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| GENUS INNOVATION LIMITED |
| Decision Analysis and Resolution Procedure |
| PRCD\_DARPRC.docx |
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| **Genus** |

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| Decision Analysis and Resolution (DAR) is used for evaluating alternatives in order to arrive at critical decisions in a project or in any other support area. |

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# Overview

Decision Analysis and Resolution (DAR) is used for evaluating alternatives in order to arrive at critical decisions in a project or in any other support area.

# Objective

To analyze possible decisions using a formal evaluation process that evaluates identified alternatives against established criteria and to arrive at most appropriate solution for critical decisions.

# Scope

This process is applicable to all activities under the purview of the R & D Division in Genus.

# Inputs

* Problem statement that requires alternative solutions.

# Entry Criteria/Triggers

* Critical decision point
  + Evaluation of alternatives for technology selection
  + Cost, effort and schedule impact is high
  + Significance of the decision is high
* The practitioners have undergone QMS trainings with focus on performing their processes.

# Tasks

| Sr.No | Task | Owner/Role |
| --- | --- | --- |
|  | **Define the problem statement and Prepare a DAR plan** |  |
|  | Identify the problem statement that requires alternative solutions. Refer DAR Guidelines. | Project Manager |
|  | Select the appropriate technique to be used which may include   * Wideband Delphi * Pareto Analysis * Grid Analysis * Paired Comparison Analysis * Decision Tree Analysis * PUGH Matrix   Refer DAR Guidelines. | Project Manager |
|  | Use “Decision Authority” guidelines to identify participants (in case more than one people are required to evaluate and make decision) and roles and responsibilities. | Project Manager |
|  | Update the “DAR Plan” section in Project Plan with identified techniques and the situations when to apply DAR in the project. Consider using “Generic DAR Template” (TMPL\_DARGEN), or other DAR templates in the QMS. | Project Manager |
|  | **Select Solution** |  |
|  | Identify different alternative solutions to address the issue   * These alternative approach/solutions/ decision criteria can come as input from different stakeholders as a result of their experience/ expertise, brain storming, literature study, or otherwise. | Project Manager/ Design Team/s |
|  | Assesss each of the alternatives with respect to the evaluation criteria.  Refer Evaluation Criteria Guidelines. | Project Manager/ Design Team/s |
|  | **Approve Final Decision** |  |
|  | Inform the final decision to all relevant stakeholders and take their approval, in case they are affected. | Project Manager |

\* Improvements/Suggestions are solicited on “Process Improvement Proposals Database”.   
\*For details on the Roles and Responsibilities of the practitioners, Refer "Roles and Responsibility" document in the QMS.

# Verification

* Review of the DAR Plan by the Project Manager
* Review of the process and its workproducts by PPQA members.
* Review of the process and its work products by Senior Management.

# Guidelines

Refer "Configuration Management Procedure" (PRCD\_CONFIG) for Access Rights, location of work products, naming convention and types of controls.

## DAR Guidelines

List of the Evaluation techniques for DAR is given below:

|  |  |  |
| --- | --- | --- |
| Sr. No. | Evaluation Technique | Criteria for Application of Technique |
|  | Pareto Analysis | * When selecting the most important and beneficial changes to make * When there are many possible courses of action |
|  | Paired Comparison Analysis | * When relative Importance of Different Options are to be worked out * When there is no objective data to base importance of options * When priorities are to be set for conflicting demands |
|  | Grid Analysis | * When a choice is to be made amongst number of good alternatives where many factors/criteria are to be balanced |
|  | Decision Tree Analysis | * While Choosing Between Options by Projecting Likely Outcomes |
|  | PMI  (Plus Minus Implications) | * When pros and cons of a decision have to be weighed |
|  | Six Thinking Hats | * When a decision is to be looked from all points of view |
|  | Cost/Benefit Analysis | * While evaluating quantitatively whether to follow a course of action |

### Paired Comparison Analysis

1. List the options you will compare. Assign a letter to each option.
2. Set up a table with these options as row and column headings.
3. Block out cells on the table where you will be comparing an option with itself - there will never be a difference in these cells;
4. These will normally be on the diagonal running from the top left to the bottom right.
5. Also block out cells on the table where you will be duplicating a comparison. Normally these will be the cells below the diagonal.
6. Within the remaining cells compare the option in the row with the one in the column. For each cell, decide which of the two options is more important. Write down the letter of the more important option in the cell, and score the difference in importance from 0 (no difference) to 3 (major difference).
7. Finally, consolidate the results by adding up the total of all the values for each of the options. You may want to convert these values into a percentage of the total score.

An example of Paired Comparison Analysis is given below:

**Decision**

How to allocate two resources for a Project in US Deliveries which is expected after a period of 3-4 weeks.

**Options**

* Recruit New resource (Option A)
* Train internal person having relevant database experience. (Option B)
* Transfer employee from other operational units (Option C)
* Outsource the requirement (Option D)

**Paired Comparison Analysis Table**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **Option A** | **Option B** | **Option C** | **Option D** |
| **Option A** |  | B 3 | C 1 | A 1 |
| **Option B** |  |  | B2 | B3 |
| **Option C** |  |  |  | C2 |
| **Option D** |  |  |  |  |

**Analysis**

Scores are A = 1, B = 3 + 2 + 3 = 8, C = 2 + 1 = 3, D = 0

Total = 1 + 8 + 3 = 12

Percentage scores are A= 8.33%, B = 66.67%, C = 25 %, D = 0

**Conclusion**

B is best option.

