SWE 2029 – Agile Development Process

Module – 2 Agile Processes

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Module	Topics	L Hrs
2	**AGILE PROCESSES:** Key Process Areas in **CMM** – Quality Improvement **Six Sigma** : Six Sigma Overview, **DMAIC** - Define, Measure, Analyze, Improve, Control; **DMADV** - Define, Measure, Analyze, Design, Verify; **Lean** : Lean Overview, Lean Principles, Lean Rules, Lean Implementation - **The 8 Forms of Waste**; Lean Tools - 5 Why's, Pareto	6

Process Improvements

- **Need of continuous improvement** in development and management of software products;

- **Software Process Improvement (SPI)** is one way; <u>SPI – Assumption:</u>

- There exists a **"Process"**;

- That describes,

  - ❑ How the software is developed?
  - ❑ How the development is managed?

- By **improving the process, quality of software gets improved**;

CMMI

- Many organization started using CMMI;
- **Collection of best practices**;
- Practices are arranged into **"process areas"**;
- **Each process area has defined goals** that need to be satisfied;
- **Set of practices that can be implemented** to reach the goals.

CMMI Model: Representation

CMMI Model: Representation:

- Staged
- Continuous

Staged:

- Process improvement is **implemented** using **5** **maturity levels;**

- **Each level (except level 1)** has a **set of process areas.**

- Staged implies organisation is improved in **steps from maturity level 1 to** 5.

CMMI Model: Representation

Continuous:

- An **Organization can pick those process areas** that would bring the **biggest benefits**, and **implement the practices from those process areas** to improve capabilities of the organization;

- **Need to have basic insight information;**

Why Agile Process Improvement?

Reason to become more agile when doing Process Improvement:

- From a business point of view it is important to be **able to adopt process improvement programs** to the **changing business needs**;

- **Improve the collaboration**;

- **Focus on deployment**;

Agile Process Improvements - Benefits

- Being able to **deliver the right product with high quality**, using frequent feedback;

- **Understanding the strengths & weaknesses** of our processes, and the business values;

- **Alignment and streamlining of processes**;

- **Efficient ways for professionals to work together** in a dispersed team;

CMMI & KPA

Level	Focus	Key Process Area	Result
5 Optimizing	Continuous Process Improvement	Organizational Innovation and Deployment Causal Analysis and Resolution	Highest Quality / Lowest Risk Higher Quality / Lower Risk
4 Quantitatively Managed	Quantitatively Managed	Organizational Process Performance Quantitative Project Management	
3 Defined	Process Standardization Organizational Process Definition	Requirements Development Technical Solution Product Integration Verification Validation Organizational Process Focus Organizational Training Integrated Project Mgmt (with IPPD extras) Risk Management Decision Analysis and Resolution Integrated Teaming (IPPD only) Org. Environment for Integration (IPPD only) Integrated Supplier Management (SS only)	Medium Quality / Medium Risk
2 Repeatable	Basic Project Management	Requirements Management Project Planning Project Monitoring and Control Supplier Agreement Management Measurement and Analysis	Low Quality / High Risk
1 Initial	Process is informal and Adhoc	Process and Product Quality Assurance Configuration Management	Lowest Quality /

SIX SIGMA

Six Sigma

- Six Sigma is a methodology for pursuing **continuous improvement** in **customer satisfaction** and **profit**.

- Is a management philosophy attempting to **improve effectiveness and efficiency**.

- Is **highly disciplined process** that helps to **focus** **on developing and delivering near-perfect products** and services.

Six Sigma - Features

- *Aim is to eliminate waste and inefficiency,* thereby **increasing customer satisfaction** by delivering what the customer is expecting.

- *Follows a structured methodology,* and has **defined roles** for the **participants**.

- Six Sigma is a *data driven methodology,* requires **accurate data collection** for the processes being analyzed.

Six Sigma is a **business-driven, multi-dimensional structured approach** for:

- Improving Processes
- Lowering Defects
- Reducing process variability
- Reducing costs
- Increasing customer satisfaction
- Increased profits

Sigma:

- Is a **statistical term** that **measures how far a given process** deviates from perfection.

