

Real Life Experience – How to Develop CMMI Processes?

Orhan KALAYCI
Nitelik Danışmanlık Ltd.

Sarit DİNMEZ
Özge YILMAZKURT

Güner MUTLU

Hüseyin KİRAZ

Volkan SEVİNÇOK

BİMAR Bilgi İşlem Hizmetleri A.Ş.

Orhan.kalayci@nitelik.net

sdinmez@izm.bimar.com.tr

oyilmazkurt@izm.bimar.com.tr

gmutlu@izm.bimar.com.tr

hkiraz@izm.bimar.com.tr

vsevincok@izm.bimar.com.tr

Abstract

In December 2003, BIMAR has initiated an SPI project to reach CMMI L2 in 2004 using XP practices at the same time. Nitelik Danışmanlık Ltd. has planned and conducting the project. Total of seven processes [1] described in CMMI L2 has been divided into two groups. The first group was including four process, namely, Requirements Management, Project Planning, Configuration Management, Supplier Agreements Management and completed in March 2003. A lot have been learned while developing these processes. These lessons learned applied the second group processes, Project Tracking and Oversight, Process and Product Quality Assurance, Measurements and Analysis. We found that although the second groups process development activities completed in much more shorter time, end results are as satisfactory as the first group of processes.

This paper aimed at sharing the real life experiences gathered during developing the CMMI L2 processes in the SPI project of BIMAR. Four examples from the process development activities will be given to further clarify the process development activities. These examples will be from the following processes: Project Tracking and Oversight, Process and Product Quality Assurance, Measurement and Analysis, Supplier Agreements Management

1 Introduction

In December 2003, BIMAR has initiated an SPI project to reach CMMI L2 in 2004 using XP practices at the same time. Nitelik Danışmanlık Ltd. has planned and conducting the project. The quantitative targets of the project was 20% decrease in duration and cost of projects and 30% decrease in the number of defects delivered to customer. This paper aimed at describing

the best practices experienced while developing CMMI L2 Processes.

When we begin process development with four processes in November 2003 it took us seven weeks to finalize the process designs. Then in March 2004 when we began to second set of process with the rest three processes of CMMI L2 we managed to conclude the process design activities in four weeks without any rush or no giving up the work quality. That is to say, the second set of processes were designed as the same quality as the first set but with twice faster.

We also want to bring it to light that BIMAR has a unique company culture which is hard to find in Turkey as well as not easy to find all over the world. The company culture focused onto creating a friendly environment of teamwork and clear and continuous communication among all levels of the company which makes CMMI process development activities easier to carry on and having fun during the process works.

We cannot emphasis it more that without BIMAR's top management sincere and uninterrupted commitment, no process activity can be reach the successful end results so that we will be able describe them as best practices here in the paper.

2 Process of process development

Process of process development has the following building items.

Process development activities are planned to be completed in around 12 weeks in which 1 day is for training for the process, 3 weeks are for process design, 6 weeks (over lapping with 2 weeks of training) for pilot project and 8 weeks (overlapping

with 3 weeks of pilot project) for institutionalizing the process as shown in *figure 1*.

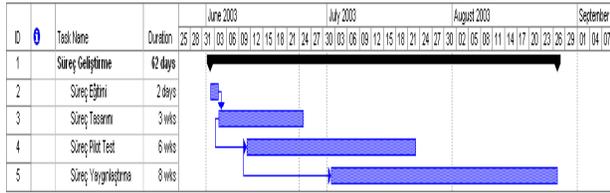


Figure 1 – Process development activities plan

This paper is giving examples for the designing of the processes. In the examples you will see these topics will be explained:

Roles: The roles played within the process design teams

Purpose: How the purpose of the process identified

Metaphor: Metaphor is a daily life story which has certain analogies with the process designed. [1]

Customer: It is important to identify the customer of the process. Under this heading it will be explained how the customer found

Main Steps: One of the most important outcome of the process design is the main steps. The other important outcome is the documents designed that will be used while performing the process in the projects

Brain Storming: The most used technique in designing process is Brain Storming. Using this technique it is possible to make everybody participate to teamwork and a feeling of ownership towards to process created.

Simplifying: We want our processes to be simple, applicable and measurable. To make them simple, after main steps identified we question every step whether it is really required.

Applicability: Under this heading, the question is “what do we need to have to make the main steps of the process easily applicable, i.e. how can we make the life of the process performers easier?”

Measurements: To improve the process performance we know that we have to measure it so that we can follow the improvements.

Lessons Learned: After each meeting of process design, we ask ourselves “in the next meeting, what do we need to “do better” or “not do” for a better meeting next time”

2.1 Project Tracking and Oversight

Project Tracking & Oversight (PTO) Process is designed to ensure finishing a project in the promised period of time and with minimum amount of bugs.

