

Rethinking the Effective Implementation of Project Controls in Consultancy Companies:

Context of Digitalization and Innovation

By: Hanadi Abuzaid



Jacobs

Challenging today.
Reinventing tomorrow.



Project Controls
EXPO
UAE, Middle East

Table of Context



01 | INTRODUCTION

02 | CHALLENGES WITHIN THE PROJECT MANAGEMENT



03 | Effective Project Control Functions

04 | The Power of Digitalization and Innovation In Project Controls



Jacobs

Challenging today.
Reinventing tomorrow.

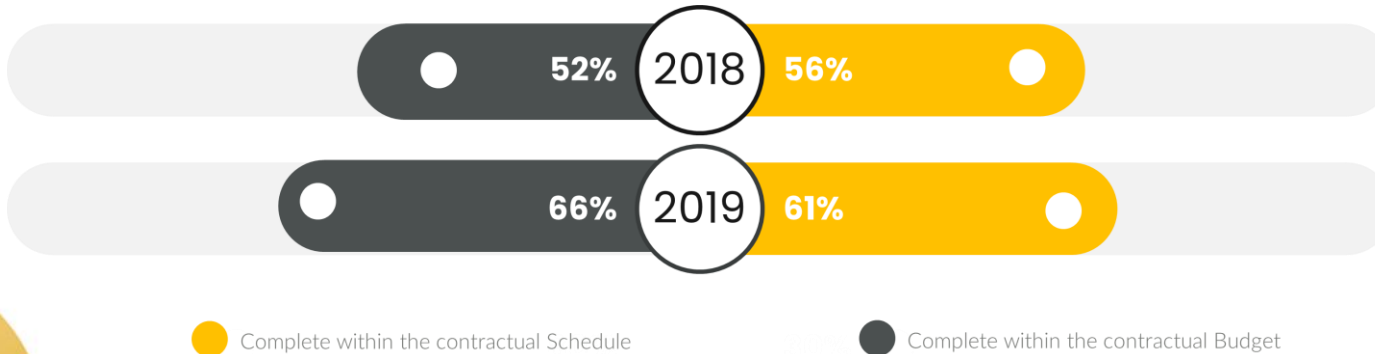


**Project Controls
EXPO**
UAE, Middle East

Introduction

- ❖ Under the banner of Saudi Vision 2030, giga projects are planned to redefine the nation's economic landscape, which have emerged as paramount challenges demands restricted project control functions.
- ❖ Despite best efforts and intentions, multiple corporations find that large-scale projects miss their strategic target due to cost overrun or delays for various reasons.

For Illustration, studies conducted by PMI showed



Introduction

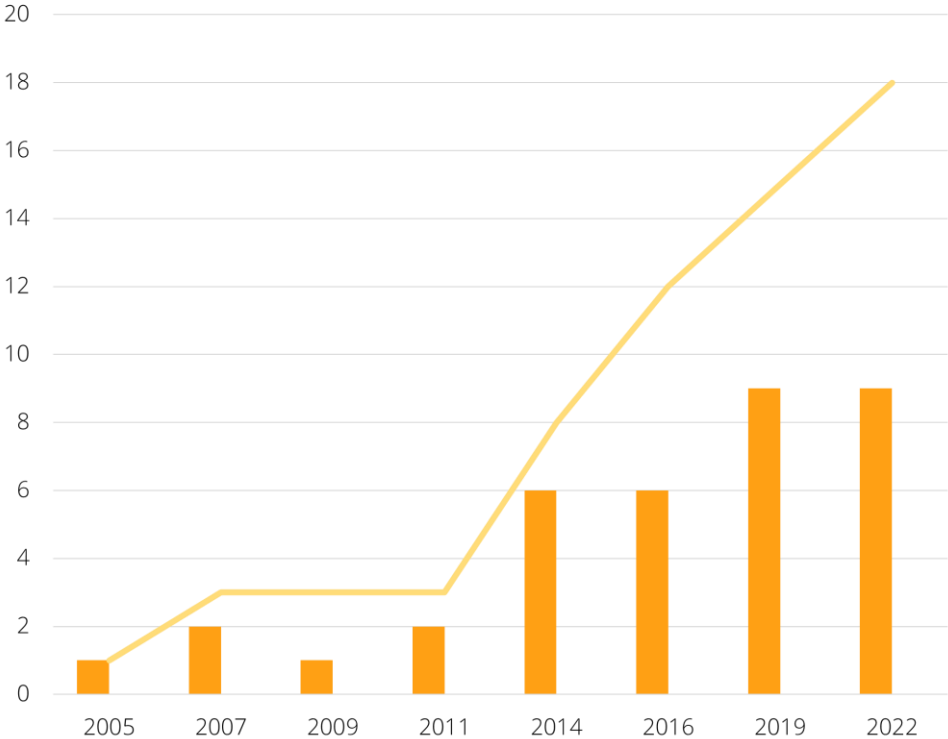
A research conducted in 2023 within the literature review on megaproject management



