

Dynamic Delay Analysis

Case Study and Learnings



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Petroleum Development Oman



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EXPO
London, UK

About the Speakers



Hamza Afdhal Mehdi Mirza

- Technical Services Lead
- 13+ years of experience in Project Controls within Oil & Gas Industry
- Led various continuous improvement initiatives within Planning & Scheduling, Cost Engineering, Risk Management, Change Management, Projects Reporting and Project Health Checks.
- Worked with Multi-billion-dollar projects and developed Project Controls expertise in all key phases of a project from Initiation phase to final handover
- Hands-on experience in various Project Controls products, e.g., Oracle Primavera, MS Projects, EcoSys, Easy Risk, Acumen Fuse, SAP, Tableau, SPO etc.



Sunil Kumar

- Senior Project Controls Professional
- 17+ years of experience in Project Controls within Oil & Gas Industry
- Expertise in Project Management, Cost Control, Scheduling, Change Management, Risk Management in EPC, LSTK, EPCM, PMC project environment
- Worked in all key phases of the project i.e., Initiation, Concept Selection, Basis of Design, Front End Engineering Design, Detail Design, Procurement, Construction, Commissioning & Start-up
- Hands-on experience in various Project Controls products, e.g., Oracle Primavera, MS Projects, EcoSys, Easy Risk, VB programming within Microsoft Office Suite



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Petroleum Development Oman

Building a sustainable and low-carbon future to maximise value for Oman



8,900
Direct Staff



60+
Nationalities



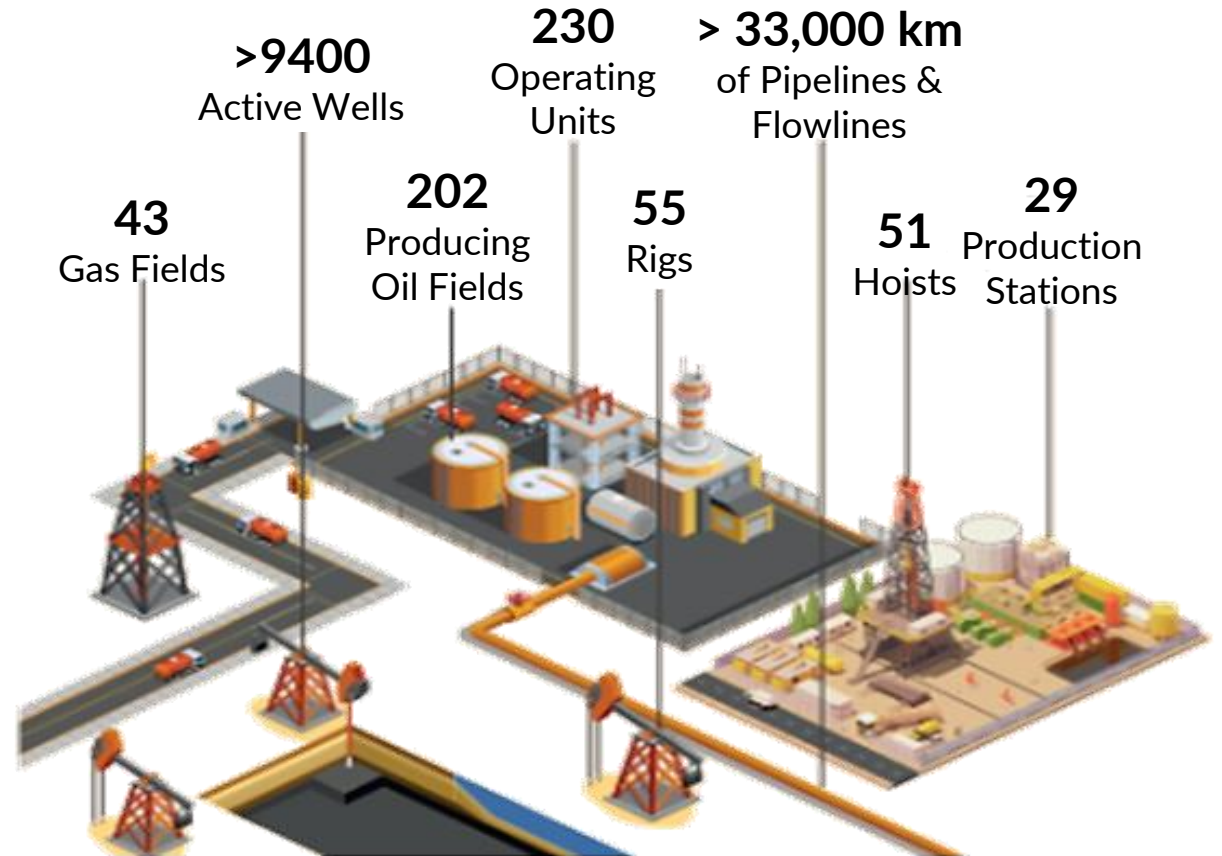
52,000
Contractor Staff

60% ENERGY DEVELOPMENT OMAN (EDO)
(Representing the Government of Oman)