The *Process Policy* is: [1]

- To ensure that the projects progress as planned,
- To ensure that the risks are tracked and the promises are kept,
- To ensure that the problems are analyzed and solution actions are tracked,
- To track the planning parameters,

2.1.1 Roles

Five different roles are defined to determine the responsibilities in the *Process Developing Team* and to ascertain that the *Process* is embraced by the team members as shown in *figure 2*. These are:

- **Manager:** S/he is the process leader and manages the meetings.
- **Script Writer:** S/he is responsible from preparing and keeping the *Process Development Documents* up-to-date.
- **Timer:** S/he is responsible from keeping track of time spent for agenda topics and from giving warnings related to time.
- **Reviewer:** S/he is responsible for making critics on the Process Development Studies.
- **Staff Member 1:**
- **Staff Member 2:**

Only the member at the managerial role is kept fixed, and for the others a table which shows the changing holders of the roles every week is prepared.

PTO Process Developing Team's role table is below. The lines marked in red, indicates the *Process study* at the mentioned date is completed.

Tarih	Yeneticisi	Sunucu/Yazici	Süre Tutucu	Eleştirmen	Eleman 1	Eleman 2
09.03.2004	Ozge YILMAZKURT	Murat FERUZ	Senol BOLAT	Habil SENOCAK	Zeynep YURTDAS	Huseyin YAGCI
16.03.2004	Ozge YILMAZKURT	Huseyin YAGCI	Murat FERUZ	Senol BOLAT	Habil SENOCAK	Zeynep YURTDAS
23.03.2004	Ozge YILMAZKURT	Zeynep YURTDAS	Huseyin YAGCI	Murat FERUZ	Senol BOLAT	Habil SENOCAK
30.03.2004	Ozge YILMAZKURT	Habil SENOCAK	Zeynep YURTDAS	Huseyin YAGCI	Murat FERUZ	Senol BOLAT
06.04.2004	Ozge YILMAZKURT	Senol BOLAT	Habil SENOCAK	Zeynep YURTDAS	Huseyin YAGCI	Murat FERUZ
13.04.2004	Ozge YILMAZKURT	Murat FERUZ	Murat FERUZ	Huseyin YAGCI	Huseyin YAGCI	Huseyin YAGCI
20.04.2004	Ozge YILMAZKURT	Huseyin YAGCI	Murat FERUZ	Senol BOLAT	Habil SENOCAK	Zeynep YURTDAS
27.04.2004	Ozge YILMAZKURT	Zeynep YURTDAS	Huseyin YAGCI	Murat FERUZ	Senol BOLAT	Habil SENOCAK
04.05.2004	Ozge YILMAZKURT	Habil SENOCAK	Zeynep YURTDAS	Huseyin YAGCI	Murat FERUZ	Senol BOLAT
11.05.2004	Ozge YILMAZKURT	Senol BOLAT	Habil SENOCAK	Zeynep YURTDAS	Huseyin YAGCI	Murat FERUZ

Figure 2 – Process developing team roles

As an outcome of the PTO Process Development Studies, a new role, PTO Manager (PTOM), is considered necessary for the applicability of the Process. PTOM will be responsible from executing the *process* steps, and preparing/distributing the relevant reports. The function of the PTOM begins the moment a project reaches the Project Office and a Project Manager (PM) is appointed. In this context, it is decided that the PTOM and PM have to be appointed simultaneously.

2.1.2 Purpose

Before starting any *Process Design*, the purpose of the *Process* must be defined. The members of the *Process Design Team* have to be sure about the necessities for, and the expectations from the *process*. By setting a *purpose sentence*, the path to be followed during design and the borders of the *process* become sharper. The ideas which are chosen among the ones that emerged during the *brain storming session* executed to determine the *PTO Purpose Sentence* and comments on them are shown below in *figure 3*. The team discussed all items one by one and the ones which are found irrelevant (in dim letters) are eliminated.

CHOSEN ITEMS	TO DEFINE THE PURPOSE
A	To track that the project plans are correct
A1	To track the project risks
A1	To track the risks
A2-B2	To be aware of the delays asap
A3	To track whether the communication plan is applied or it is sufficient
A4	To track the human resources management
A-B-C-D	To control whether the project goes on in harmony with the plan and the necessary corrective actions are taken
Purpose	To ensure that the project sticks to the proposed time and quality
To be investigated (tbi)	To follow the integration management
B	To follow the consistency with the plan
B	To determine the problems related to project plans
B-C	In case of deviations from plans, determining the causes and requesting precautions
Inform	To inform the upper management about the course of projects
Inform	To ensure that the created BIMAR values are saved
Inform	To report the statuses of the projects
Inform	To inform the relevant parties (persons) about the deviations
C	Requesting corrective actions in inappropriate (with the plan) cases
C	Triggering the renewal of planning
Decision 2	To produce healthier plans for the future projects
Decision 2	Taking precautions so as not to live similar problems in future projects
Decision 2	Recording and sharing lessons-learned
Eliminated Items	
	Predetermining cost/time deviations
	Predetermining and/or keeping the exact finishing date and cost of the project up-to-date
	Controlling products and data
	Foresee the problems asap

	Keep the out-of-date risks out of sight
	Ensuring that the resources are utilized in the most efficient manner
	Managing changes
	Revising the project plan oftenly, so decreasing the effects of the deviations which are expected in the near future
	To inform the parties
	To fulfill the requirements of Quality Assurance, Measurement & Analysis, Configuration Management Processes
	To perform Contract Management

Figure 3 –Brain Storming results for “Process Purpose”

Following that step, some simplifications are made in order to make the *purpose sentence* clearer by focusing on the remaining ideas. After simplification, the initial form of the *purpose sentence* is developed, and it later became a guiding principle in defining the *process* steps. The *purpose sentence* for the *PTO Process* is as follows;

To inform the PM and upper management as soon as possible about the deviations in plans and to track the captured problems until they are solved in order to assist the PM in delivering the project in the promised period of time and with minimum amount of bugs.

