

Paper On
PLAN DO CHECK ACT (PDCA)
IMPROVING QUALITY THROUGH AGILE ACCOUNTABILITY

by

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1 – ABSTRACT AND INTRODUCTION

PDCA (plan–do–check–act) is an iterative four-step quality improvement and management agile process typically used for the better of the business strategy. PDCA is a successive cycle which starts off small to test potential effects on processes, but then gradually leads to larger and more targeted change. Plan, Do, Check, Act are the four components of Work bench in Software Testing. However, diverting from the exact essence of what this concept primarily applies to, we shall be using this concept more towards achieving an individualistic goal which will finally lead to a bigger picture enhancement and improvement rather than applying this to the process itself directly. Though the method is applicable to process, business and organization as generally utilized by the industry, but this is an attempt to try and adopt the same at an individual level to bring productivity improvement in individuals which will trigger a improvement in process and quality for the organization at a bigger level. The concept itself suggests that small baby steps initially would one day lead to bigger marathons in future, so the logic is customized to see how this method would help an individual to become more accountable which will untlimately enable a group, a product line and an organization to be able to make a difference in improving the overall quality. Every individual has a routine way of leading life both professional and personal and by adopted the PDCA concept, he/she can excel in ensure that daily goals are accomplished effectively which will help them to come back fresh the next day and start working on newer creative activities rather than trying to catch up with previous day's backlogs. The method tries to bring in changes to the traditional ways how an individual does an activity and with few improvements, the overall productivity can be increased that will ultimately benefit the organization. Once the method is applied to an individual for making them more productive, we shall then apply the same to a group, product line and organization to replicate the success story for a positive growth and development.

2 - THE CONCEPT

Plan

Establish the objectives and processes necessary to deliver results in accordance with the expected output (the target or goals). By making the expected output the focus, it differs from other techniques in that the completeness and accuracy of the specification is also part of the improvement.

Do

Implement the new processes, often on a small scale if possible, to test possible effects. It is important to collect data for charting and analysis for the following "CHECK" step.

Check

Measure the new processes and compare the results (collected in "DO" above) against the expected results (targets or goals from the "PLAN") to ascertain any differences. Charting data can make this much easier to see trends in order to convert the collected data into information. Information is what you need for the next step "ACT".

Act

Analyze the differences to determine their cause. Each will be part of either one or more of the P-D-C-A steps. Determine where to apply changes that will include improvement. When a pass through these four steps does not result in the need to improve, refine the scope to which PDCA is applied until there is a plan that involves improvement.

3 - APPROACH

A fundamental principle of the PDCA is iteration—once a hypothesis is confirmed (or negated), executing the cycle again will extend the knowledge further. Repeating the PDCA cycle can bring us closer to the goal, usually a perfect operation and output

4 – IMPLEMENTATION

PDCA should be repeatedly implemented in spirals of increasing knowledge of the system that converge on the ultimate goal, each cycle closer than the previous. One can envision an open coil spring, with each loop being one cycle of the scientific method - PDCA, and each complete cycle indicating an increase in our knowledge of the system under study. This approach is based on the belief that our knowledge and skills are limited, but improving. Especially at the start of a project, key information may not be known; the PDCA —scientific method—provides feedback to justify our guesses (hypotheses) and increase our knowledge. Rather than enter "analysis paralysis" to get it perfect the first time, it is better to be approximately right than exactly wrong. With the improved knowledge, we may choose to refine or alter the goal (ideal state). Certainly, the PDCA approach can bring us closer to whatever goal we choose

Rate of change, that is, rate of improvement, is a key competitive factor in today's world. PDCA allows for major 'jumps' in performance ('breakthroughs' often desired in a Western approach), as well as Kaizen (frequent small improvements). In the United States a PDCA approach is usually associated with a sizable project involving numerous people's time, and thus managers want to see large 'breakthrough' improvements to justify the effort expended. However, the scientific method and PDCA apply to all sorts of projects and improvement activities.

5 – PDCA AT A IT COMPANY

Global IT companies use several process, methods and techniques which are adopted and implemented to come up with a high level quality product which meets and exceeds customer expectations. PDCA approach at global IT compaines at a higher level can be adopted and applied at 4 different levels as classified below

- a) Individual level
 - Each associate can incorporate PDCA to complete daily activities
- b) Program level
 - Each program can adopt PDCA for every scrum and non-scrum based programs.
- c) Product line level
 - Each product line can analyze its goals by periodic use of PDCA concept
- d) Organization level.
 - The company as a whole can review its overall performance from time to time.

