

Seven Success Factors for CMMI based Process Improvement

Abstract

The following seven success factors were used to make sure a successful deployment of processes into the organization Meteksan Sistem was carried out in 2006: 1) Business Objectives & Leadership, 2) Separation of Powers & Ceasing Over-Commitment, 3) Result-Oriented Processes, 4) Wide Spread Involvement & Awarding System, 5) Correct Planning for Transformation, 6) Tools are Just Tools! and 7) Sustainable Transformation. This paper aims at explaining how we measured the progress of Meteksan Sistem toward CMMI ML3 using these seven success factors.

Introduction

Meteksan Sistem is the number one systems integrator in Turkey with annual turnover of more than 0.5 billion U.S. dollars. In late 2004, the company decided to improve its software development processes. Its goal was to reach CMMI ML3 by the end of 2006. In 2005, it had completed process definitions, and by early 2006, it had realized the difficulty of deploying new processes. Orhan Kalayci from XPI, www.xpi.ca, helped the company achieve this feat by using his seven success factors as a scorecard for management. With Orhan Kalayci's help, the management team identified its strengths and weaknesses through each of Kalayci's seven success factors. To-do lists were prepared to address the weaknesses identified. Progress was monitored, and in 8 months, all the processes were successfully deployed. The "seven success factors" framework boosted product quality and enabled the company to become CMMI ML3-compliant.

1) Business Objectives & Leadership

In fact, motivation is the only secret to success. Motivation of every individual in the organization is crucial for successful process improvement. It is the motivation of the top management that counts the most. The top management can only be motivated by business results. A process improvement program without sound business objectives cannot secure the sponsorships of the top management. Strong sponsorship requires strong business targets that are related to the results of process improvement. Classical business objectives are reduced cost, faster delivery, and higher quality. Success of the process improvement program depends on its relation to these business objectives.

Change should start from the top. The sponsor is the one who should change first. He or she, along with the whole management team, should be the role model for the new way of working. There may be many obstacles on the road to change. No obstacle, however, should be used as an excuse not to change. The sponsor and the management team should personally be involved in the process improvement activities by asking the right questions. SPI programs will lead to successful results only if the top management knows the right questions to ask—the right questions to ask the functional managers, the project managers, and the employees. Asking the right question requires knowledge of the purpose of the change. Questions should help people focus on the correct direction for change. The correct direction is always the direction that leads to business results.

2) Separation of Powers & Ceasing Over-Commitment

There is no balance between resources at hand and the commitments made to the customers, especially in ML1 and ML2 organizations. Organizations at lower maturity tend to give

promises more than their abilities. Their inabilities generally come from both their ill designed organizational structure and lack of necessary resources.

For a successful process improvement program organizations should assign these three tasks to different people: Managerial tasks, quality assurance and auditing tasks, performing tasks. An organization with people loaded for more than 100% should delay the process improvement program for a period of time where people at most load 80% or 90% where at least %20 or 10% is available for process improvement within the organization.

3) Result Oriented Processes

Correct definition of scope of a process is very important for the success of the process improvement. Boundaries of a process should cover the organization from end to end. That is to say, any process should start with an outside customer request and end with a payment from an outsider customer. There should be no process without generating revenue to the organization. All other activities not generating revenue to the organization should be considered a subprocess of a process.

"Subprocesses are defined components of a larger defined process. For example, a typical organization's development process may be defined in terms of subprocesses such as requirements development, design, build, test, and peer review. The subprocesses themselves may be further decomposed as necessary into other subprocesses and process elements." Page 365 of pdf version of [3] Texas Instrument breaks its 4 billion semiconductor business into six core processes: [5] Strategy Development, Product Development, Customer design and support, Manufacturing capability Development, Customer communication, Order fulfilment.