2.1.3 Metaphor

Samples from the daily life are seek in order to ascertain that the *process* and its functions are easily understood. [1]

3 candidate metaphors are determined as an outcome of a brain storming. These are:

- A season of a football team
- A building under construction
- Formula 1 Pit Stop

Formula 1 PIT Stop is chosen as the *process’ metaphor* since it is found more suitable and it is expected to attract more attention. The leading reason for choosing the F1 Pit Stop as a metaphor was that all relevant processes and process responsibilities can be shown on it. In this metaphor, the *PTO Process’* steps are easily followed if the operation which begins when a racing car enters the pit stop -and ends when it leaves the pit stop- is taken as a project.

The PM’s, pairs’, Measurement & Analysis Group’s, Quality Control Group’s, upper management’s, and PTO Manager’s duties and relations are easily tracked during the tasks such as replacing tires, taking in gas and so on. Since the pit stop process takes only

seconds, they are changed to hours in order to make the analogy more traceable and understandable.

2.1.4 Customers

After the requirements for and the purpose of the process are made clear among the team members, then came the step where the person(s) that the *process* will serve will be determined. The intent of this step was to determine the person(s) who are affected by the process and who are denominated as *customers*.

As an outcome of a *brain storming*, following *customers* are found:

- * Coordination Committee
- Project Team
- All company
- Customer Relations Manager
- * PM
- Manager of the Project Office
- Other PMs

(Only the ones marked with “*” are kept as *customers* at the end of the process studies)

2.1.5 Main Steps

Following the afore-mentioned (pre)studies, the team passed to the development step where the *main steps* of the *process* would be determined and another brain storming session was executed. The items which did not serve for the purpose and/or were found out of context are eliminated first, and the remaining ones grouped under certain classes. The ideas that emerged during the brain storming are evaluated by making use of the simplification principles.

Following the evaluations, the first frame of the *process steps* is formed. They are as follows:

PTO Main Steps (First Form)

A. TRACKING

A.1. PLANNING

A.1.1. Tracking Plan is prepared

- Up-to-date statistical data related to criteria are received from the Measurement & Analysis Process

PTOM & PM fills in the Tracking Plan Template

A.1.2. The roles and responsibilities in the Tracking Operation are announced

- The holder of PTOM role is announced in the *Project Opening Message*

A.2. TRACKING

A.2.1. The compliance with the *project plan* is tracked

- PTOM controls the compliance of the project documents with the project plan according to the Tracking Plan.

B. PROBLEM DESIGNATION

B.1. TO DESIGNATE A PROBLEM

B.1.1. The data obtained during the tracking sub-process are analyzed and problems are determined

- PTOM puts forth the deviations in the project plan
- PTOM compares the deviations with the threshold values stated in the Tracking Plan

B.2. PRIORITIZATION

B.2.1. The costs that the problems may cause are asked for

- PTOM demands the costs of the effects that the problems may lead from the PM.

B.2.2. Problems are sorted

- PTOM prioritizes the problems of which the costs are forecasted.

C. MONITORING THE PROBLEM

C.1. TO REQUEST A SOLUTION

C.1.1. A solution is asked for

- Solution is requested from the PM with its cost-benefit analysis
- PM refreshes the project documents according to the solution plan
- PTOM tracks the refreshed plans
- In case the PM cannot offer a solution the matter is escalated

C.2. TRACKING THE PROBLEM

C.2.1. PTOM tracks the statuses of the problems.

C.2.2. Unsolved problems are escalated by PTOM

D. CLOSING THE PROBLEM

D.1.1. PTOM refreshes the status of the problem in the tracking plan

D.1.2. PTOM enters the information related to the problem in the database

- PTOM records the information related to the project in the general PTO database
- PTOM derives lessons learned by filling in the comments area in the general PTO database

2.1.6 Brain Storming

During the process design studies, *brain storming* is adopted as the dominant design method in order to;

- Provide full participation of the team
- Put no boundaries to the ideas.

Thanks to the *brain storming* method,

- Team members declared their ideas without any limitations and as they wished,
- Time management could be accomplished,
- More effective and visionary discussion media could be attained.