- <u>**Central idea behind Six Sigma:**</u>

    If you can measure how many "defects" you have in a process, you can **systematically figure out how to eliminate them** and get as close to "zero defects".

Six Sigma – Key Concepts

Six Sigma – Key Concepts:

❑ **Critical to Quality**: Attributes most **important to the customer**.

❑ **Defect**: Failing to deliver what the customer wants.

❑ **Process Capability**: What your **process can deliver**.

Six Sigma – Key Concepts

- **Variation**: What the **customer sees and feels.**

- **Stable Operations**: Ensuring **consistent**, predictable processes to improve what the customer sees and feels.

- **Design for Six Sigma**: Designing to **meet customer needs** and process capability.

Six Sigma – Myths

Six Sigma – Myths:

- Six Sigma is only concerned with **reducing defects.**
- Six Sigma is a **process for production or engineering.**
- Six Sigma **cannot be applied to engineering activities.**
- Six Sigma uses **difficult-to-understand statistics.**
- Six Sigma is **just training.**

Six Sigma – Key Elements

Six Sigma – Key Elements:

❑ **Customers**

❑ **Processes**

- ❑ **Define processes**; as well metrics and measures;
- ❑ **Quality** should look from customer's perspective;

❑ **Employees**

- ❑ **All** should **get involve**;
- ❑ **All team members** should have **defined role**;

Six Sigma – Roles & Responsibilities

Six Sigma – Roles & Responsibilities

Six Sigma – Roles & Responsibilities:

1. Leadership

- **Defines the goals and objectives** in the Six Sigma process;

- Six Sigma council sets the goals to be met by the team;

Leadership – Responsibilities:

- **Defines the purpose** of the Six Sigma program

- **Explains how the result is going to benefit** the customer

- **Sets a schedule for work** and interim deadlines

- **Support team members**

2. Sponsor

- Are **high-level individuals who understand Six Sigma** and are committed to its success.

- Is a **problem solver**

- Are the **owners of processes and systems;**

3. Implementation Leader

- Responsible for **supervising** **the Six Sigma team** effort;

- **Ensuring that work is completed** in the desired manner;

- **Ensuring success of implementation plan** and solving problems;

- **Arrange for training** as needed;

4. Coach

- Coach is **Six Sigma expert** or **consultant**

- Is **one who sets a schedule**, defines result of a project, and **who mediates conflict;**

5. Team Leader

- An **individual responsible for overseeing the work** of the team;

Responsibilities:

- **Communication with the sponsor** in defining goals;

- **Picking and assisting team members**;

- **Keep track of schedule** & process steps;

6. Team Member

❑ **Who works on Six Sigma project**;

❑ Have **specific duties within a project**, and has associated deadlines.

7. Process Owner

❑ The individual who takes on **responsibility for a process after a Six Sigma team has completed its work**.

Six Sigma - Belts

Six Sigma - Belts

Six Sigma – Belts:

- Belt names are a **tool for defining levels of expertise** and **experience.**

Black Belt:

- **Has achieved the highest skill level** and expert in various techniques.

- Should **have completed a thorough training program** and has the **experience working on several projects.**

- Given the **role of a team leader,** responsible for execution and scheduling tasks.

Master Black Belt:

❑ **Deals with the team**;

❑ **Equivalent to the role** played by the **coach**;

Green Belt:

❑ **Belong to team leader** or to a member of the team working directly with the team leader.

❑ Is **less experienced than a Black Belt**;

Is Six Sigma Right for You?

❑ Is the **strategic goal clear for the company**?

❑ Is the **business healthy enough to meet the expectations** of analysts and investors?

❑ Is there a **strong theme or vision** for the future of the organization that is well understood and consistently communicated?

❑ If the **organization good at responding effectively and efficiently to new circumstances**?

❑ **Evaluating the overall business** results.

❑ **Evaluating how effectively are we operating.**

❑ **How effective are your current improvement and change management** system is?

❑ How well are your **cross-functional processes managed**?

The Cost of Six Sigma Implementation

□ **Direct Payroll** for the **full time individuals.**

□ **Indirect Payroll for the time devoted by executives**, team members, process owners and others, involved in activities like data gathering and measurement.