4) Wide Spread Involvement & Awarding System

Everybody in the organization has the right and responsibility of being a part of process improvement program. A Process Action Team (PAT) should be constructed for each process. Head of the PATs should be assigned from the most experienced individual for that process. Head of the PATs should come together to make Engineering Process Group (EPG). The head of the EPG should be from the management team. EPG leader represents the project manager for the process improvement program. The sponsor and the top management team constitute the process improvement steering group.

The most efficient way of overcoming resistance to change is make people defining the change. Awarding people who are champions for change is very much important. People should clearly know that they are invited to take part in the change and the ones who are leading the change and adapting the change in front lines will be awarded.

5) Correct Planning for Transformation

Transformation is a long journey. However quick wins should be identified and the progress should be visible in short period of times. Even the small successes should be recognized and celebrated. IDEAL [4] phases should be planned and performed according to plan.

IDEAL requires first of all a good start. In the "Initiating" phase of IDEAL, sponsor should identify the reason for change. He or she needs to define the organizational structure for change management, such as EPG leader, steering group, etc. Assignment of PAT leader may be done in the later phases after the completion of identification of processes.

In Diagnosing phase of IDEAL, a gap analysis comparing current state of the organization with the desired state will help to plan the transformation in Establishing phase. The plan will be implemented in Acting phase and after the transformation is over Lessons learned phase will help not to repeat some mistakes done in earlier transformations.

Process improvement is no different from any other project. It requires planning, resource allocation, monitoring, verification, validation, configuration management, etc.

6) Tools are just tools!

Identifying, acquiring, and using the correct tools belong to later phases of process improvement. The first step is to create people committed, able, capable, responsible, and believing in processes and eager to use them. Tools should follow then to help these people in performing their tasks. We should not forget tools will not create committed, able, capable and responsible people.

7) Sustainable Transformation

Successful transformation should be acknowledged and celebrated. The secret for sustainable transformation is to set new and challenging targets whenever a target for change has reached. After one or two years after a successful transformation, new challenging targets for change should be set. Change management looks like a two way path the if we do not go up, it means that we will go down.

Conclusion

The seven success factors framework is a strong tool that can be used as a scorecard for management in establishing the necessary infrastructure for change management. The management team can identify their strengths and weaknesses in each of seven success factor. A “to do list” prepared for the each weakness identified. Progress should be monitored to make sure that all the processes have been successfully deployed. The “Seven Success Factors” framework will help to boost product quality, cost saving, faster delivery and also enable companies to become CMMI compliant easily.

References

1. Matthew Hotle, “*Why Process Improvement Efforts Fail*,” ID Number: TG-15-4929, Gartner, 9 April 2002
2. Peter Senge, *The Fifth Discipline*, 1994
3. SEI, *CMMI v1.2*, 2006
4. Bob McFeeley, *IDEAL, A User’s Guide for Software Process Improvement*, CMU/SEI-96-HB-001, 1996
5. Thomas Pyzdek, *The Six Sigma Handbook*, 2003

Bio



Orhan Kalaycı is an accomplished IT professional with 15 years’ software process improvement & organizational change management experience. Adept at integrating CMMI ML3 concepts with Software Process Improvement (SPI) program & agile software development life cycles and conducting gap analysis for global companies such as Alcatel, Siemens, and the Central Bank of the Republic of Turkey. Created demand for CMM/CMMI in Turkey by developing 3-day course to educate businesses about integrating agile software development (XP) practices and CMMI-based process improvement; provided 600+ hours

training to 300+ attendees. Conducted 3 CMMI-based process improvement programs. Presented Process Improvement & Agile concepts at 15+ conferences in the US, Holland, and Turkey including 7th Annual CMMI Technology Conference, European SEPG 2006, PSQT North 2004, and European Quality Congress, 2002. Authored book, “Right Questions for Managers” in Turkish, earning designation as CMMI expert. Developed the “Seven Success Factors for CMMI Based Process Improvement” guidelines in 2006. CMMI candidate instructor, committed to becoming CMMI (SCAMPI) Lead Appraiser. PMI Member. International speaker & author. Fluent in English & Turkish.