The idea is to first successfully adopt the PDCA concept at the first two levels to begin with, that is, at the Individual Leval and Program Level. Based on the successful implementation at these two levels, the implementation can later be applied at the Product line level and Organization level to ensure that we achieve a wholistic improvement from the base to the top ultimately making a difference to the company's overall yearly objectives, targets, financial goals and also the meet and exceed customer expectations. "Quality is King", this is the mantra of success at Tektornix moving forward and PDCA method would definitely help in a great way in successful implementation of this mantra

5 – PDCA AT INDIVIDUAL LEVEL

Each associate in an IT company, an individual usually has a 8 hour work schedule from dawn to dusk at 5 days a week. The actual productivity would be around 6.5 hours average considering the loading factor and various other interruptions. These 6.5 hours average of work is the core and crucial time in conceptualizing and in realization of great products for the organization. We can find some examples of PDCA being adopted in some areas around us in some of the work products that we develop. Example – When a software defect is submitted in the bug tracking tool (Clearquest), we plan the resolution of the defect, resolve the defect and finally verify and close the defect. This completes and closes the loop of the particular defect. However it has been observed that there is a need to adopt PDCA at an individual level to continuously improve one's effectiveness and ability to achieve and deliver the daily goals set. An efficient and effective way of PDCA implementation at an individual level is explained below for each associate to incorporate

PLAN

- Check mails first as soon as you login to your PC
- Read and understand the activities that you need to perform on that day
- Note down the tasks that you need to work on that day
- Prioritize each of the tasks identified.

DO

- Start working on the tasks identified and prioritized in the above PLAN
- Each task has to be completed to its logical conclusion with high accuracy and quality
- Complete easy tasks first preferably

CHECK

- Verify the results by comparing the PLAN and DO phases.
- Plan is the expected output and Do is the actual output
- Identify the differences in the actual output and expected output

ACT

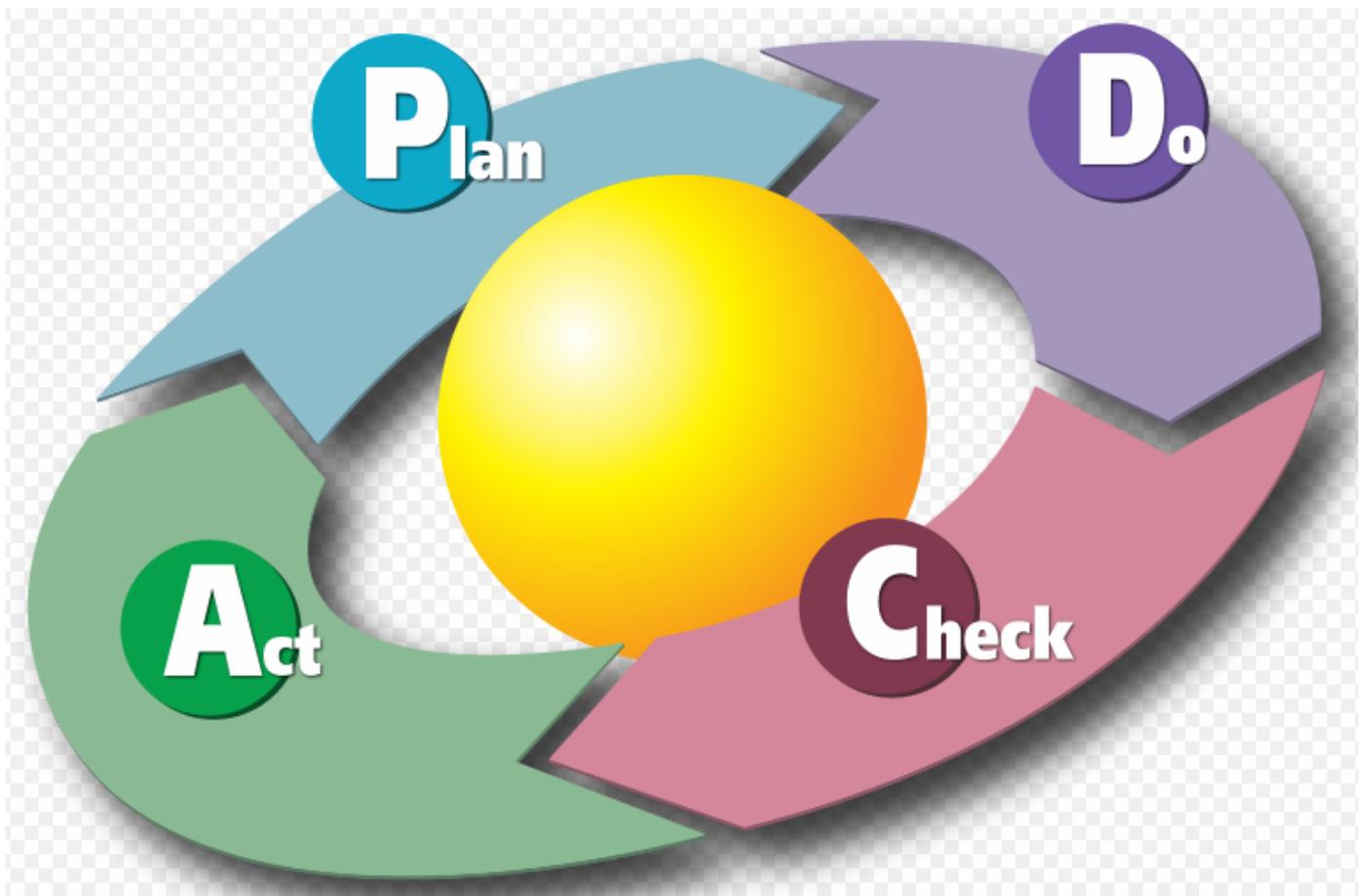
- Analyze the differences as found in the above CHECK step
- Determine where to apply the changes for improvement
- Finally apply the changes which will result in elimination of differences
- The result of this ACT will be a highly productive work with good quality at the end of the day

