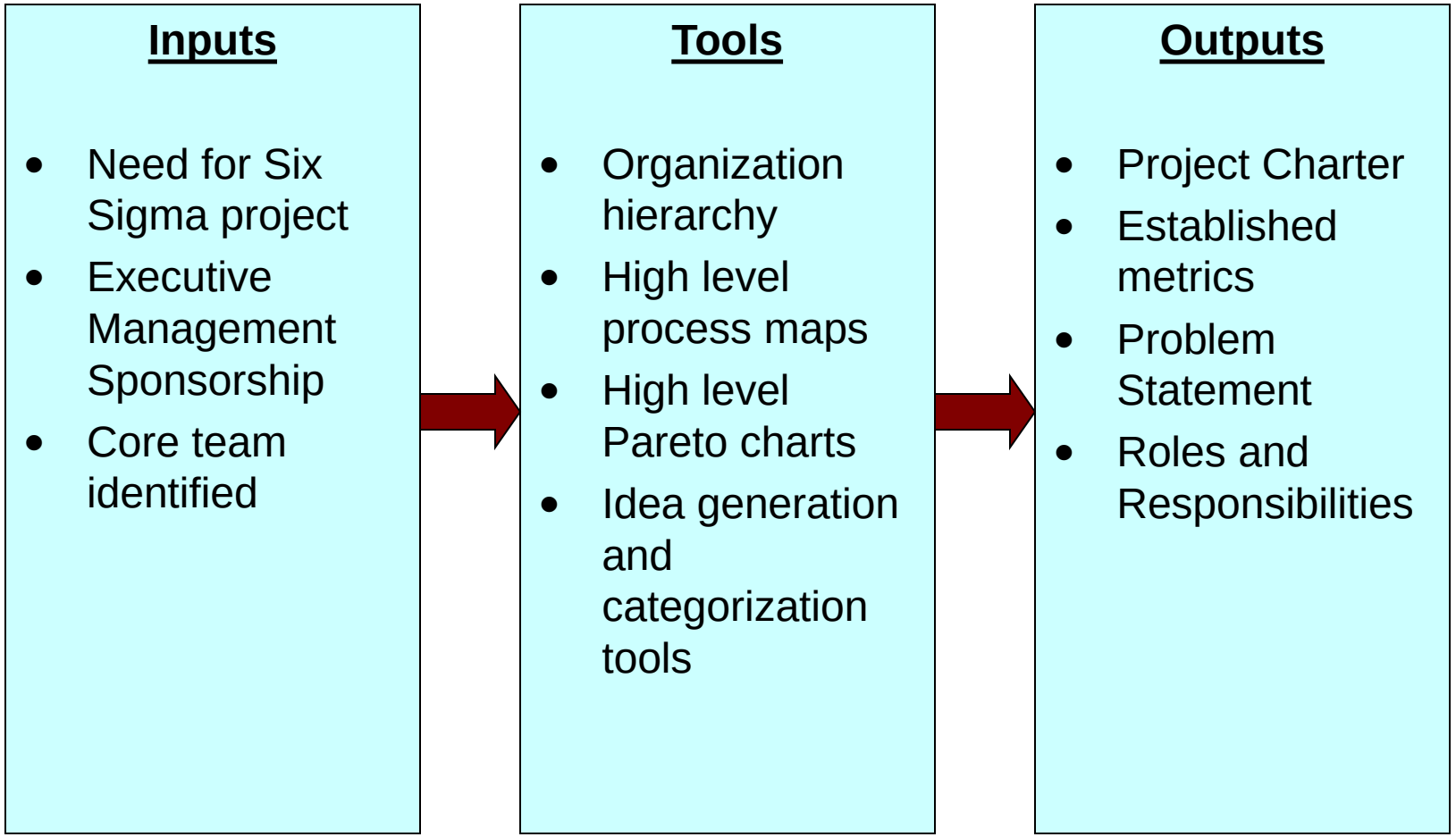
Six Sigma Green Belt - Study Guides

Index – Six Sigma Methodology (Define)



Input : Need for six sigma project

- A six sigma project is different from other traditional quality measures which meant to ensure that there was conformance to internal requirements.

- Six sigma methodology emphasizes providing better value for money by improving customer satisfaction and reducing costs .