Seven Success Factors for CMMI based Process Improvement

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November 2007

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Risk of Failure

STRATEGIC PLANNING ASSUMPTION(S)
Two-thirds of process improvement initiatives within application development organizations will fail within three years of initiation (0.7 probability).

Matthew Hotle, *Why Process Improvement Efforts Fail*,
Gartner, Publication Date: 9 April 2002, ID Number: TG-15-4929

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Definition of Success




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Definition of Success

1950 - Deming

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graph LR
    Input --> Process
    Process -- "-5% Investment" --> Process
    Process --> Output
    Output -- "-20% defective" --> Defects
    Output -- "-10% defective" --> Defects
    Defects --- Savings["+10% savings"]
            
```


Less Defect (High Quality) with less unit cost



W. EDWARDS DEMING
Out of the Crisis

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Definition of Success

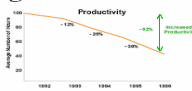
Carnegie Mellon University
Software Engineering Institute

Impact of Software Process Improvement: Boeing Data

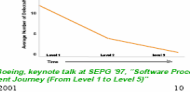
Software Estimates (Effort = Labor Hours)



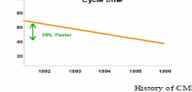
Productivity



Post Release Defects



Cycle Time



John Yu, Boeing, keynote talk at BEPO '97, "Software Process Improvement Journey (From Level 1 to Level 5)"
Sept 2001

History of CMMI

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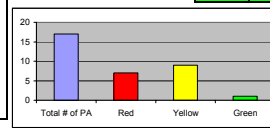



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Meteksan - April 2006

PA	Status	# of Implementations	PA's	PA's	PA's	PA's	PA's
1	RECMI	10	10	0	0	0	0
2	PP	4	4	0	0	0	0
3	PMO	10	10	0	0	0	0
4	MA	4	4	0	0	0	0
5	CM	2	2	0	0	0	0
6	PPQA	1	1	0	0	0	0
7	RD	2	2	0	0	0	0
8	TS	No Obs	0	0	0	0	0
9	VER	No Obs	0	0	0	0	0
10	JAL	No Obs	0	0	0	0	0
11	PI	No Obs	0	0	0	0	0
12	RSKM	4	4	0	0	0	0
13	PM	6	6	0	0	0	0
14	OPF	1	1	0	0	0	0
15	OPD	2	2	0	0	0	0
16	DAR	No Obs	0	0	0	0	0
17	OT	0	0	0	0	0	0

Summary	
Total # of PA	17
Red	0
Yellow	0
Green	17



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Meteksan - July 2006

Typical Issues in CMMI Implementations	Status	Çözüm Önerileri
1 Business Objectives linked to CMMI	Green	
2 Tools (too much expactions from tools)	Green	
3 Plan (long term short term balance)	Green	Aylık Gözden Geçirme Toplantıları Süreç Sorumlularının Pj'i ve Grup Yöneticilerine dağıtılması
4 Separations of Powers (Implementation, Consulting, Appraisal)	Green	%20 fazla kestirimler Geçimlere sempatik yaklaşıyoruz CMMI Fazla zaman alıyor demek yanlış (başka bir ifade bulmak) Proje Ynt. İş yükü
5 Organization (no democracy during war) / Overcommitment	Green	"Amacı ve faydası" anlamadığımız herşeyi lütfen sorun A4 Süreçler Süreç Haritası Posterleri CEP CMMI
6 Human Factor (no slaves but believers)	Green	CMMI Süreç Alanlarının üzerinden geçmek Ayda 2 kere toplantı - Grup Ynt. Pj'i Ynt. Süreç Sahipleri, Birleyler
7 Leadership (from top to down) - Group Mng. Pj'i Mng.	Green	

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Meteksan - December 2006





Meteksan Sistem Kurumsal Uygulamalar ve Yazılım Geliştirme Direktörlüğü

CMMI ML3




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Business Objectives & Leadership

Typical Business Objectives:

1. Increase Scope
2. Decrease Cost
3. Decrease Duration
4. Decrease Defects

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Business Objectives & Leadership

How many leaders?
Who is leader?