The PDCA cycle can be implemented effectively by each individual through a PDCA DAILY GOAL CHART which is a simple excel file based plan used to ensure that all the stages of PDCA are captured, tracked, closed and later used for developing a better plan for the next day.

THE PDCA DAILY GOAL CHART
Figure 1 – General PDCA Chart

Date	<mention the date here>			
Tasks Identified based on priority for today				
	PLAN	DO	CHECK	ACT
Priority	Tasks Identified between 9-00 am to 10-00 am	Tasks worked on	Status at 6-00 pm	Improvements
1	<mention the tasks identified here based on priority>	<mention the tasks completed here based on priority>	<Done/Not Done>	<mention the lessons learnt here while completing this task. Is applicable to both Done and Not Done. This data help in a better plan for the next day>
2				
3				
4				
5				

THE PDCA CYCLE
Figure 2 – The PDCA Cyle



6 – CASE STUDY OF JOHN (an imaginary character) before and after PDCA

John is a Software Quality Engineer at an IT company. He works from 9-00 am to 6-00 pm every day however is still unsatisfied with the work completed at the end of each day and goes home worried every day. He is not able to achieve the tasks that are assigned to him to be completed on that day due to various reasons and often carries the backlog to the next day. Every day there is a pile of tasks (both backlogs and new tasks) which is causing him to spend extra time in office beyond 6-00 pm which sometimes would stretch upto 9-00 pm. He is concerned that this trend will result in less productivity finally leading to a performance issue affecting his overall rating at the end of the year. This is also affecting his family life as he is now spending less time with his family during weekdays.

In this situation, PDCA would greatly help in ensuring the following

- a) John works from 9-00 am to 6-00 pm every day but is able to complete the tasks within this time frame
- b) John is now clear on what he has to do every day
- c) John is able to identify and prioritize the tasks effectively
- d) John is able to deliver high quality work at the end of the day
- e) No backlogs carried to the next day
- f) Can spend good quality time with his family after office hours.

These are achieved by the following method by John

PLAN

- Check his emails first in outlook as soon as he logs into his PC
- Reads and understand the activities that he needs to perform on that day
- Note down the tasks that he needs to work on that day as observed below
 - Verify CR12345 and respond to Doug
 - Test the SB10B feature
 - Update UI-Func test scripts for Trigger subsystem
 - Perform installshield testing for DPOPWR app
 - Provide training to Tim on NPP-4040
- Prioritize each of the tasks identified (listed below on priority)
 - Update UI-Func test scripts for Trigger subsystem
 - Test the SB10B feature
 - Provide training to Tim on NPP-4040
 - Verify CR12345 and respond to Doug
 - Perform installshield testing for DPOPWR app

DO

- Start working on the tasks identified and prioritized in the above PLAN
- Complete easy tasks first preferably
 - Updated the UI-Func test scripts for Trigger subsystem
 - Tested the SB10B feature
 - Provided training to Tim on NPP-4040
 - Verified CR12345 and responded to Doug
 - Performed installshield testing for DPOPWR app

CHECK

- Verify the results by comparing the PLAN and DO phases.
- Installshield testing for DPOPWR took longer time than expected
- Training to Tim could not be completed in 1 hour since he had lots of questions that extended the training time by another 15 minutes

ACT

- Plan installshield testing as a more higher priority task next time since it takes more time based on the above CHECK step
- Plan one more round of training session since the planned training session exceeded beyond 1 hour.