34% THE SHELL GROUP

4% TOTAL

2% PTTEP

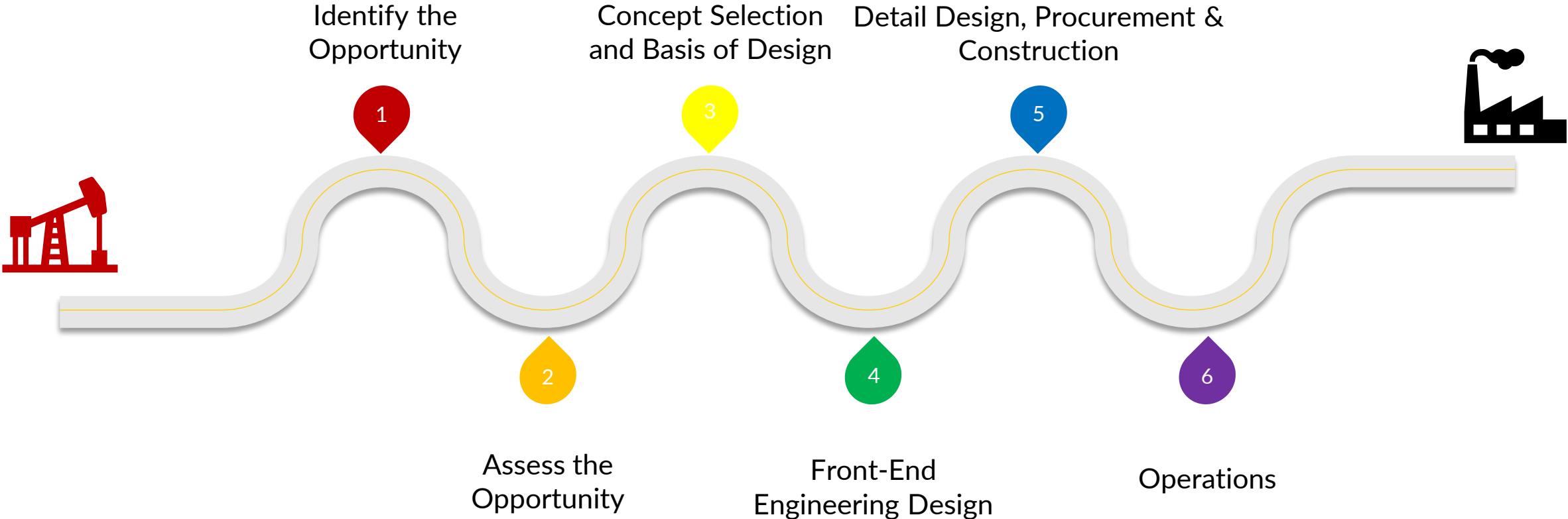


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Opportunity Realisation



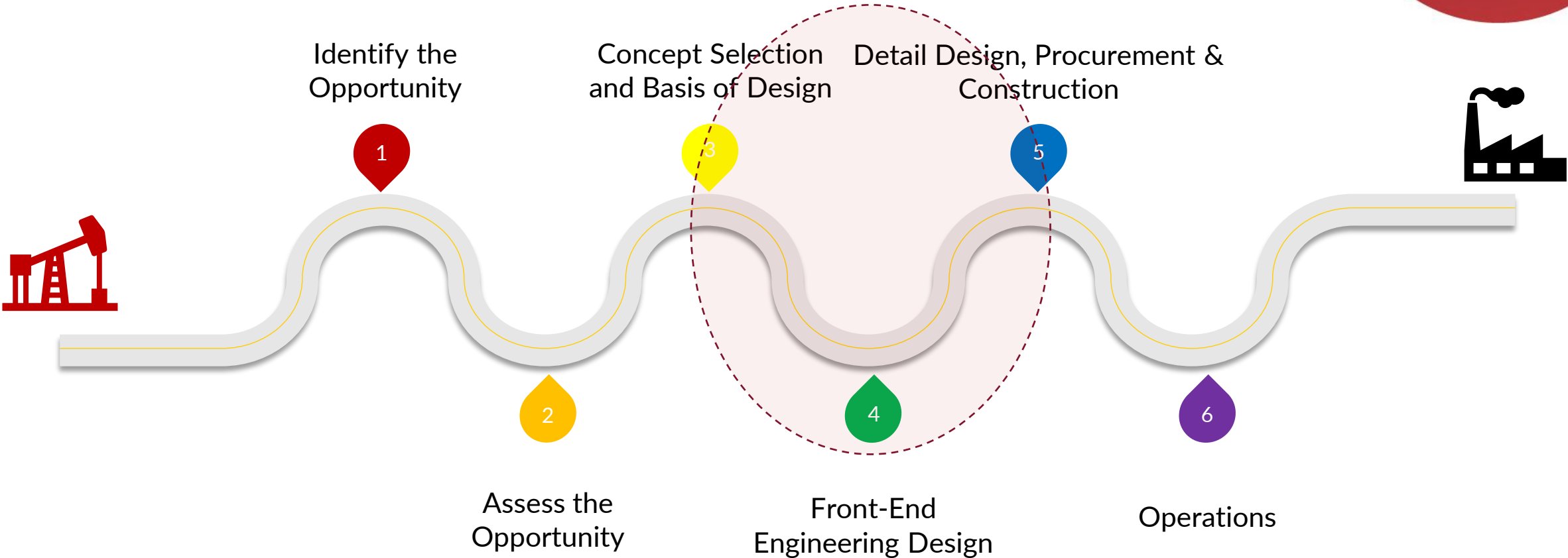
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Opportunity Realisation