This trend, especially over the past five years, suggests a growing number of megaprojects worldwide

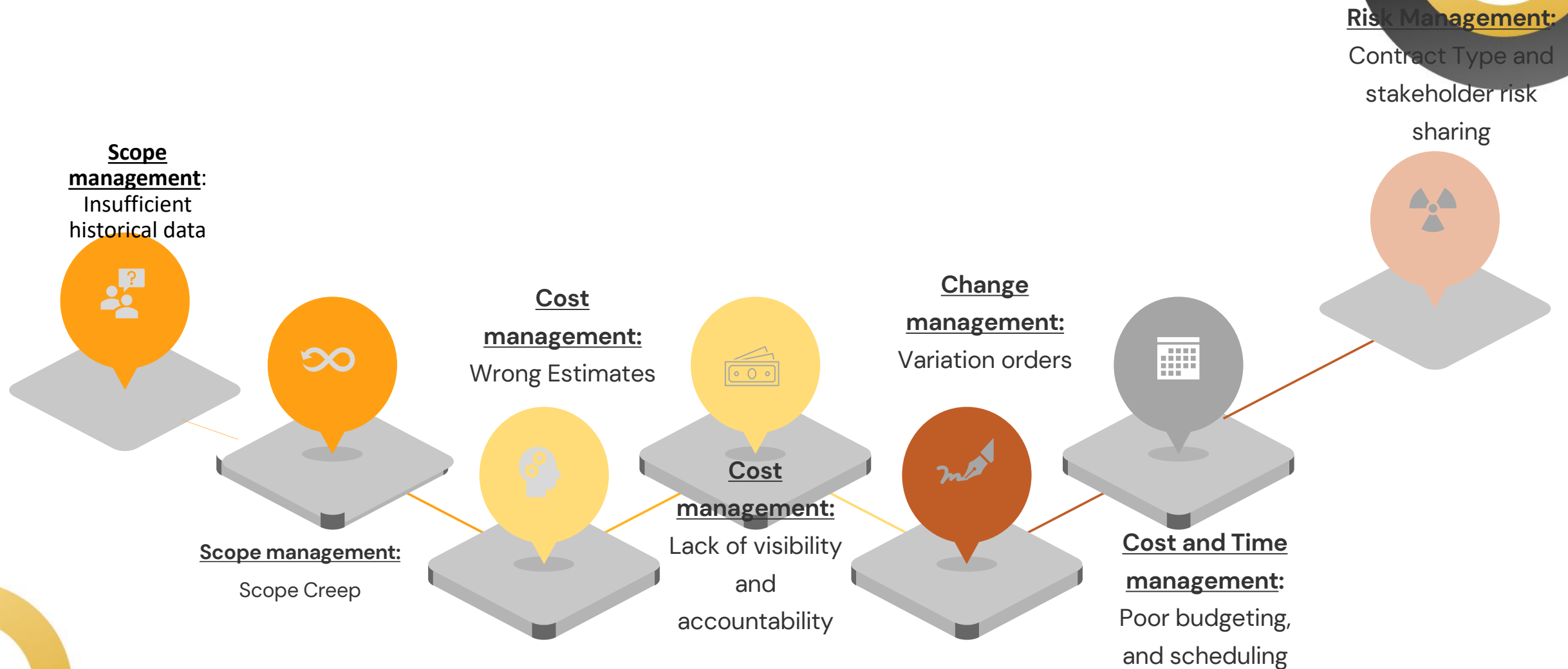


Number of Published Articles in Mega Project



2. Challenges Within the Project Management

Challenges Within the Project Management



Jacobs

Challenging today.
Reinventing tomorrow.



