For example, the ability to work through problems to achieve a challenging objective.*
Skill Development	*Practicing of routines, often with coaching guidance.*
Kata	*A routine or method that can be practiced to develop particular skills and mindset. A routine that is practiced and used time and again, whereby it becomes second nature.*
The Improvement Kata	*Toyota's fundamental routine for improving and evolving throughout the organization.*
The Coaching Kata	*The way the improvement kata is taught at Toyota.*

Terminology

- A *target condition* is not a *solution*. It's something you are striving to reach.
- What you do to overcome *obstacles* (problems) on the way to a target condition are *solutions* or *countermeasures*.
- *Adaptiveness* happens as you strive toward something.