FEED Office Scope



About the Topic

- What is Delay Analysis
- Why is this the optimal solution?
- Methodology Applied
- Conclusion



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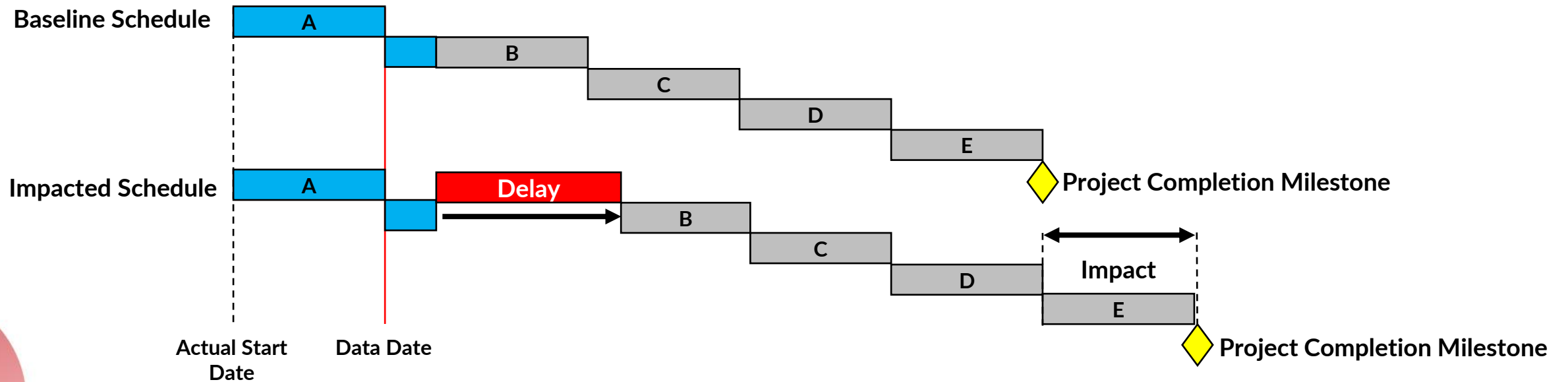


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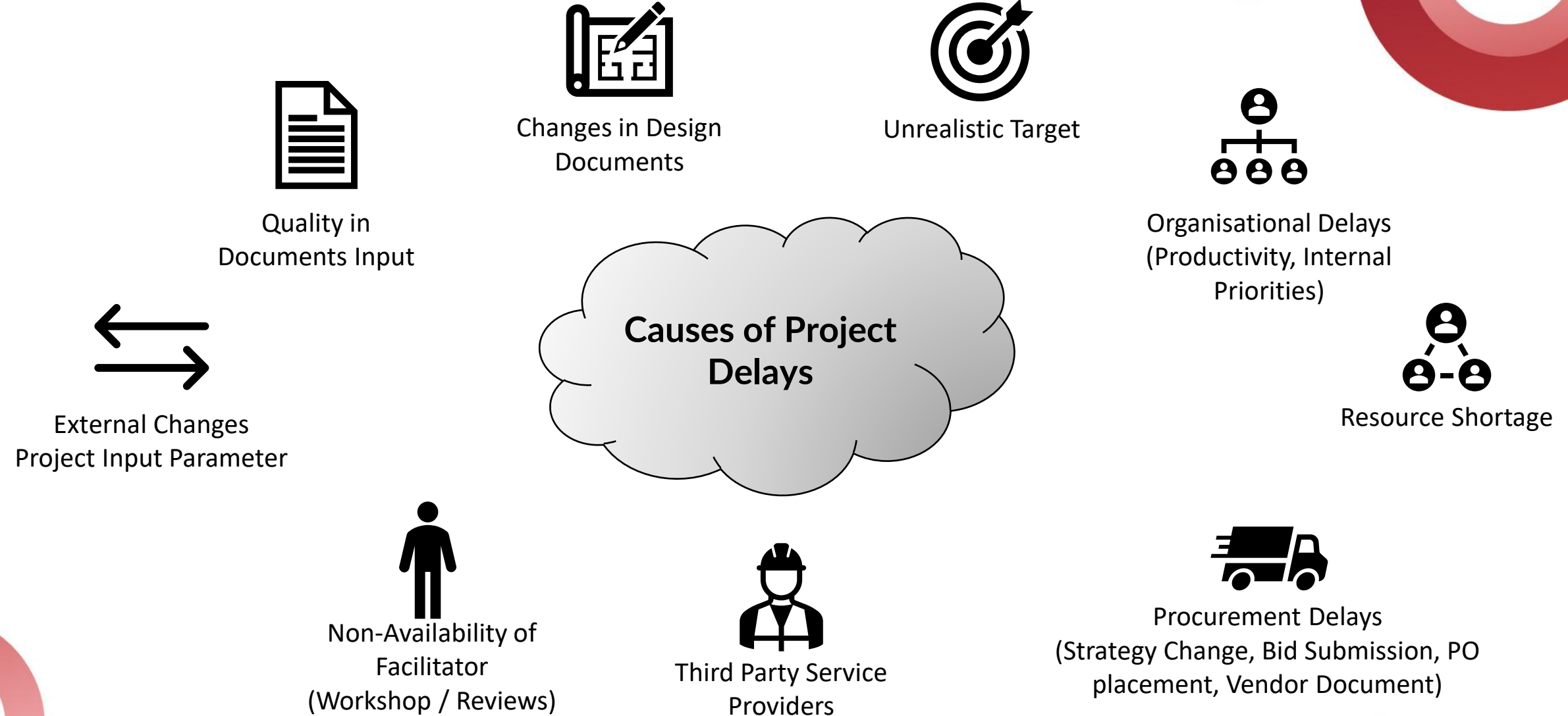
Objective