During the “Determination of Main Steps” study which was carried out by the *brain storming* method, the items that are found by the team members are first recorded without any comments as shown in *figure 4*. Then, the items which are considered out of scope or do not comply with the purpose of the *process*, are eliminated by evaluating all items one by one. The eliminated items are kept as dim lines in the *process development documents*. The simplifying procedure is explained in detail in section 4.2.7 *Simplifying*. The determination of the *process* steps, can be given as an example of brain storming sessions executed during *process development studies*. The initial outcome of *brain storming* about *process steps* are as follows:

	DETERMINING THE STEPS	
23.03.2004	REQUESTING SOLUTION	
C1	Requesting explanations from the PM about the problems of which priorities are determined	
C1	Requesting solutions and solution plans from the PM about the problems whose priorities are fixed	Risk
C2	Escalation of the problem in case no solution is suggested	Time Plan
C1	Requesting the cost/benefit analysis of the proposed solution	Comm
Reporting	Informing PM about the probable dangers / existing problems	Resources
Reporting	Informing upper management about the probable dangers / existing problems	Cost
Reporting	Submitting information to the relevant person(s) about the problem and its priority	Scope
Reporting	In case of no solution, escalation report	Social Dimension
	Deciding from whom solution will be asked	Decide
	Asking the periods of time required for the proposed solutions	Inform
	Requesting solutions for the prioritized problems	Request
	Evaluating the requests of PM related to the solution and supplying them	Determine
	Pass on the problems to the PM	Supply
	Requesting explanation/solution from the PM	Transfer

	Requesting report from the PM about the solution plan	Prepare
	Requesting the PM to fix the cause/root of the problem	Escalate
	Requesting the PM to fix the responsible person(s) and due dates about the solution	Guess
	Requesting solution proposals for the problems starting from the most important	Analyze
	Expecting alternative solution proposals when necessary	Satisfy
	Requesting the threshold value for starting the alternative solution	Warn
	Forecasting the solution's capability for meeting the requirements	
	To be satisfied by the proposed solution	
23.03.2004	TRACKING THE SOLUTION	
D1	Tracking the problems' and solution plans' statuses	
D2	Escalating the troubles encountered during execution of the solutions	Risk
Reporting	Reporting the progress of the solution plan to the upper management	Time Plan
	Preparing an escalation report in case of un-coordination with the plan	Comm
	Tracking whether there are improvements	Resources
	Recording the difference that the solution creates	Cost
	Tracking whether the risks are updated	Scope
	Recording the problem and the solution's success or failure in the lessons-learned database	Social Dimension
	Requesting the status of the solution plan	
	Tracking the conformity with the solution plan	Follow
	Tracking that the project plan is revised	Track
	Tracking that the baseline of project plan is saved	Escalate
	Informing the PM about the risks of the solution plan	Request
	Requesting information regarding the plan during the tracking of the solution	Inform
	Observing the solution's capability for meeting the needs	Ask for information
	In case the solution does not suffice, determining the root/cause of the problem	Observe
	Requesting the PM to execute the solution plan	Determine
		Submit a report

Figure 4 – Brain Storming results for “Determination of Main Steps”

The marginal or similar ideas that arose during the brain storming sessions are simplified and/or merged together by means of *win-to-win* principles or accepted as they were, provided that a consensus is reached among team members.

2.1.7 Simplifying

The suitability of process steps with the metaphor is evaluated following the constitution of the first version. A scenario is prepared on which the *process steps* are executed to make them more applicable, fitter for purpose, and of higher quality. While evaluating the steps that emerged as the result of the brain storming sessions, 3 questions are utilized;

- Is this specific brain storming session output under discussion, a main step? Or does it define a sub-step of any main step?
As in the case of the “designation and prioritization of problems.” (This is decided as a sub-step)
- Is this specific brain storming session output under discussion falls in the scope of the *process*? Does it suit to the purpose and metaphor of the *process*?
As in the item “determining the source of the problem.” (This item is out of the scope and does not fit to the purpose of the process.)
- Is this specific brain storming session output under discussion really necessary?
In order to answer the above question, 3 additional questions are utilized;
 - o What if this is not performed?
As in the case of “determining the risks that may be triggered by the problem”.(This item falls into the responsibility area of the PM, so is unnecessary.)
 - o Is it trivial?
As in the case of determining the person(s) from whom solution would be asked for (This is unnecessary since the roles are defined)
 - o Is it a very perfectionist approach?
As in the item of “determining the cause in case of delay” (The purpose of the process is solely to designate the problem. Trying to find the causes or roots of the problem is evaluated as a perfectionist approach)

During the *simplification* studies, the *sub-steps* which are utilized in determining the *main process steps* are also taken into consideration and all *process steps* took their latest form as below:

PTO Main Steps (Last Version)

A. TRACKING

A.1. PLANNING

A.1.1. Tracking Plan is prepared

A.1.1.1 Up-to-date statistical data related to criteria (average delay percentage) are received from the measurement and analysis process.

A.1.1.2 PTOM & PM fills in the relevant sections in the *PTO Status Report*.

A.1.2. Roles and responsibilities in the Tracking Operations are announced.