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eXtreme Process Improvement

Business Objectives & Leadership

The Broken Windows Theory

- Identify the broken windows
- Fix them
- Warn the one who broke it, punish if necessary



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Business Objectives & Leadership

Three Secrets of Japan Emperor



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Business Objectives & Leadership

Three Secrets of Japan Emperor



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Business Objectives & Leadership

Three Secrets of Japan Emperor

Objective Info



Award



Penalty



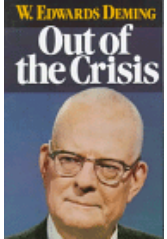
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eXtreme Process Improvement

Business Objectives & Leadership

Deming's 14 points

- 1."Create constancy of purpose towards improvement".
- 2."Adopt the new philosophy".
- 3."Cease dependence on inspection".
- 4."Move towards a single supplier for any one item."
- 5."Improve constantly and forever".
- 6."Institute training on the job".
- 7."Institute leadership".
- 8."Drive out fear".
- 9."Break down barriers between departments"
- 10."Eliminate slogans"
- 11."Eliminate management by objectives".
- 12."Remove barriers to pride of workmanship".
- 13."Institute education and self-improvement".
- 14."The transformation is everyone's job".

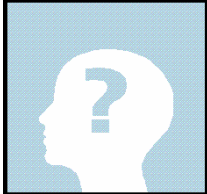


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Business Objectives & Leadership

WHY?



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Separation of Powers & Ceasing Over-Commitment



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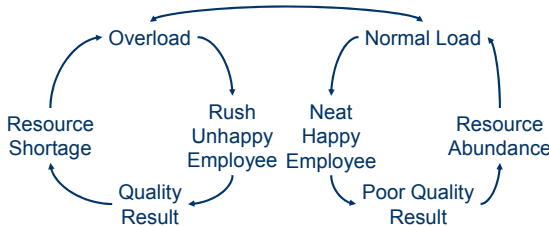
Separation of Powers & Ceasing Over-Commitment



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Separation of Powers & Ceasing Over-Commitment

The diagram is a pyramid divided into three horizontal sections. The top section is green and labeled 'Senior Management', with 'Policy' on the left and 'Strategy' on the right. The middle section is purple and labeled 'Middle Management', with 'Procedure' on the left and 'Tactics' on the right. The bottom section is orange and labeled 'Line Management', with 'Execution' on the left and 'Operations' on the right.

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Seven Success Factors

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Two small illustrations are on the right: one of a person in a blue suit celebrating with arms raised, and another of three people (two men and one woman) looking at a laptop.

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Result-Oriented Processes

Three small illustrations are shown: a green truck, a purple computer monitor, and a person in a pink dress holding a tablet.

Meaningful Processes for Customer

A Large Financial Software Company

1. Provide good products at good prices
2. Acquire customers and maintain good relations with them
3. Make it easy to buy from us
4. Provide excellent services and support after the sale

Texas Instrument

1. Strategy Development
2. Product Development
3. Customer design and support
4. Manufacturing capability development
5. Customer communication
6. Order fulfillment

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Result-Oriented Processes

A complex flowchart with many nodes and arrows, representing a multi-layered process.

Simple Meaningful
Result Oriented Multi Layered

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Result-Oriented Processes