PDCA DAILY GOAL CHART OF JOHN
Figure 3 – The PDCA Chart of John

Date		20th Aug 2011		
Tasks Identified based on priority for today				
	PLAN	DO	CHECK	ACT
Priority	Tasks Identified between 9-00 am to 10-00 am	Tasks worked on	Status at 6-00 pm	Improvements
1	Update UI-Func test scripts for Trigger subsystem	Updated UI-Func test scripts for Trigger subsystem	Done	None
2	Test the SB10B feature	Tested the SB10B feature	Done	None
3	Provide training to Tim on NPP-4040	Provided training to Tim on NPP-4040	Done	Plan second round of session since the training time stretched beyond 1 hour
4	Verify CR12345 and respond to Doug	Verified CR12345 and responded to Doug	Done	None
5	Perform installshield testing for DPOPWR app	Performed installshield testing for DPOPWR app	Done	Work on this on a much higher priority since it took longer time to complete

Note

- a) In a realistic scenario, the tasks that we need to perform will appear even during the middle or end of the day so whatever tasks we identified in the beginning of the day may or may not be the only tasks to perform at the end of that day.
- b) In such situations, we need to insert the new tasks in the PLAN column by setting an appropriate priority level
- c) New tasks that are assigned to us in the later half of the day (similar to requirement creep in the middle of product life cycle and implementation) needs to be evaluated and can be later labeled as “cannot be performed today” and such tasks needs to be planned in the next day’s chart.

There is further scope for expanding the usage of PDCA concept at Program Level, Product Line Level and Organization Level by following similar methods as described above.

7 – PDCA AT A PROGRAM/PROJECT LEVEL

Each program or a project in an IT company usually has a duration of around 4 to 6 months depends on the customer requirements and technology. However due to various factors which are not in control of the team, the release dates move in or out further. The pulled in are always beneficial but the dates moving out sometimes may hurt the overall business objectives. Using the PDCA method, we can ensure that the review and analysis is being done continuously at shorter milestones and corrective action is being taken at regular intervals to be able to apply the learning for the next goal. With the adoption of scrum method, it has become much more easier to achieve our objectives on schedule and we also have a product ready at the end of each sprint which will help us in meeting the requirements as per the scheduled estimates. The following concept can be applied to projects to be able to ensure that continuous improvement is planned and adopted effectively.

PLAN

- Understand all the customer requirements and break them into phases
- Prioritize each of the requirements identified.
- Come up with schedule estimates with risks on accomplishing the goals
- Identify the resources required for the implementation

DO

- Start working on the requirements identified and prioritized in the above PLAN
- Each requirements has to be implemented and completed to its logical conclusion with high accuracy and quality
- Implement easy requirements first preferably

CHECK

- Verify the results by comparing the PLAN and DO phases.
- Plan is the expected output and Do is the actual output
- Identify the differences in the actual output and expected output
- Verification, validation, reviews, testing etc.. can also be used to ensure correctness of work product,
- For scrum based projects, the analysis needs to be end at the end of each sprint.

ACT

- Analyze the differences as found in the above CHECK step
- Determine where to apply the changes for improvement
- Finally apply the changes which will result in elimination of differences
- The result of this ACT will be a highly productive work with good quality at the end of the day
- If the process is successfully, the method can be standardized and applied for the next cycle as a best practise. If the process is not successful, then root cause analysis can be done to take corrective action. Use the output to again plan the right things as an input to the next cycle of planning.

8 – REFERENCES

- a) <http://en.wikipedia.org/wiki/PDCA>
- b) <http://asq.org/learn-about-quality/project-planning-tools/overview/pdca-cycle.html>

9 – ABOUT THE AUTHOR

Mr K.A.Chandrakanth has completed his Bachelors of Engineering in Computer Science from Bangalore University. He is also a Post Graduation Diploma Holder in Sales and Marketing from All India Institute of Management Studies, Chennai. He is currently working at Tektronix as an EXPERT – SOFTWARE QUALITY ENGINEERING in the Software Quality Group. Tektronix is headquartered at Beaverton, Oregon State, USA with offices around the globe including a Engineering Development Center in Bangalore. Tektronix is also a global leader in Test and Measurement Instruments. He has around 11 years of experience in the areas of Software Testing and Quality Assurance and is presently the focal point for Software Quality in Tektronix, Bangalore. He has submitted various papers in many of the global seminars and events like the annual Tektronix Symposium which is held in Beaverton during April every year and also the annual Pacific Northwest Software Quality Conference (PNSQC) which is held in Portland. He is also the member of Bangalore Software Engineer Process Group (BSEPG) and the Bangalore Software Process Improvement Network (BSIPN). He has actively participated in several of the in-house innovation events, contests and idea sharing platforms at Tektronix and submitted many innovative and creative ideas in making the organization to improve the quality of its products

10 – APPENDIX

None

// The End //