Project Controls
EXPO
UAE, Middle East

Time Management Practices over the time

Practice /tools	Time Plan	Time monitoring	Can be used in complex project	Accurate delay analysis in link with Risk management	Required special software
Gantt Charts and Milestone Chart	✓	✗	✗	✗	✗
Critical Path method (CPM)	✓	✓	✗	✗	✗
Scheduling by using Primavera	✓	✓	✓	✗	✗
Building Information Modeling (BIM) & 4D Construction Scheduling	✓	✓	✓	✗	✓
Proposed Framework	✓	✓	✓	✓	✓

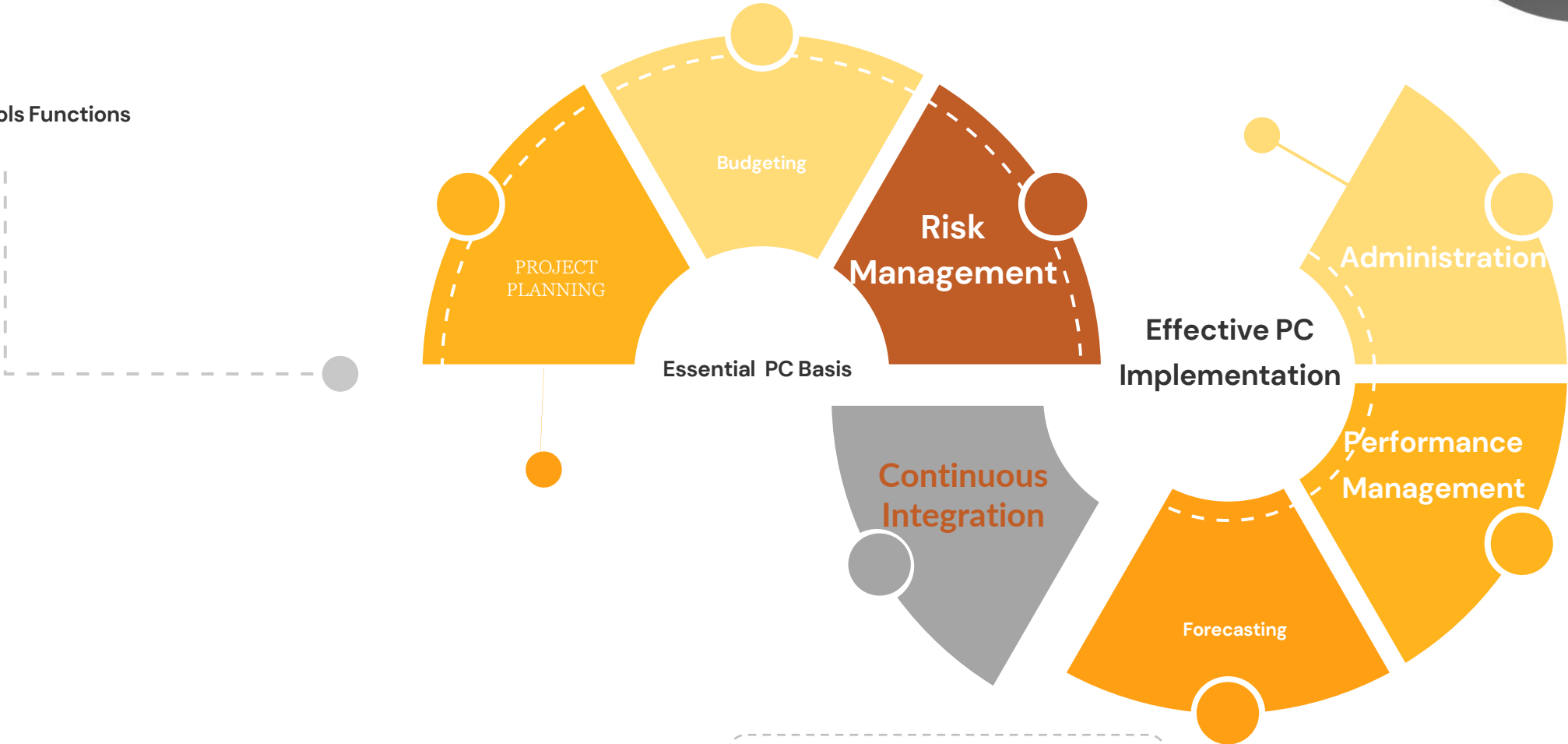
Cost Management Practices over the time

Practice /tools	Cost Budget	Cost monitoring	Can be used in complex project	Accurate cost impact in link with Risk management	Required special software
Budgeting and Earned value management (EVM)	✓	✓	✗	✗	✗
Resources allocation by using Primavera	✓	✓	✓	✗	✓
Building Information Modeling (BIM) & 5D Construction Scheduling	✓	✓	✓	✗	✓
Proposed Framework	✓	✓	✓	✓	✓

3. Effective Project Control Functions

Effective Project Control Functions

Project Controls Functions



4. The Power of Digitalization and Innovation in Project Controls

Utilizes Philosophical Modular

Implantation of Some Software (Primavera, Acumen Risk, QlikSense and Power BI Dashboard)

The Core of Project Control

Innovation

Ability to rethink your current business to find new revenue streams and maintain competitive advantage. It can be done either by improving an existing business model or by looking for new ways to provide value.

Standers and Procedures

Processes that minimize the performance gap and giving the best integration between planning and execution and how to report it to the decision maker.