- Need for six sigma projects:
  - Improving customer satisfaction
  - Process Reengineering (major process change) or process improvement (minor process change) for improving internal processes
  - Decreasing the defects or errors in the product
  - Decreasing costs
  - Creating long-term viability and competitive advantage

- Please note that the needs mentioned above are not mutually exclusive; a six sigma project may satisfy one or more needs.

Input: Executive Management Sponsorship

- Executive Management Sponsorship is one of the pre-requisites for any six sigma initiative.

- Executive or Senior Management provides:
  - High level need for the six sigma project
  - Resources required for the project
    - Human resources: The people who would be participating in the project
    - Financial support
  - Coordination with other internal groups in the organization
  - Motivation and Support to initiate and sustain the six sigma project

Please note: Like other projects, six sigma projects are progressively elaborated i.e. the distinguishing characteristics of the project will be broadly defined early in the project, and will be made more explicit and detailed as project team develops a better and more complete understanding of the product.

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Input- Core team identified

Executive sponsor should identify and assign core team members to the project. Core team members include:

- Project Manager
  - Person responsible for coordinating activities for the project
  - Has knowledge or project management methodology
  - Responsible for project deliverables and managing cost, scope, time, risk, human resources and communications for the project

- Six Sigma Expert
  - Preferably a six sigma Green Belt or Black Belt.
  - Understands six sigma methodology : can serve as a liaison between the Six sigma Black Belts/Master Black Belts and the project team.
  - Ability to interact with other Subject matter experts in different fields (e.g. Finance, Human Resources etc.) who may be involved in providing expertise wherever required.

Input- Core team identified (continued)

- Additional resources (as required)
  - Other than the project manager and Six sigma expert, additional resources may be assigned to the core team. Some examples include people with intimate knowledge of the process under study, Subject Matter Experts etc.

- Please note:

  - Other than identifying the core team, Executive sponsor should also provide the core team with authority to get information from and coordinate with other internal groups.
  - The core team should have the ability to engage other organizational resources in the project team as required for completing specific tasks in the six sigma project

Tools- Organization hierarchy

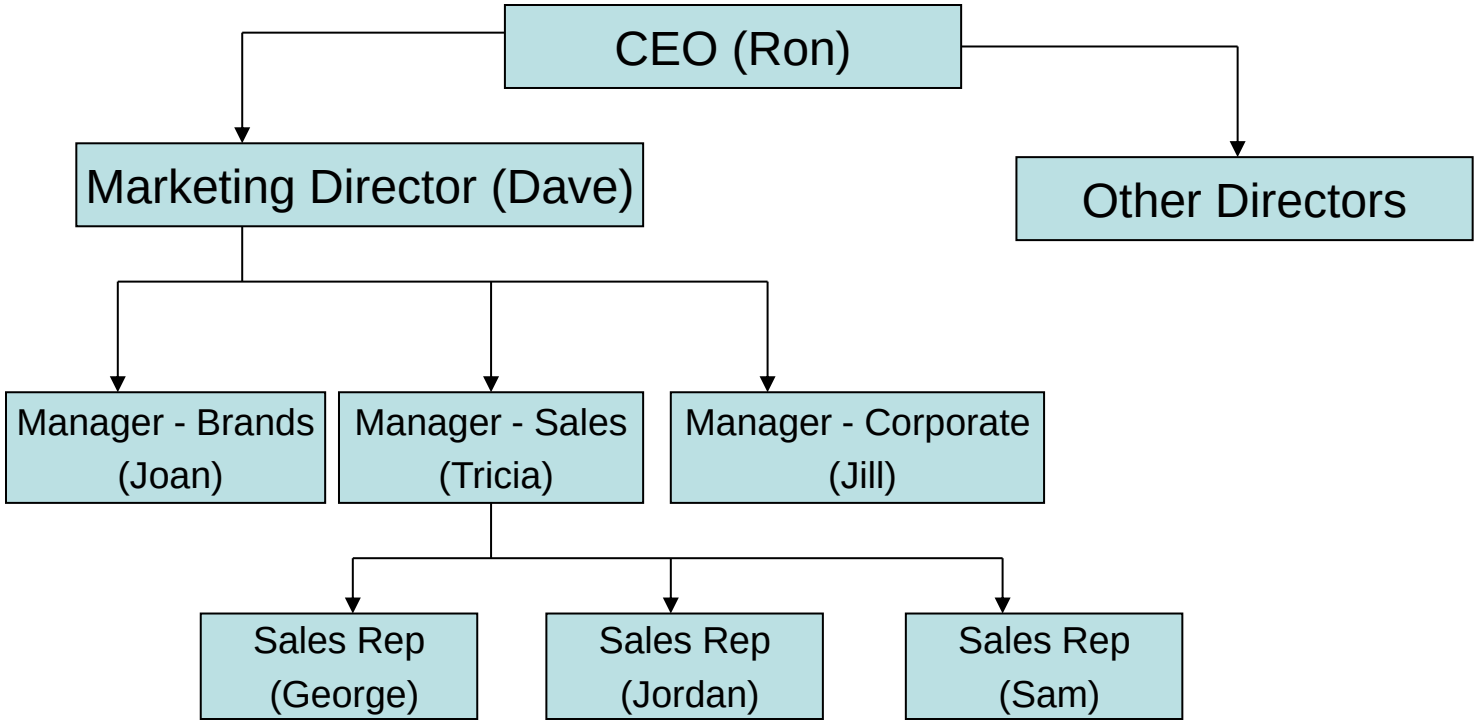
- Organization hierarchy is a hierarchical structure which shows the different people in an organization and their associated skills