□ **Training and Consultation fee to teach Six Sigma** Skills and getting advice on how to make efforts successful.

□ **Improvement Implementation Cost.**

Six Sigma Start-up

- Deploying Six Sigma within an organization is a big step;
- Some **steps which are required** for an organization at the time of **starting Six Sigma implementation.**
  - ❑ Plan your own route
  - ❑ Define your objective
  - ❑ Stick to what is feasible
  - ❑ Preparing Leaders
  - ❑ Training the organization
  - ❑ Piloting Six Sigma effort

Project Selection for Six Sigma

Top-down:

- Generally **tied to business strategy** and is aligned with customer needs.

Bottom-up:

- In this approach, **Black Belts choose the projects** that are well-suited for the **capabilities of teams.**

Six Sigma Methodology

Six Sigma Methodology

Six Sigma has two key methodologies:

- **DMAIC**: It refers to a **data-driven quality strategy** for **improving processes.** This methodology is **used to improve an existing business process.**

- **DMADV**: It refers to a **data-driven quality strategy** for **designing products & processes**. This methodology is **used to create new product designs or process designs.**

- **DFSS** - Design For Six Sigma.

- **DFSS** is a **data-driven quality strategy** for **designing** or **redesigning** a **product or service**.

DMAIC Methodology

DMAIC Methodology:

Define --> Measure --> Analyze --> Improve -->Control

- **Define**: Define the **problem or project goal** that needs to be addressed.

- **Measure**: Measure **the problem and process** from which it was produced.

- **Analyze**: Analyze **data and process to determine** root causes of defects.

- **Improve**: Improve the **process by finding solutions** to fix, diminish, and prevent future problems.

- **Control**: Implement, control, and sustain the improvements solutions to keep the process on the new course.

DMADV Methodology

DMADV Methodology

This methodology consists of five steps:

Define --> Measure --> Analyze --> Design -->Verify

- **Define**: Define the Problem or Project Goal that needs to be addressed.

- **Measure**: Measure and determine customers needs and specifications.

- **Analyze**: Analyze the process to meet the customer needs.

- **Design**: Design a process that will meet customers needs.

- **Verify**: Verify the design performance and ability to meet customer needs.

DFSS Methodology

DFSS Methodology

This methodology can have the following five steps.

   Define --> Identify --> Design --> Optimize -->Verify

- **Define**: Define what the customers want, or what they do not want.

- **Identify**: Identify the customer.

- **Design**: Design a process that meets customers needs.

- **Optimize**: Determine process capability and **optimize the design**.

- **Verify**: Test, verify, and validate the design.

Six Sigma - DMAIC's Different Phases

Six Sigma - Define Phase

Six Sigma - Define Phase:

❑ **Project team formation**

❑ **Document Customers Business Processes**

❑ **Develop a Project Charter**

❑ Develop the SIPOC process map

Conclusion:

❑ We know who the customer / end-user is and their requirements.

Six Sigma – Measure Phase

Six Sigma – Measure Phase:

❑ Overall business process performance is measured;

Key set of activities involved are:

❑ **Data Collection** Plan and Data Collection

❑ **Data Evaluation**

❑ **Failure Mode and Effects Analysis** - FMEA

   ❑ Preventing defects before it occurs

Six Sigma - Analyze Phase

❑ Aim is to define the cause of defects, measure those defects, and analyze them so that they can be reduced.

❑ **Source Analysis**

❑ **Process Analysis**

❑ **Data Analysis**

❑ **Resource Analysis**

❑ **Communication Analysis**

Six Sigma - Improve Phase

Six Sigma - Improve Phase:

- **Identify improvement** break-through,
- **Identify other alternatives**,
- Select preferred approach,
- **Design the future state**,
- **Determine the new Sigma** level,
- **Perform cost/benefit analysis** and
- Create a **preliminary implementation plan**.

Six Sigma - Control Phase

- ❑ **Quality Control**

- ❑ **Standardization**

- ❑ **Responding when defects cccurs**

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Thank You!