A.2. TRACKING

A.2.1. Compliance with the project plan is tracked

A.2.1.1 PTOM controls the compliance of the project documents with the project plan according to the Tracking Plan

A.2.1.2 *PTO Status report* is published at a frequency stated in the *tracking plan*

B. PROBLEM DESIGNATION

B.1. TO DESIGNATE A PROBLEM

B.1.1. The data obtained during the *tracking sub-process* are analyzed and problems are determined

B.1.1.1 PTOM puts forth the deviations in the project plan.

B.1.1.2 PTOM compares the deviations with the threshold values stated in the Tracking Plan

B.1.1.3 PTOM records the problem in the Problem Tracking Excel Sheet

B.2. PRIORITIZATION

B.2.1. Approximate costs that the problems may cause are asked for

B.2.1.1 PTOM requests the approximate cost-benefit analyses of the problems from the PM. PM sorts the problems according to the projected costs.

[The cost of the problem to the customer (ARKAS) * Probability of materialization) – The cost of the solution = Aggregate utility cost.

All 4 values must be requested separately.]

C. MONITORING THE PROBLEM

C.1. TO REQUEST A SOLUTION PLAN

C.1.1. A solution plan is asked for

C.1.1.1 PTOM follows the project plans which are revised according to the solution plans by the PM

C.1.1.2 The priorities are refreshed by deleting the solution cost in the status reports for the problems for which no solution plans are suggested. PTOM tracks the refreshed plans.

C.1.1.3 In case the PM cannot suggest a solution, the problem is escalated.

C.2. TRACKING THE PROBLEM

C.2.1. PTOM tracks the statuses of the problems and refreshes the *Problem Tracking Excel Sheet*

C.2.2. The problems which cannot be solved, are escalated by the PTOM.

D. CLOSING THE PROBLEM

D.1.1. PTOM refreshes the status of the problem in the tracking plan.

D.1.2. PTOM puts the information related to the problem in the relevant database.

D.1.2.1 PTOM records the problems related to the project in the general PTO *Problem Tracking Excel Sheet*.

2.1.8 Applicability

After setting and testing the process steps, the applicability headings are filled. The purpose of this milestone was to put forth the “sine-qua-non”s for applying the process steps and the matters which would ease their application. It is observed that the *applicable* decreased considerably after *simplification* milestone, and the *process* steps became easily usable. As an example, the *applicability* items determined for the *tracking main step* are below:

- * PTOM must be appointed at the same time with PM
- * *Measurement & Analysis Process* must provide the necessary statistical data for the *PTO Process*
- * PM must prepare the project plan and submit it to *Configuration Management*

2.1.9 Measurements

Following completion of main process steps, *measurements* which mean “the information set that can be measured during the execution of the process to be presented in the reports requested by the upper management” are defined as well as *applicable*. [1]

These items can also be defined as “base measurements which will be taken into consideration to be tracked in the upper management reporting by the *Measurements & Analyses Process*”

As an example, the measurements which are defined in the “Problem Designation” step are given below:

Measurability:

- * Measuring the time passed during prioritization process

* Measuring how many problems are designated

2.1.10 Lessons Learned

During the team studies, many benefits are attained in many disciplines including *team management*, *process design study management*, *discussion styles*, *applied methods*. These benefits are mostly attained by utilizing the critics that were made by the Reviewers at the ends of the sessions. The rules that followed are perceived as *lessons-learned* and compiled under the heading “*Process Design Team Working Principles*”.

PTO Process Design Team Working Principles

- 1 – The process team must be precise about the working hours and rest intervals.
- 2 – Every member of the process team has a defined role which changes weekly. The only exception is the team leader.
- 3 – At the end of each session, the positive/negative critics, first of the Reviewer, then of all participants are asked for and recorded.
- 4 – Some games, research and conversation topics are also accepted as process development studies as long as they contribute to the participation of and communication among the team members
- 5 – Documents prepared by single/multiple members of the team can be considered as official process documents with the condition that they are shared and confirmed by all members
- 6 – The problems that arise during the process development studies shall be solved by making use of the *win-win principle* wherever possible.

2.2 Process and Product Quality Assurance

2.2.1 Roles

In CMMI Process and Product Quality Assurance process design studies held at BIMAR, distribution of roles in process group, is described below:

Process Group Leader : A person responsible for overall success of the group.

Scriptwriter : A person responsible for writing study notes during process design studies.

Timekeeper : A person responsible for keeping accurate time during process design studies.

Quality Assurance Observer : A person responsible for criticizing process design studies for improving productivity of next study.

2.2.2 Purpose

In CMMI Process and Product Quality Assurance process design studies held at BIMAR, following ideas related to purpose were suggested by process group.

- Improving efficiency and productivity of other CMMI Processes.
- Providing a point of view to management with which they can evaluate performed processes against designed process descriptions.
- Supplying services at registered quality level to customers.
- Providing transparency about processes to high level management.
- Improving satisfaction of high level management by instituting quality management concept in BIMAR and improving quality level.
- Focusing on processes that manage and produce product instead of the product itself.
- Establishing a self-evaluation mechanism for all CMMI processes.
- Helping high level management to control company.
- Providing visibility on processes to high level management.
- Assuring project managers that task are completed with minimum number of errors.
- Increasing added value of processes in the way of the company reaching its objectives.
- Strengthening company's competition power by application of processes.