- Six sigma projects require a lot of information and may need to engage several people from the organization. Knowledge of organization hierarchy allows the six sigma project team the ability to understand where they can get specific information, and who to engage in the different stages of a six sigma project.

- It is preferable for a six sigma project team to have access to the Human Resources team of the company and get an idea of the organization hierarchy and competencies of different individuals.

Organization hierarchy (continued)

Example of organization hierarchy



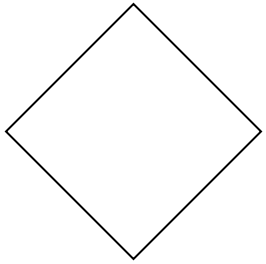
Tools- High level process maps

- Some features of process maps:
  - Process maps give a view of how work flows through the company. It is a graphic representation of processes in a company showing the sequence of tasks performed and their relationships.
  - Standard symbols are used in creation of process maps
  - Process maps are progressively elaborated: i.e. a high level process map is defined early on in the project which shows major processes and this will be made more explicit and detailed as project team develops a better and more complete understanding of all the processes

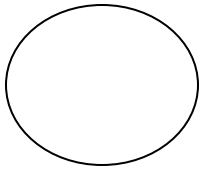
- Benefits of process maps:
  - Helps clarify several process steps and process flow which may not be understood clearly before.
  - Helps all members of the team gain appreciation for the work being done by others in the team.
  - Visually shows the various alternatives possible and helps in selecting an appropriate solution.

Symbols used in creation of process maps

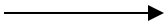
Rectangle: represents a process step or action taken.
Each process step has one or more inputs,
does some activity, and creates one or more outputs.



Diamond: represents a decision step i.e. different alternatives possible depending on the input to this step



Oval: represents the start of stop of a process map, also used to depict if the process map continues in another page