- To identify possible cause of delay with probability of occurrences in projects (sample data)
- High impact reasons
- Plotting Possible frequency vs impact matrix
- Simulation of collected data to identify right schedule contingency by type and size of project

Typical Delay Analysis Model



Causes of Delays



Introduction

What is a Delay Analysis?

It is the process to determine how the overall project schedule was impacted by either one or more events that occurred during the project delivery.

Why Delay Analysis?

Delays in project delivery happens due to various reasons, however for eliminating and reducing future delays in projects it is useful to find out dominant and frequently happening causes which are acting as bottleneck or delaying project delivery.

- Delays in project is attributed to multiple causes active in parallel in varying degree
- While one cause can be prominent in one project while other cause can be prominent to some other project
- Dynamic Delay Analysis helped the team to identify main causes feeding in the overall project delay, developed frequency vs. impact matrix



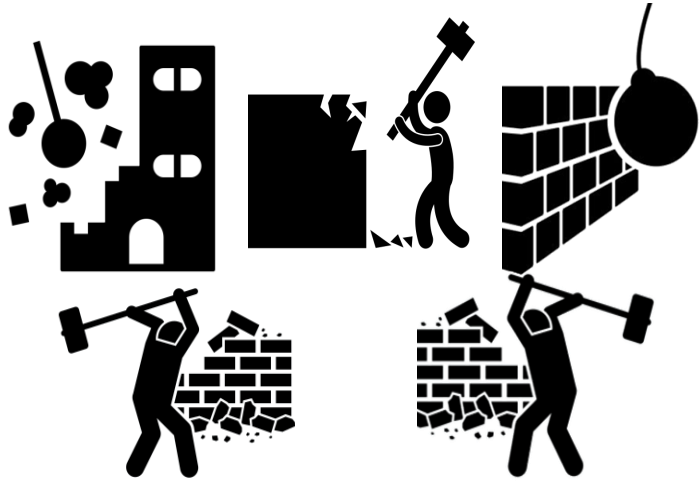
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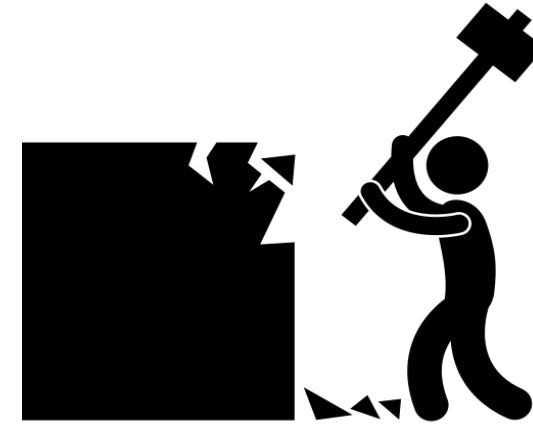
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Why is this the optimal solution

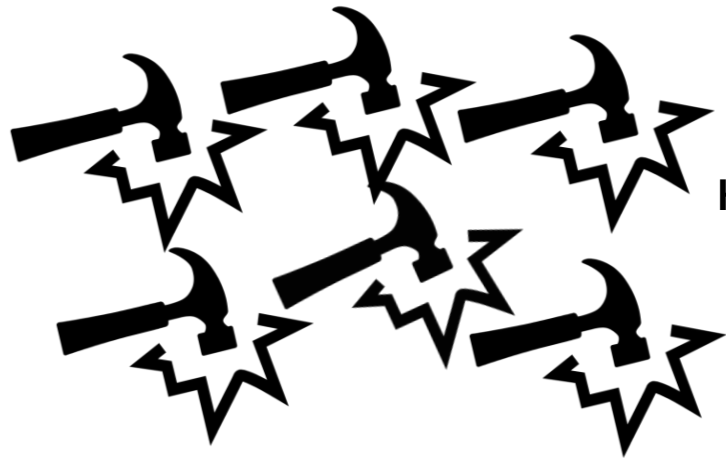
- Different reasons need different priority for addressing the issue



High Frequency
High Impact



Low Frequency
High Impact



High Frequency
Low Impact



Low Frequency
Low Impact

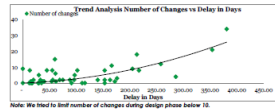


Methodology

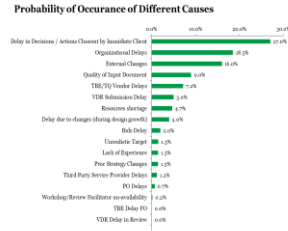
Data Collection from Projects with Duration of Delay from Baseline and Reasons of Delay