A detailed flowchart showing software development processes. Key stages include: 'Build Process' (with sub-steps: 'Build Process', 'Rightly Build', 'Control'), 'Use' (with sub-steps: 'Software Use', 'Bug Reports, Feature Requests'), and 'Voting and Code Access' (with sub-steps: 'Voting', 'Approved Changes', 'Code Changes', 'Export Code'). Other terms include 'Modify', 'Approved Code', and 'Export Code'.

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Result-Oriented Processes

Two diagrams are shown. The first is labeled 'Heterarchy' and shows four boxes in a row with curved arrows between them, indicating non-hierarchical relationships. The second is labeled 'Hierarchy' and shows a tree structure with a root box at the top and four child boxes below it.

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Result-Oriented Processes

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Wide Spread Involvement & Awarding System

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Wide Spread Involvement & Awarding System

#	PA	Processes	Process Owner	PM	Developer	CM	SDA	Test
1	PP, PMC, IPM	Proje Yönetim	P	Kadiye	Hakan	Safak		
2	RSKM	Risk Yönetimi	P	Filiz	Pelin	Güçlü		Emre Güneş
3	REQM, RD	Gereksinim Müh.	P	Ulaş	Hakan	İrem		Emre Bayram
4	TS	Teknik Çözüm	P	Ziya	Mustafa Kemal	Emre Ergöden		
5	PI	Ürün Entegrasyonu	P	Murat Orun	Yalçın	Mesut		
6	VER	Gözetim Geçirimi	P	Eğin	Ercan	İlkay		
7	VER, VAL	Yazılım Testi	P	Yeşim	Ziya	Dilan	Ulaş	Canan
8	PPQA	Yazılım Kalite Güvence	P	Canan	Tülay	Yeliz		
9	CM	Yazılım Konfl. Ynl.	P	Sevdaç	MMT	Uluk		
10	DAR	Karar Analizi ve Çözüm	P	Şahin	Muhammed	Onur Şentürk		
11	MA	Ölçme ve Analiz	O	Koray	Hüseyin Erdem	Elif		
12	OPD, OPF	Süreç Yönetimi	O	Eda	Filiz	Dilek		
13	OT	Kurumsal Eğitim	O	Banu	Melike	Aygegül		
14	OPF	Yazılım Yönetiminin Gözetim Geçirilmesi	O	Umut	Ali Çakıcı	Yılmaz		
15		İş Geliştirme	O	Gökmen	Kadiye	Dilek		Yeşim
16	CM	Değişiklik Yönetimi	P	Sibel	Asım	Gülner		

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Wide Spread Involvement & Awarding System

The Fifth Discipline

1. Personal Mastery
2. Shared Vision
3. Mental Models
4. Team Learning
5. Systems Thinking

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Wide Spread Involvement & Awarding System

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Seven Success Factors

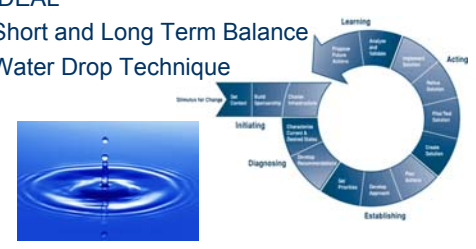
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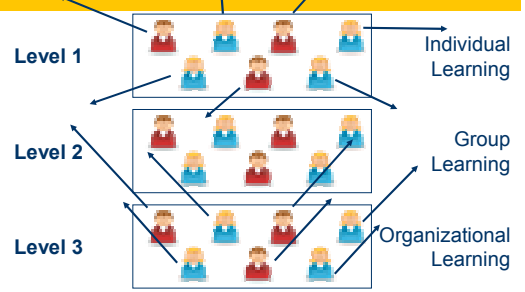
Correct Planning for Transformation

- IDEAL
- Short and Long Term Balance
- Water Drop Technique




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Correct Planning for Transformation



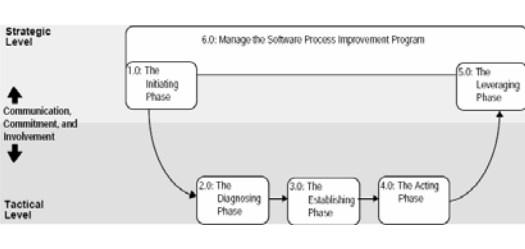
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IDEAL



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IDEAL



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eXtreme
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Tools are Just Tools!

Software Engineering Institute
Definition of Software Process

Process – a sequence of steps performed for a given purpose (IEEE)

Software process – a set of activities, methods, practices, and transformations that people use to develop and maintain software and the associated products (SEI)

Procedures and methods defining the relationship of tasks

People with skills, training, and motivation

Tools and equipment

14 History of CMM

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Tools are Just Tools!

Recognized Adoption Issues

- “70% of tools purchased by the organizations in the surveys are never used, other than perhaps in initial trial
- 25% are used by only one team or person within each organization
- 5% are widely used, but not to capacity. Perhaps only 10% of the capacity of the tool is used.”