Arrow: represents the direction of flow in a process map

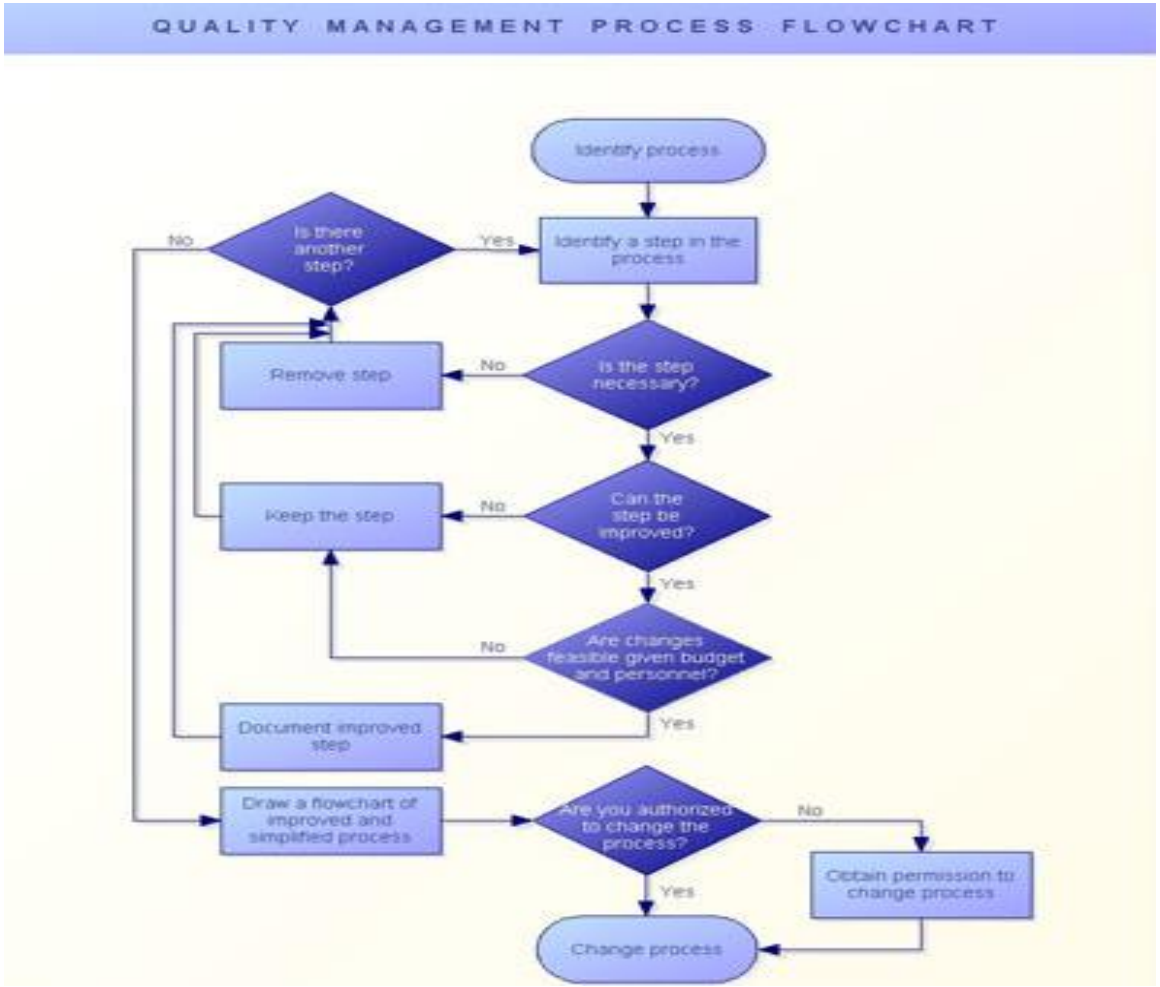
Process map- creation steps

- Put together a cross functional team who have knowledge of the process and appropriate subject matter expertise to create the process maps
- Try to find out existing process maps which may already be in existence in the company
- Map all the “As-is” high level processes i.e. processes as they exist now. This will create an awareness within the team about the processes in existence currently, and also let all team-members understand the contribution from others. This is the “As-is Process map”
- Ask the cross-functional team to study the process and identify opportunities for improvement.
- Based on the inputs from cross functional team, map all the “To-be” processes. This is the “To be Process map”

Process map- example

Sample process map created using

Smartdraw – a process mapping tool



Tools – Pareto chart Features and benefits

- Based on the Pareto principle (also referred to as 80-20 rule), which states that a small number of causes (20%) is responsible for a large percentage (80%) of the effect

- In a six sigma project, there are several available opportunities which can be followed to attain the project objectives. Pareto chart helps in identifying and ranking which of the opportunities would yield maximum benefits and hence should be pursued first.

Steps in creation of Pareto charts

- Put together a cross functional team who have knowledge of the different opportunities or problems
- Create different categories for the opportunities
- Select a time interval for the analysis which is reasonable
- Determine the total occurrences of events in each category
- Rank the total occurrences in each category from maximum to minimum
- Compute the percentage for each category by dividing by the category total and multiplying by 100.
- Create a graph of the opportunities – with the category names in the X Axis and the % of opportunities in the Y Axis.

Creating Pareto chart – case study

1. As the project manager of a six sigma effort to determine the lost bags in ABC Airlines company, you decide to do a Pareto analysis of the opportunities (i.e. lost bags)

2. You start by talking to the baggage division of the airlines, who provide you the information about the major categories into which you can divide the problem they have.