### Grid Analysis / Criteria Based Matrix

1. Lay out your options as rows on a table.
2. Set up the columns to show your factors/criteria.
3. Allocate weights to show the importance of each of these factors/criteria.
4. Score each choice for each factor/criteria using numbers from 1 (poor) to 5 (very good).
5. Multiply each score by the weight of the factor/criteria, to show its contribution to the overall selection.
6. Finally add up the total scores for each option.
7. Select the highest scoring option

### Decision Tree Analysis

**Draw Decision Tree**

1. Draw Rectangle in left side of paper. This represents decision to be taken.
2. Draw Lines towards right. These represent actions. Write down the actions along with the Lines.
3. At the end of the line on right side, draw a circle if it is uncertain solution. If there are further decisions then draw rectangles at that place

**Evaluate the Tree**

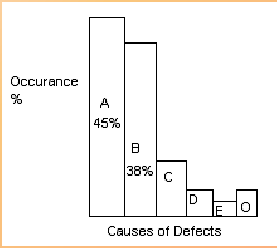
1. Give scores for each uncertain solution in terms of probability.
2. Rank each action in terms of score (Numbers) or cache ($ value). Score for the action indicates ease of the action, benefits of the action etc.
3. Multiply probability and score. Get net score and decide the best path for the solution.

### Pareto Analysis

* Based on 80-20 Rule.
* Find out all the causes for the problems
* Scale their effects based on past historical data or brain storming
* Draw Pareto chart based on this. Find out the Root causes giving highest effects. Control these causes and solve the problem

**Example**

Too many defects in the Project XYZ



A: Improper Requirement gathering

B: In-adequate test cases

C: Lack of technical knowledge

D: In-adequate test data

E: Changes in Requirements

O: Others

**Conclusion**

Majority of the defects are due to Improper Requirement gathering and inadequate test cases. Improve on them.

### Six Thinking Hats

This technique is used when decision is to be viewed from different viewpoints. Problem solving group is divided in to 6 groups. Each group is wearing hats with different style of thinking as below:

#### White Hat

With this thinking hat you focus on the data available. Look at the information you have, and see what you can learn from it. Look for gaps in your knowledge, and either try to fill them or take account of them. This is where you analyze past trends, and try to extrapolate from historical data.

#### Red Hat

'Wearing' the red hat, you look at problems using intuition, gut reaction, and emotion. Also try to think how other people will react emotionally. Try to understand the responses of people who do not fully know your reasoning.

#### Black Hat

Using black hat thinking, look at all the bad points of the decision. Look at it cautiously and defensively. Try to see why it might not work. This is important because it highlights the weak points in a plan.

#### Yellow Hat

The yellow hat helps you to think positively. It is the optimistic viewpoint that helps you to see all the benefits of the decision and the value in it. Yellow Hat thinking helps you to keep going when everything looks gloomy and difficult.

#### Green Hat

The Green Hat stands for creativity. This is where you can develop creative solutions to a problem. It is a freewheeling way of thinking, in which there is little criticism of ideas.

#### Blue Hat

The Blue Hat stands for process control. This is the hat worn by people chairing meetings. When running into difficulties because ideas are running dry, they may direct activity into Green Hat thinking. When contingency plans are needed, they will ask for Black Hat thinking, etc

### Cost/Benefit Analysis

Cost benefit analysis helps to decide whether to implement the solution.

1. State and consolidate cost of implementing the solution

Examples:

* Efforts of resources in development of tools
* Hardware resources required
* Maintenance efforts

1. State benefits of implementing the solution. Consider tangible and intangible benefits

Examples:

* Efforts of resources in development or testing etc.
* Efforts of resources saved in any process
* Waiting time in any manual process of approval etc.
* Improvement in quality (Intangible benefit).
* Customer satisfaction (Intangible benefit)

Obtain net profit based on the difference between the two. If Profit is positive, then take decision to implement the solution.

### Other DAR Techniques

* PUGH Matrix
* Wideband Delphi
* Brain Storming
* Lateral Thinking / Out of box thinking
* Root Cause Analysis (Fish Bone diagram)
* Piloting
* Simulation
* Design of Experiment (DOE)
* Failure Mode Effect Analysis (FMEA)
* Literature Study

## Evaluation Criteria

Use the criteria below for evaluation of alternatives

* Availability
* Expertise
* Cost
* Feasibility
* Reusability
* Legal aspects

## Decision Authority

The decision authority is in increasing order of impact.

|  |  |
| --- | --- |
| Area | Authority |
| Technical | Functional Head >>HOD |
| Staffing | Project Manager >> Functional Head >> HOD/HR >> CxO |
| Tools | Functional Head >> Procurrement / HOD >> CxO |
| Vendor Selection | Functional Head >> Procurrement / HOD >> CxO |
| Project Priority | HOD/Marketing |

# Applicable Measurements

NA

# Exit Criteria/Outputs

* Approved DAR Plan
* Final Solution for the problem statement

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