Sr No	Possible Cause of Delay	% Delay Attributed to the Reason (Example Analysis)			
		Project 1	Project 2	Project 3	Project 4
1	External Changes - (Project Input Parameters)	50%	30%	45%	15%
2	Quality of Input Documentation	5%	25%	45%	5%
3	Delay due to changes (during design growth)	5%	25%	25%	5%
4	Unavailability of resources				
5	Unrealistic Target				
6	Organizational Delay - (procurement, interface activities, etc.)	5%	10%	10%	25%
7	Lack of experience in similar work	5%	3%		
8	Resource shortage				10%
9	Third Party Service Provider Delay				

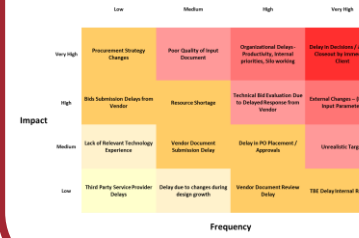
Simulation / Analysis of Collected Data



Plotting Probability of Occurrence of Different Causes



Frequency Vs Impact Matrix



Mitigation Measures in Right Priority



Data Collection

Sr No	Possible Cause of Delay	% Delay Attributed to the Reason (Sample Data)			
		Project 1	Project 2	Project 3	Project 4
1	External Changes - (Project Input Parameter)	50 %	35%		15%
2	Quality of Input Document		25%	45%	5%
3	Delay due to changes (during design growth)	5%		20%	
4	Workshop/Review Facilitator un-availability				
5	Unrealistic Target			10%	
6	Organizational Delays - (Productivity, Internal priorities, Silo working)	5%	10%		25%
7	Lack of Experience (in Relevant Technology)	5%	3%		
8	Resources shortage				10%
9	Third Party Service Provider Delays				
10	Delay in Decisions / Actions Closeout by immediate Client	35 %	25%	10%	30%
11	Procurement Strategy Changes			15%	
12	Bids Submission Delays from Vendor				2%
13	Technical Bid Evaluation Due to Delayed Response from Vendor		2%		5%
14	TBE Delay Internal Reasons				
15	Delay in PO Placement / Approvals				
16	Vendor Document Submission Delay				5%
17	Vendor Document Review Delay				3%

Data collected for 55 projects of various size and type through all key stake holders of project

Objective;

1. To identify reasons with high probability of occurrence in project
2. High impact reasons
3. Plotting Possible frequency vs impact matrix like risk assessment matrix
4. Identifying P50 and P90 scenario with type of project to identify right schedule contingency by type and size of project