3. You determine that you would like to do the analysis for one year. This is because the baggage department recommends that processes for handling bags has changed and the process they had a year ago is not relevant

4. Baggage department also provide you with some metrics that they have kept for the past 1 year of the occurrences of problems that they had in each category. (please see next page)

Creating Pareto chart – case study (continued)

Metrics provided by baggage department

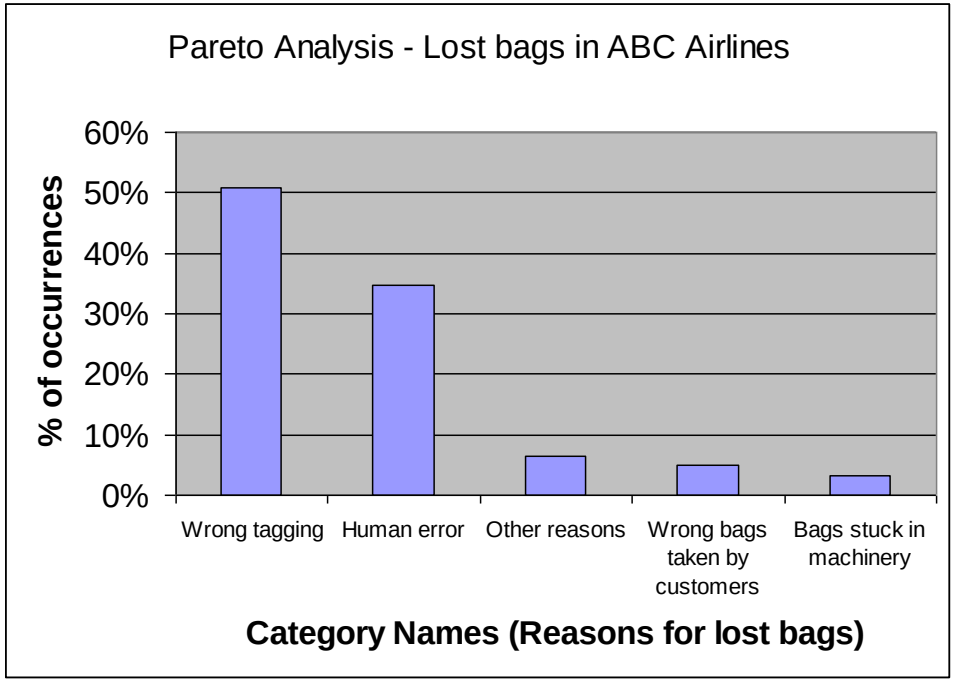
Category (Problem)	Bags Lost in 1 year
Human error	3200
Bags stuck in machinery	300
Wrong tagging	4700
Wrong bags taken by customers	450
Other reasons	600
Total	**9250**

5, 6) Rank the total occurrences in each category from maximum to minimum, calculate Percentage ofopportunities

Category (Problem)	Bags Lost in 1 year	Percentage
Wrong tagging	4700	51%
Human error	3200	35%
Other reasons	600	6%
Wrong bags taken by customers	450	5%
Bags stuck in machinery	300	3%
Total	**9250**	**100%**

Creating Pareto chart – case study (continued)

7) Create a graph of the opportunities – with the category names in the X Axis and the % of opportunities in the Y Axis.



After the Pareto Analysis, you know that you will have to concentrate your efforts to reduce Wrong tagging and Human Error (since they result in maximum lost bags)

Idea Generation and Categorization tools

- Several Idea Generation and Categorization tools are used in six sigma. Important tools for Idea Generation:
  - Surveys (covered in Chapter 2: stakeholders, customers and financial measures)
  - Focus Groups (covered in Chapter 2: stakeholders, customers and financial measures)
  - Kano Model (covered in Chapter 2: stakeholders, customers and financial measures)
  - Brainstorming (covered in Chapter 3: setting up and managing a six sigma project)
  - Nominal Group Technique (covered in Chapter 3: setting up and managing a six sigma project)
- Important tools for Idea Categorization:
  - Multivoting (covered in Chapter 3: setting up and managing a six sigma project)
  - Affinity diagrams (covered in Chapter 3: setting up and managing a six sigma project).
- You are requested to revise the tools mentioned above which have been already covered in other chapters

Idea Generation and Categorization tools (continued)

Benefits:

- Idea generation and categorization tools help in collecting and consolidating information from several sources.