From Jerry Weinberg's informal tool survey, cited in *Quality Software Management vol 4: Anticipating Change*. Dorset House, 1997.

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eXtreme
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Sustainable Transformation

- Up or down!
- There is no “Let’s stay here”

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eXtreme
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I
mprovement

Sustainable Transformation

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eXtreme
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**Seven Success Factors
for
CMMI based
Process Improvement**

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November 2007

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PROCESS IMPROVEMENT CONSULTANT

Accomplished IT professional with 15 years' software process improvement & organizational change management experience. Adept at integrating CMMI ML3 concepts with Software Process Improvement (SPI) program & agile software development life cycles and conducting gap analysis for global companies such as Alcatel, Siemens, and the Central Bank of the Republic of Turkey. CMMI candidate instructor, committed to becoming CMMI (SCAMPI) Lead Appraiser. PMI Member. International speaker & author. Fluent in English & Turkish. Areas of expertise also include:

- ◆ Strategy Development
- ◆ Quality Management Systems
- ◆ Software Metrics
- ◆ SPI Planning
- ◆ SEPG Leadership
- ◆ Process Assessment
- ◆ Project Management
- ◆ Quality Assurance
- ◆ Process Definition

CAREER ACCOMPLISHMENTS

- Served as a Resident Affiliate for Software Engineering Institute in Pittsburgh and fulfilled final prerequisite to become an official CMMI instructor; subsequently invited to the 5th Annual CMMI Workshop, exclusive to authorized SCAMPI Lead Appraisers, CMMI Instructors, and official candidates.
- Created demand for CMM/CMMI in Turkey by developing 3-day course to educate businesses about integrating agile software development (XP) practices and CMMI-based process improvement; provided 600+ hours training to 300+ attendees. Conducted 3 CMMI-based process improvement programs.
- Presented Process Improvement & Agile concepts at 15+ conferences in the US, Holland, and Turkey including 7th Annual CMMI Technology Conference, European SEPG 2006, PSQT North 2004, and European Quality Congress, 2002.
- Authored book, "Right Questions for Managers" in Turkish, earning designation as CMMI expert.
- Developed the "Seven Success Factors for CMMI Based Process Improvement" guidelines in 2006.
- Spearheaded effort to persuade YKB Bank IT Department Head to make 20 Project Managers members of PMI; efforts eventually resulted in the start-up of PMI Turkey chapter.

PROFESSIONAL EXPERIENCE

XPI – eXtreme Process Improvement, Toronto, Canada & Istanbul, Turkey 2003 –Present
Founder / Principal Consultant

Developed consultancy & training business to educate global corporations about CMMI concepts, and served as a Senior Consultant on the following client projects:

- **SEI, Pittsburgh, PA, USA ~ Aug.-Sept. 2007:** Consulted with SEI on Improving Processes in Small Settings (IPSS), bringing state-of-the-art knowledge to the table.
- **Meteksan System, Istanbul, Turkey ~ April-Dec. 2006:** Participated in two official CMMI ML3 appraisals (SCAMPI); partnered with Senior Management to implement the "Seven Success Factors" framework; boosted product quality and enabled company to become CMMI ML3-compliant.