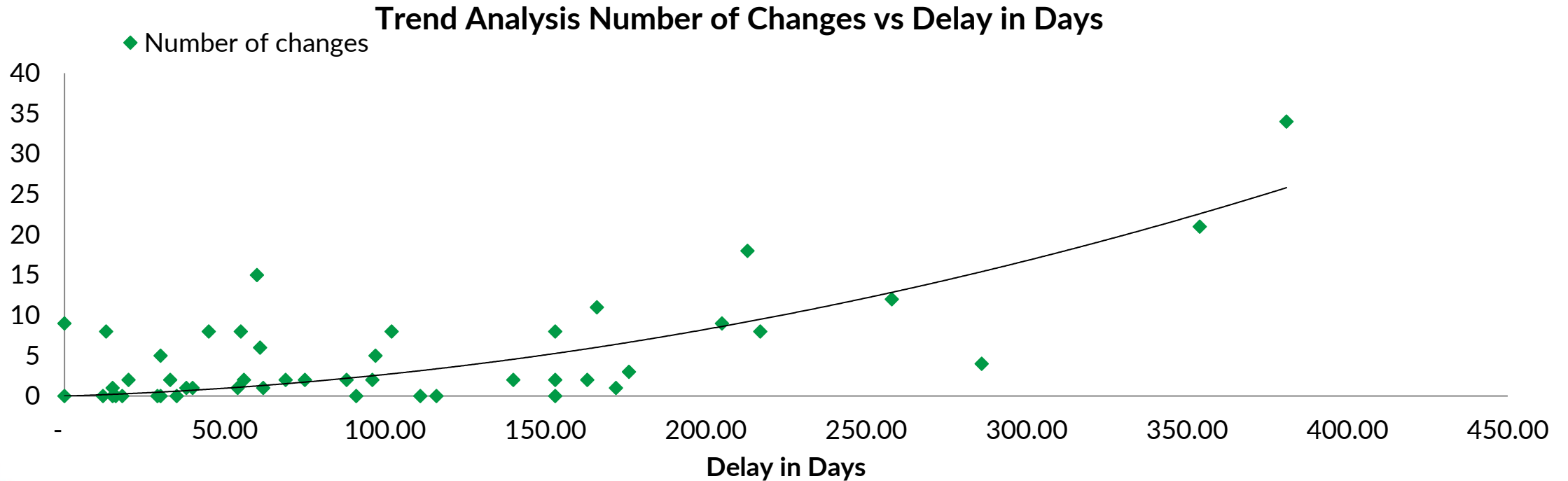
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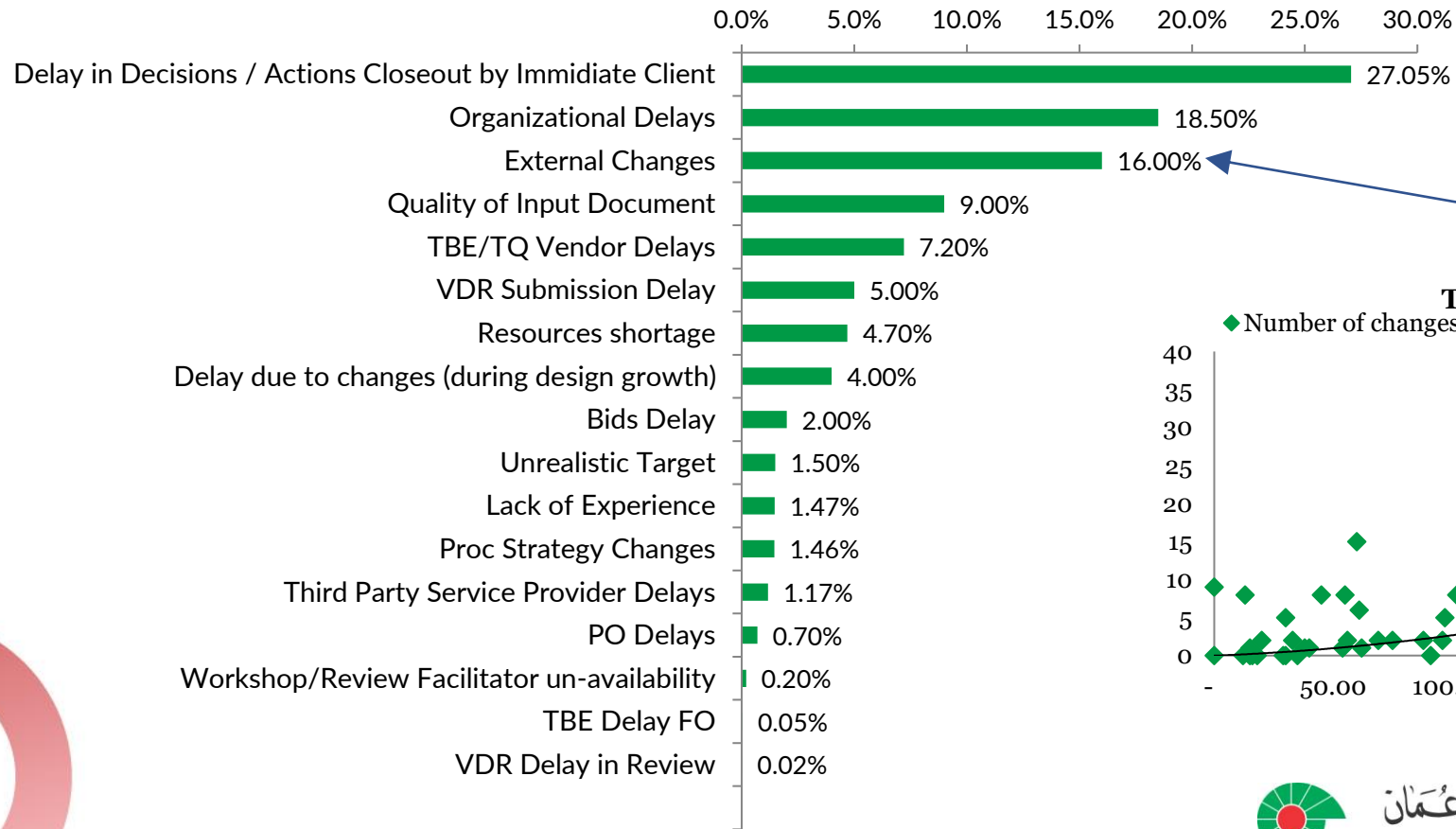
Simulation / Analysis of Collected Data

- Simulation carried out based on the collected data from stakeholders of the project.
- The below graph illustrates the No. of Changes happening in Projects vs. expected delay in terms of Days

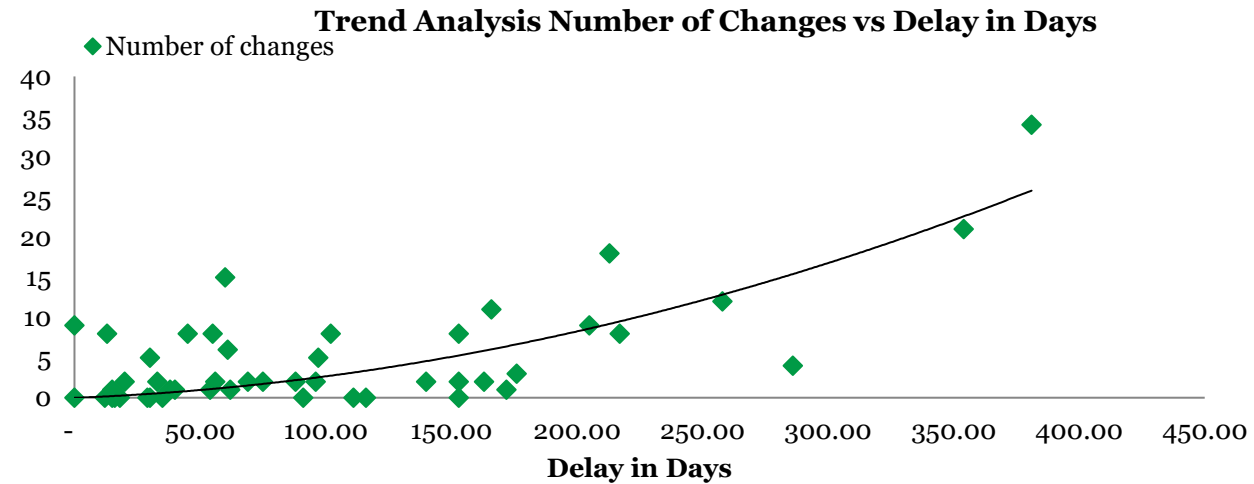


Plotting Probability of Occurrence

- Top Four reasons constitutes 70% frequency and the most impact reasons which we will see in frequency vs impact matrix. Hence focusing on top Four can have significant improvement in overall delivery cycle.