From these ideas, an idea about self-evaluation mechanism was embraced by process group and it was strategically agreed to institute BIMAR's Quality Assurance System based on this mechanism.

As a result, the purpose of CMMI Process and Product Quality Assurance process design studies was defined as;

Establishing a process focused Quality Management System based on self-evaluation mechanism, to help high level management to control company by providing them a point of view with which they can evaluate performed processes and work products against the designed process descriptions and standards.

2.2.3 Metaphor

In CMMI Process and Product Quality Assurance process design studies held at BIMAR, following

metaphors are suggested by process group to use in process design studies.

- Turkey's EU accession process and inspections.
- Pregnancy and Gynecologist.
- Military investigations and maneuvers.
- Aircraft manufacturing.
- School inspections.
- Traffic and Traffic Police.

From these candidate metaphors, "Pregnancy and Gynecologist" was chose to use in process design studies by process design group. Periodic checks done by Gynecologist were likened Quality Assurance Evaluations.

Another important reason to choose this metaphor was naturalness of pregnancy process and thus its closeness to perfection. However mother's bad habits can have harmful effects on pregnancy process. In periodic checks, Gynecologist tries to find out these bad habits, their harmful effects and then discourages mother from carrying on these bad habits.

Also in software development, developers who have been educated in software engineering, try to be faithful to software engineering processes. On the other hand, because of some restrictions like cost, deadline etc. applied by management to projects, processes could not be executed completely. With evaluations in company, Quality Assurance Persons would try to provide complete execution of processes.

2.2.4 Customers

In CMMI Process and Product Quality Assurance process design studies held at BIMAR, following customer groups of Product Quality Assurance process were determined:

- Other CMMI Processes
- High Level Management
- Software Development Group
- Project Managers
- Customer Relationship Managers

2.2.5 Main Steps

In CMMI Process and Product Quality Assurance process design studies held at BIMAR, following steps has been defined as main steps of process.

1. Planning the evaluation

- 1.1. Establishing a Quality Assurance Plan
- 1.2. Adding Quality Assurance work products into Configuration Management Plan and Measurement and Analysis Plan
2. Maintaining the evaluation
 - 2.1. Collecting Self-evaluation Data
 - 2.2. Performing Evaluation
 - 2.3. Communicating evaluation results
 - 2.4. Communicating noncompliance issues and ensuring their resolutions.
3. Closing Project
 - 3.1. Preparing Project Quality Assurance Report
4. General Quality Assurance Steps
 - 4.1. Preparing General Quality Assurance Report which includes Quality Trends.

2.2.6 Brain Storming

In CMMI Process and Product Quality Assurance process design studies held at BIMAR, Brain Storming idea generation method was used effectively. All ideas about Quality Assurance activities that could be performed in BIMAR, were recorded, regardless of they were reasonable or not. All ideas were explained in detail for correct understanding. Finally these ideas were grouped under process main steps and main steps of CMMI Process and Product Quality Assurance process were obtained. In the next step, which was simplifying, unnecessary steps were eliminated.

2.2.7 Simplifying

In CMMI Process and Product Quality Assurance process design studies held at BIMAR, ideas produced with brain storming method, were reduced according to tree criteria. These three reduction criteria are shown below.

- Process step has more superiority then required.
- Absence of process step does not have effects on process sufficiency.
- Process step is performed naturally in process.

For example “Establishing a Quality Assurance Risk Plan” process step was eliminated, because its conformity to first criteria. “Customizing Quality Assurance Plan according to project type.” process step was eliminated, because its conformity to second criteria. And “Performing evaluations according to Quality Assurance Plan” process step was eliminated, because its conformity to third criteria.

2.2.8 Applicability

In CMMI Process and Product Quality Assurance process design studies held at BIMAR, to provide applicability of process steps, some pre-requisites and support activities required for performing process step, were defined. Thus it was tried to expose missing points which could be appear during the application of processes.

Some examples to these items are below.

- For each project Quality Assurance Responsible must be appointed by Project Office Manager.
- Self-evaluation reports must be placed in Configuration Management System.

2.2.9 Measurements

In CMMI Process and Product Quality Assurance process design studies held at BIMAR, for obtaining improvable and thus for obtaining measurable process steps, some measurements were defined. Some samples are below.

- Project Quality Assurance Plan Establishment time.
- Evaluation time.
- Time spent for communicating noncompliance and resolution.

2.2.10 Lessons Learned

In CMMI Process and Product Quality Assurance process design studies held at BIMAR, it was experienced that despite designing a process requires intensive work, it is pleasant study. Other lessons learned are below;

- Being present in studies on exact time and regular attendance are important for success.
- Bringing each process group member’s understandings to same level, prevents the discussed idea to appear in later studies.
- Preparation to studies and looking over previous notes increase the speed of current study.