- **Central Bank of the Republic of Turkey, Ankara, Turkey ~ Jan. -March 2006:** Persuaded SW Quality Audit Department to develop long-term strategic road map for process improvement; conducted meetings with department heads and CIO to analyze situation; identified need for a project management office to reduce costs and expedite delivery; reengineered organization with separate roles for performer, consultant, and auditor.
- **Siemens, Istanbul, Turkey ~ Nov.-Dec. 2005:** Performed gap analysis against CMMI ML3; developed preliminary SPI Plan for focusing business on requirement development, project management, and verification using agile software development practices.
- **Yaltes (A Thales company in Turkey), Istanbul, Turkey ~ Aug.-Sept. 2005:** Trained CEO, Directors, Department Heads, Project Managers, and Developers on CMMI.
- **Bimar, Izmir, Turkey ~ Aug. 2003-April 2005:** Developed a proposal that won over IBM, HP, Accenture, PriceWaterhouseCoopers, and Deloitte & Touche; performed gap analysis against CMMI ML2; prepared and implemented SPI Plan with agile practices; built Software Engineering Process Group (SEPG); and piloted projects that boosted customer satisfaction in 2005, 2006, and 2007.

PROFESSIONAL EXPERIENCE*(Continued)***Alcatel**, Istanbul, Turkey

1999 – 2001

SEPG Leader

Served as SEPG Leader for Istanbul, Worldwide Training Process Owner for 5,000 engineers in Alcatel VND R&D, Project Quality Manager for Turk Telecom Project with \$140M budget, and team member of center Program Office in Antwerp, Belgium. Attended meetings in Belgium, Germany, Spain, and France on a frequent basis.

- Facilitated metric system, SQA plans, project plans, test plans, and project review meetings.
- Analyzed business-critical issues and provided solutions.
- Introduced new agile SDLC, Feature Driven Development (FDD), in Alcatel Istanbul.
- Led the SPI program that resulted in Istanbul reaching SW-CMM L3 from L1+ within two years, which enabled completion of project with lower costs, less duration, and fewer defects.
- Saved \$100K by developing an in-house software program coded in Java; completed project in 4 month.

YKB Bank, Istanbul, Turkey

Jan. – April 1998

Team Leader

Collaborated with Andersen Consultants (Accenture) to lead team in development of software change control procedures.

- Identified deficiencies in test environment that resulted in significant improvements in cost, duration, and quality of software changes in the production environment.

TUBITAK Marmara Research Center, Kocaeli, Turkey

1993 – 1995

*(Tubitak is the Turkish equivalent of the NSF in the USA.)****Team Leader***

Led team for object-oriented GUI development in compliance with IEEE 730 in a military NATO project RTP6.2 HISPARS – High Speed Pattern Recognition Systems, a collaboration of 9 countries and 11 companies with an \$8M budget; attended project meetings in Germany and England.

- Played leadership role on team that was designated as the best team project-wide.

EDUCATION & DEVELOPMENT***Master of Science in Industrial Engineering***, 1995*Master thesis:* Software process assessment and application in the Turkish software industry***Bachelor of Science in Computer Engineering***, 1991

*Bogazici University, Istanbul, Turkey, 1995

*Credentials assessed by Comparative Education Services, University of Toronto

OFFICIAL SEI COURSES

CMMI Version 1.2 Instructor Training

Intermediate Concepts of CMMI v1.2

Introduction to CMMI (Staged and Continuous) by Borland

Defining Software Processes Workshop

NON-SEI COURSES

Balanced Score Card ~ Robert S. Kaplan

High Performance Communication Networks ~ University of Berkeley

SW Project Management ~ Alcatel University

SQA- SW Quality Assurance ~ Q-Labs

SW Requirements Management ~ Object Technologies

AFFILIATIONS

SEI, IEEE, PMI, Toronto SPIN, SPI Partners