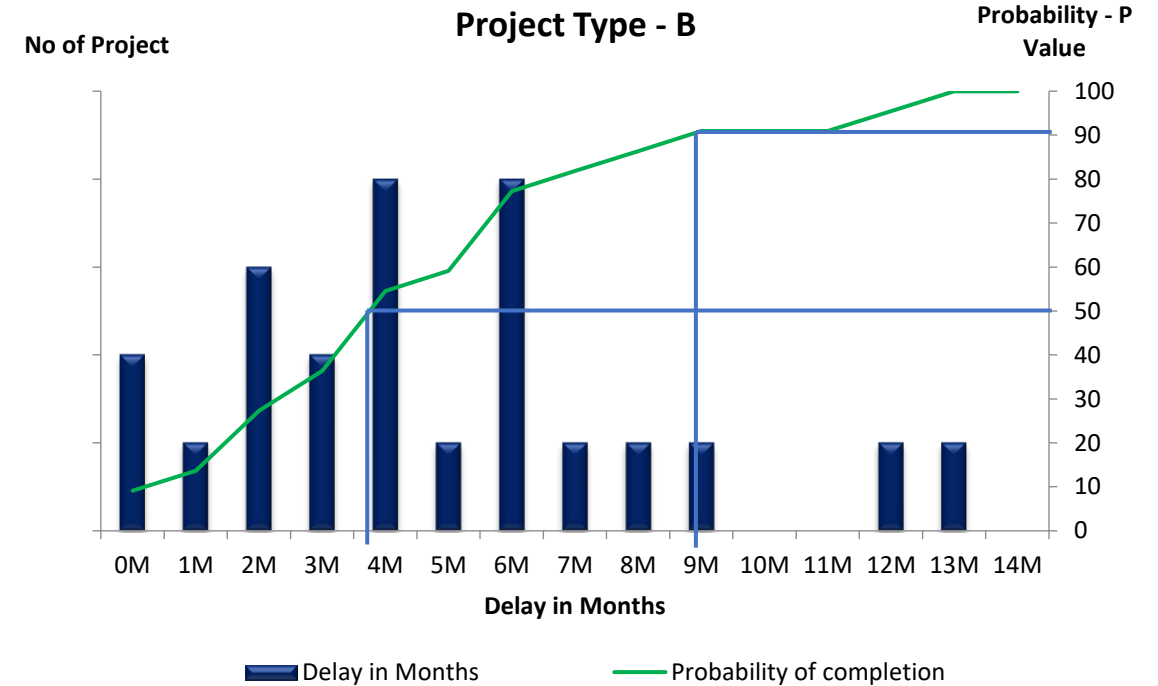
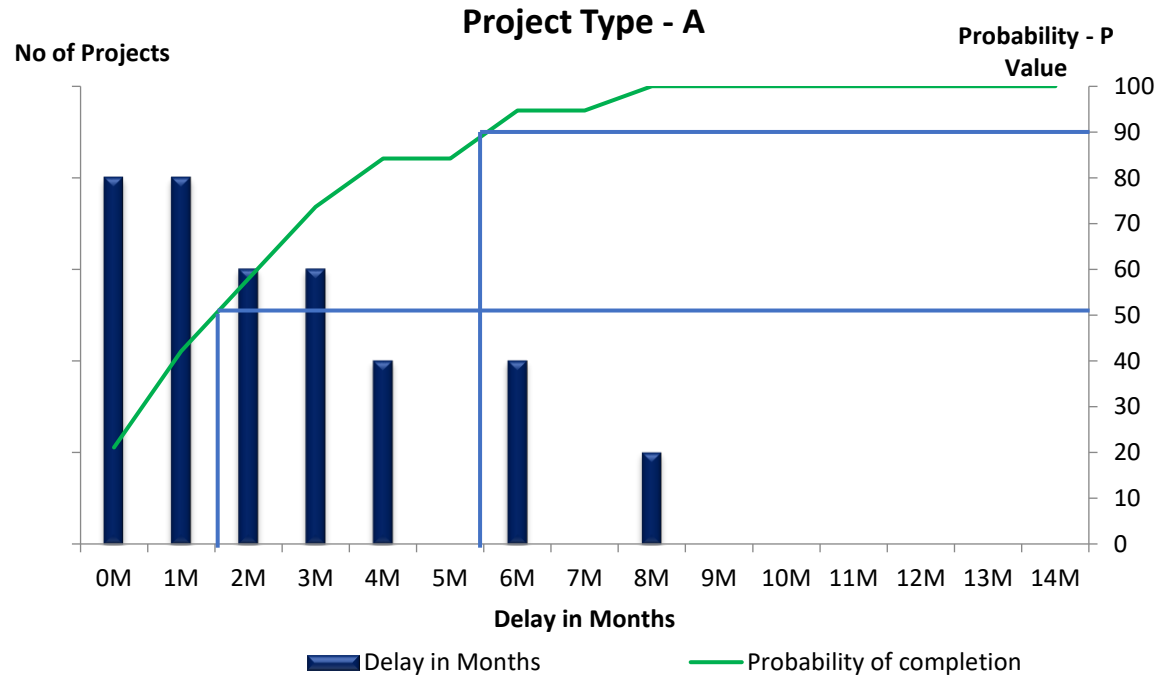