2.3 Supplier Agreement Management

2.3.1 Purpose

In CMMI Supplier Agreement Management process design works held at BIMAR, following purpose were suggested by processing group.

To find and recommend our customer;

- The most satisfying, accurate and exact solution (not less than and not more than our customers' needs),
 - The cheapest solution,
 - The fast solution,
 - The most correct solution,
 - The minimum risk,
 - The latest technology,
 - The most useful

Solution corresponding to our customer requirements and managed this aim with supplier agreement.

2.3.2 Metaphor

In CMMI Supplier Agreement Management process design studies held at BIMAR, following metaphors are suggested by processing group to use in process development works. While designing the metaphor, we imaged the rental car company that rents cars from suppliers and rents cars to customers.

Prerequisites

Customers

Beginning Criteria (prerequisites)

Potential Customer Forecast

Demand Planning

Special Customer Request

After Sales Agreement

Preparing rental agreement

Preparing an insurance agreement

Preparing guarantee agreement

Preparing leasing agreement (credit purchase)

Preparing sales agreement

Finding Customers and Cars Methods

Renter

Suppliers (we rent cars from this company)

Company's owner

Loan

Renting

Purchase

Credit purchase

Special order (tailor made)

2.3.3 Customers

In CMMI Supplier Agreement Management process design works held at BIMAR, following customer groups of Supplier Agreement Management Process were determined: In this step we used our metaphor and brainstorming.

1. Arkas Holding companies
2. Arkas High Level Management

3. IT Systems Coordination
4. Our suppliers (even their subcontractor)
5. Bimar S.A.

2.3.4 Main Steps

In the CMMI Supplier Agreement Management process development works which is held at BIMAR, following steps have been defined as main steps of process.

1. Project Plan Preparation
 - a. Details Analysis of Customer Requirements
 - b. Possible supplier research
2. Analysis and request for information
 - a. Short list preparation
 - b. Request for information and scorecard
3. Make supplier choice
 - a. Short list preparation
 - b. Request for information and scorecard
4. Signing of the agreement / contract
 - a. Preliminary enquiries before signing
 - b. Signing of contract
5. Agreement Flow - Control (Customize / Development)
 - a. Supplying additional hardware, software and infrastructure
 - b. Customize/Development
 - c. Acceptance Test
 - d. Installation (Installation, Power user acceptance test and go alive)
6. Closing Project
 - a. Customer Agreement
 - b. Customer Satisfaction Survey (Supplier, Product, Bimar)
 - c. Supplier Agreement
 - d. Supplier Project Evaluation
 - e. Project Technical Evaluation

2.3.5 Brain Storming

Brainstorming was used mostly in the activities below;

- Choosing the metaphor,
- Setting the process goal,

- Setting the process activities,
- Setting the process customers.

2.3.6 Simplifying

Brainstorming method was used to collect the ideas of the team.

To design a simple and easy to understand process;

1-The result words/sentences of brainstorming were discussed.

2-The items discussed were converted to simple and easy to understand sentences.

3- As the metaphor chosen was good, it improved the team's way of thinking.

4- Help was taken from the other process teams about the simplicity of the process steps.

2.3.7 Applicability

To design an applicable process;

1- Experience of the team was used.

2- Every activity was tested by the question "If we were the one to fulfill this activity, what would we think and feel?"

3- The applicability of the activity was discussed in the light of current circumstances and problems.

An example is below;

6.3.2 Analyse and Request For Information Applicability

1. To have a supplier database
2. The supplier database should include the supplier performance analysis results.
3. The supplier database should include the criteria of suppliers that can be worked.
4. The supplier database should include the supplier product information.

2.3.8 Measurements

After simplifying and improving the process steps, process indicators were set in order to measure process performance and to be able to give reports to management. To improve the process is also aimed while setting the process indicators. An example is below;

6.3.3.2 Proposal and Validation Measurements

1. Planned and real duration, number of people worked and effort (man/day) for each process step.
2. Planned and real duration for each meeting. (Meetings are grouped according to their goal.)
3. Number of times the proposal was rejected.
4. Product cost
5. Number of pages of the proposal
6. Time between sending the proposal and the reply.
7. Number of criteria in the scorecard
8. Number of suppliers
9. Number of logical errors in the proposal.
10. Number of rejected items in the proposal.
11. Number of updates on the proposal.

4.1. 10. Lessons Learned

During the process improvement project we learned very important technical and teamwork lessons. We observed positive improvement during the process improvement project about the team. Some of the lessons learned are below;

- The team should attend all the meetings as much as possible and everyone should be on time.
- In the beginning of every meeting, the roles are set. Only the process leader's role – manager of the meeting – is fixed.
- In the beginning of our process improvement project, perfect ideas were discussed usually. But after the team realized that "the process designed should be acceptable and applicable by all company" the best solution for BIMAR was discussed instead of the perfect one.

2.4 Measurements and Analysis

2.4.1 Purpose

The purpose of the process is

- helping the firm for reaching the firm targets by supporting the concrete data
- evaluate the chance and problems just in time
- build a warning system and support its continuity

2.4.2 Customers

Top management are the only customer of the Measurement and Analysis Process. Other requests owners should transmit their requests through their managers.