- The process helps in providing information which can be used for project selection using financial measures e.g. NPV, PV, IRR, Payback period, Life Cycle Cost, BCR, Opportunity Cost, Sunk cost – (covered in Chapter 2: stakeholders, customers and financial measures)

- After getting inputs from the customer, Quality Function Deployment (QFD) can be used to map the voice of the customer to internal company processes and also provide competitive evaluation. QFD analysis includes inputs from all groups inside the organization, and forms the basis for determining the requirements for the project. (covered in Chapter 2: stakeholders, customers and financial measures)

Outputs – Project Charter

- A project charter is a document issued by the project initiator or sponsor that formally authorizes the existence of a project. It includes:
  - The business need that the project was undertaken to address
  - The product description
- The project charter provides a project manager with the authority to get organizational resources for project activities.

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Charter Negotiation

- Creation of the project charter from a six sigma project perspective includes several issues that need to be discussed and negotiated by relevant stakeholders. Some important issues which need to be negotiated include:
    - Objectives : Quantifiable criteria that must be met to for the project to be considered successful
    - Scope: This is a measure of the work required to complete the project successfully
    - Boundaries: Project boundary states explicitly what is in scope and what is out of scope for the project
    - Resources: In creation of project charter, critical resources (including people and funding required) are negotiated to ensure that appropriate resources are available.
    - Project closure activities
    - Project transition activities
- The project charter is a very important document which lays the foundation for next steps about the project

Established Metrics

- At the end of define phase of a six sigma project, the project team establishes standards or measures which would be used to determine success or failure of the project. These measurable and quantifiable parameters are also referred to as metrics.
- Metrics can be broadly categorized into:
  - **Primary metrics** –measures which the six sigma project primarily targets to achieve e.g. for a particular project, reduction in cycle time could be a primary metric
  - **Consequential metrics** – while trying to achieve the goals set forth by primary metrics, there may be some additional metrics which may be impacted. These are referred to as consequential metrics e.g. for a particular project where reduction in cycle time is the primary metric, there may be added advantages e.g. reduction in defect rate and improvement in perceived quality by the customer – so, these are consequential metrics of the project
- At a high level, most metrics can be classified into cost, cycle time and quality. For example metrics like defect rate, cost of poor quality (COPQ), six sigma level etc. are all metrics related to quality.
- Establishment of metrics is a very important requirement in any six sigma project because :
  - Metrics help in quantifying the benefits expected from the project
  - Metrics provide clear and unambiguous goals for the project team

Problem Statement

- At the end of define phase of a six sigma project, we should have a clearly defined problem statement.

- An ideal problem statement should be a few sentences long and describe what the project team aims to achieve through the project. It should include:

    - Baseline performance: The “As Is” system and its performance (preferably in terms of quantifiable metrics)

    - Improvement goals: The improvement possible if the six sigma project is implemented. This provides an idea of the “To Be” system. (preferably in terms of quantifiable metrics)

Outputs – Roles and Responsibilities

- At the end of Define phase, the six sigma project charter is created and project goals are known. So, resources are assigned to the project and provided with appropriate roles (who does what) and responsibilities (who decides what).

- A roles and responsibility matrix for the six sigma project team is created which ensures commitment from relevant stakeholders. Some important roles include:

    - Executive Management (also referred to as Deployment Champions) is responsible for sponsorship of the project and allow for commitment of organization resources to the six sigma project.

    - Master Black Belts and Black Belts act as consultants and experts in Six Sigma. They are also responsible for providing guidance and coaching others in the organization about the six sigma philosophy.

Outputs – Roles and Responsibilities (continued)

- Six Sigma Green Belts serve as a liaison between the Black Belts and the project team. They perform the operations required for the six sigma project and work with the project team to ensure that appropriate deliverables are met.

- The project team members work in executing the actual work of the project through guidance provided from six sigma green belts and six sigma black belts. Project team members should include those who have working knowledge of the existing processes.

- Subject Matter Experts in different fields (e.g. Finance, Human Resources etc.) may be involved in providing expertise wherever required.

- Project Manager who would be responsible for coordinating activities for the project. He will be responsible for project deliverables and managing cost, scope, time, risk, human resources and communications for the project

Roles and Responsibilities Matrix (Sample)

RACI Chart	Person				
Activity	Ann	Ben	Carlos	Dina	Ed
Define	A	R	I	I	I
Design	I	A	R	C	C
Develop	I	A	R	C	C
Test	A	I	I	R	I

R = Responsible A = Accountable C = Consult I = Inform

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