Detail Analysis of Every Cause



Deviation for Baseline (Delay) – Due to any Reason

- Below graph illustrates the Probability of Completion vs. Delays in Months based on different types of projects



P50 value of 1.5 Month (50% projects completed with less than 1.5 Months of Deviation from Baseline)
P90 value for 5 Month (90% projects completed with 5 Months of Deviation from Baseline)

P50 value of 4 Month (50% projects completed within 4 Months of Deviation from Baseline)
P90 value of 9 Month (90% projects completed within 9 Months of Deviation from Baseline)

Analysis

Sr No	Possible Cause of Delay	% Delay Attributed to the Reason (Sample Data)							
		Project 1	Project 2	Project 3	Project 4	Frequency	Average Impact	Frequency Category	Impact Category
1	External Changes - (Project Input Parameter)	50 %	35%		15%	3	30%	High	Very High
2	Quality of Input Document		50%	45%		2	48%	Medium	Very High
3	Delay due to changes (during design growth)	15%	15%	20%	15%	4	18%	Very High	High
4	Workshop/Review Facilitator un-availability								
5	Unrealistic Target			10%		1	10%	Low	Low
6	Organizational Delays - (Productivity, Internal priorities, Silo working)	5%	10%		25%	3	13%	High	Medium
7	Lack of Experience (in Relevant Technology)	5%	3%			2	4%		
8	Resources shortage				10%	1	10%		Low
9	Third Party Service Provider Delays								
10	Delay in Decisions / Actions Closeout by immediate Client	35 %	25%	10%	30%	4	34%	Very High	Very High
11	Procurement Strategy Changes			15%		1	15%	Low	Medium
12	Bids Submission Delays from Vendor				2%	1	2%	Low	Low
13	Technical Bid Evaluation Due to Delayed Response from Vendor		2%		5%	2	4%	Medium	Low
14	TBE Delay Internal Reasons								
15	Delay in PO Placement / Approvals								
16	Vendor Document Submission Delay				5%	1	5%	Low	Low
17	Vendor Document Review Delay				3%	1	3%	Low	Low

Identification of Frequency and Impact of various Cause of Delay



Frequency vs. Impact Matrix

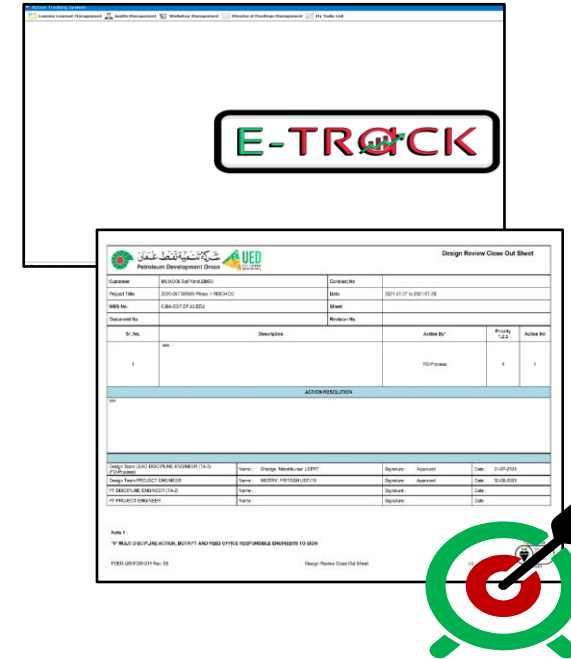
- 4 X 4 Matrix derived from Analysis, identifying High impact and High Frequency Reasons

	Low	Medium	High	Very High
Very High	Procurement Strategy Changes	Poor Quality of Input Document	Organizational Delays - Productivity, Internal priorities, Silo working	Delay in Decisions / Actions Closeout by immediate Client
High	Bids Submission Delays from Vendor	Resource Shortage	Technical Bid Evaluation Due to Delayed Response from Vendor	External Changes - (Project Input Parameter)
Medium	Lack of Relevant Technology Experience	Vendor Document Submission Delay	Delay in PO Placement / Approvals	Unrealistic Target
Low	Third Party Service Provider Delays	Delay due to changes during design growth	Vendor Document Review Delay	TBE Delay Internal Reasons



Conclusion

- ❑ This study helped us in identifying reasons of delay along with their possible impact on the project duration. Thus, allowing us to take up mitigating measures in right priorities.
 - *For Example: Developing action tracking tool and spreading awareness to close action within given time.*
 - *Expedited follow up with vendors*
 - *Checklist and matrix to evaluate project input documents*
- ❑ Helped in predictability of project completion. Measure and demonstrate robustness of a schedule
- ❑ Provided Bench benchmark data to measure effectiveness off actions taken resulting in measurable improvement in project delivery





THANK YOU



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