2.4.3 Main Steps

- REQUEST CREATION
- DESIGN
- VALUE ADDED ANALYSIS
 - A REQUEST CREATION
 - A1 Making a presentation that contains the advantage and the results of the measurement projects to the top management as a period of three months according to their authorization levels.
 - A2 Getting the targets which prepared by the customers.
 - A3 Suggesting measurement targets to the managers by using firm targets, market analysis
 - B DESIGN
 - B1 Getting the target of the measurement for the Measurement Projects
 - B11 Filling the Target Definition Form
 - B2 Preparing Measurement Project Plan
 - B21 Filling the Measurement List Card (Obtaining target of measurements by defining the necessary measurements and their relationships. Finding alternative methods and choosing the best one)
 - B22 Filling the Measurement Cards (Each measurement card contains one measurement)
 - B23 Filling the Qualification Cards (Measurement Qualification cards divided into works that takes 2 days. Each qualification card is prepared for one measurement card.)
 - B3 Managing Measurement Project Plan
 - B31 Filling the measurement method form for each measurement according to qualification card. (This card contains the method of collecting the measurement results)
 - B32 Filling the information form. (This card contains the measurement analysis methods and their communication plan)
 - B4 Pilot Project
 - B41 Defining the pilot project
 - B42 Managing the pilot project

- B43 Evaluating the result of the pilot project and if necessary, updating measurements or their methods.(if necessary back to the step B2)
- B44 Customer Approval
- B5 End of the project
 - B51 To become wide spread (education, sharing user manual and forms)
 - B52 Sharing the Project outputs with the Quality and the Configuration Management teams
- C VALUE ADDED ANALYSIS
 - C1 Tracing the measurement method form and the information form for meeting the targets with the requirements
 - C2 Evaluating the advantage of the measurements among top management of the Bimar

2.4.4 Brain Storming

We defined the main steps beginning from the goals of the Measurement and Analysis Process. For each step we use the brainstorming method.

126 items were found and categorized.

2.4.5 Simplifying

We traced all steps when simplifying, we used figures and process library for understanding each other and also the Measurement and Analysis Process.

As a result of this work we obtain the different main steps from the brain storming study and create new forms.

2.4.6 Applicability

REQUEST CREATION

- General Measurement Analysis Leader role must be assigned
- Attention presentation must be prepared
- Ethic rules must be shared with top management
- Firms must have defined vision and targets

DESIGN

- There must be at least one measurable demand
- Its purpose must be clarified
- Measurement Project team must be assigned

VALUE ADDED ANALYSIS

- Measurement Method Form and information form must be prepared
- The cost of the project should be lower than the profit of the project

2.4.7 Measurements

DEMAND CREATION

The number of demand per period of time

DESIGN

Project planning duration

Project Management duration

Pilot Project duration

The expected cost profit ratio of the project

The real cost of the project

VALUE ADDED ANALYSIS

Recovery project cost / Expected profit

Measurement operation cost / Expected profit

2.4.8 Lessons Learned

Recovery Proposal

- Some topics are over-negotiated
- Our agenda was un-structured
- Agenda was not properly followed
- We have difficulty on understanding each other
- Sometime we didn't skim the lessons learned part at the beginning of the meeting
- We haven't got a detailed agenda tasks so we didn't have a feeling of the end of task. Sometimes tasks were as a group because of that we finished half of the task and couldn't close the task.

Positive Perspective

- It was a very efficient study for the first time of the group
- Standardization of the terminology enhanced the communication
- Flow Charts make us understand each other easily
- Conflict among group demonstrates that we have an idea about topic
- Preparation of the scenario makes process steps more clear.
- Keeping the all documents in a specific folder accelerated our study

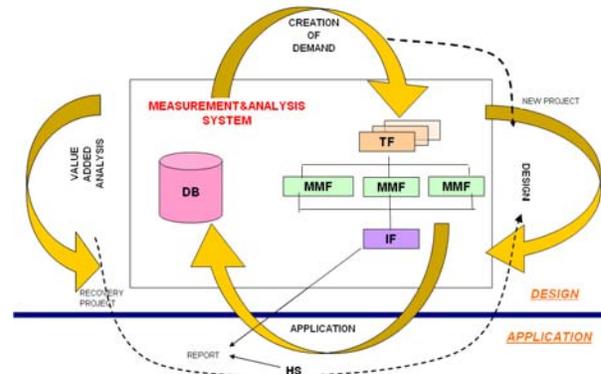


Figure 5 – Measurement & Analysis System

3 Conclusion

We have tried to describe in this paper the ingredients of the process design. Namely, the roles required in the process design team, the value of using a metaphor, how to find the purpose of the process designed by using the techniques such as brain storming and simplifying then how to make processes more applicable and measurable. The last point explained was the lessons learned to make better meetings.

We believe that the secret of good work is teamwork and communication. We managed to become team and we never underestimate the value of good communication and encourage participation. Then the conclusion is success.

4 References

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