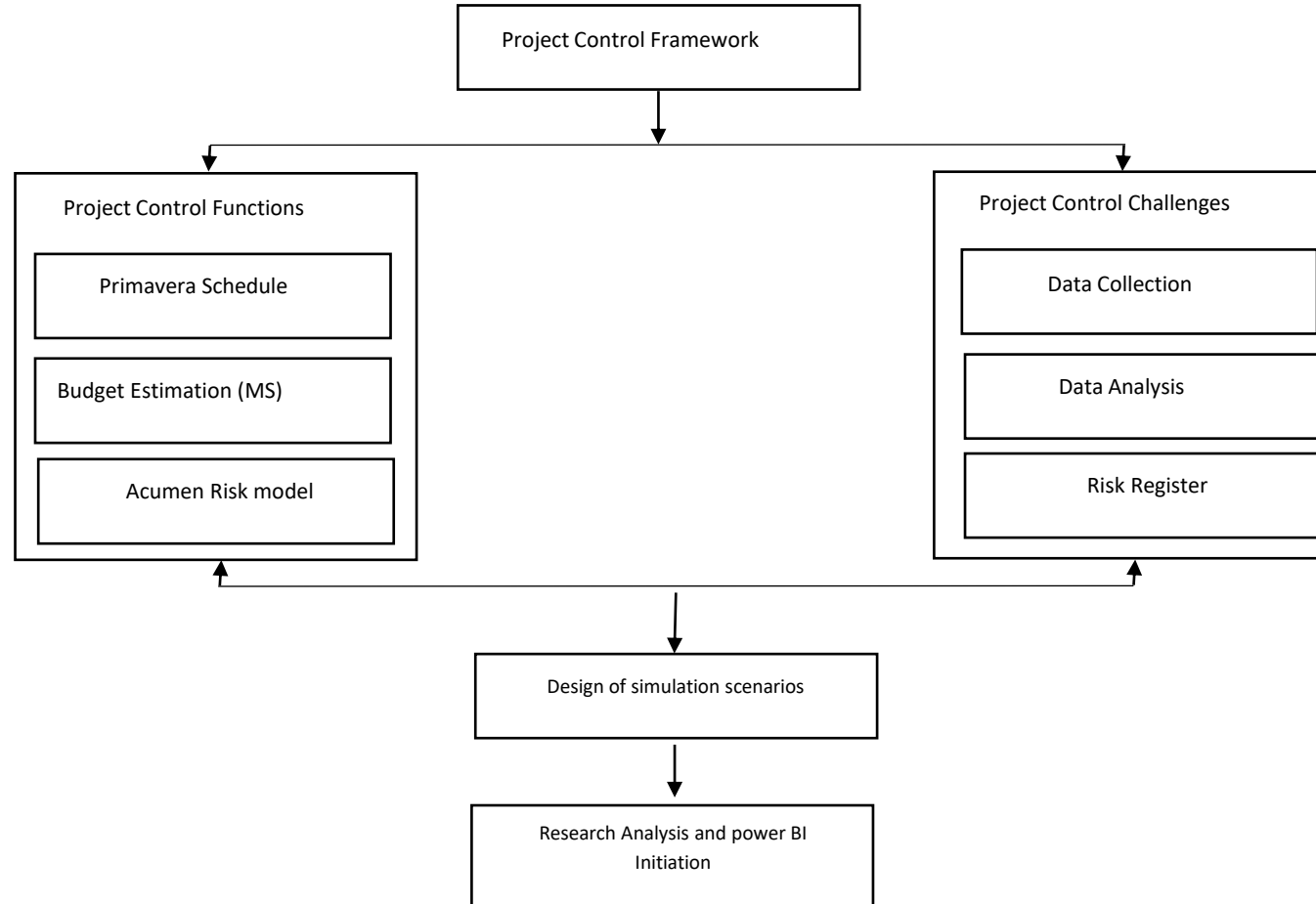


Software

Utilization the smart and economic tools within the setting of project controls

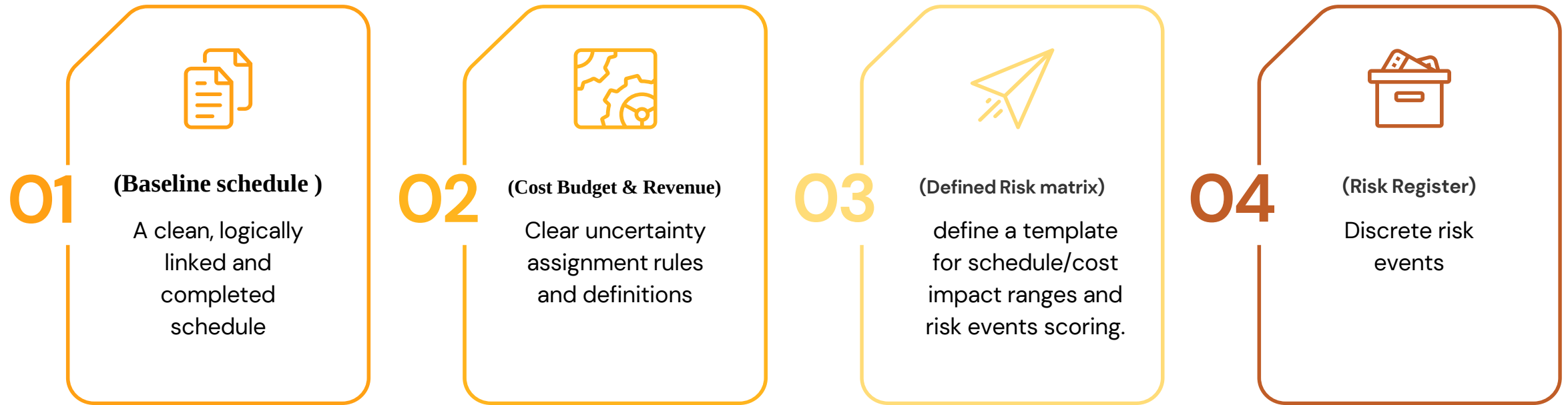
Utilizes Philosophical Modular Steps

In order to have valid and reliable project controls and risk analysis results, we should start with building a valid model that fulfils four needs:



Stage 01

Utilizes Philosophical Modular Basis



Stage 02

Utilizes Philosophical Modular

Risk Management Plan

Responsibility chart	client	Contractor	Risk Team	Consultant	Risk owner	Other stockholders
Plan risk management		X	X			
Identify risks	X	X	X	X	X	X
Perform qualitative risk analysis	X	X	X	As need		X
Perform quantitative risk analysis		X	X	As need		X
Plan risk responses	X	X	X	As need	X	X
Monitor and control risk		X	X	X	X	

Perform Qualitative Risk Analysis

Method	Details	Responsibility	Time budget
Data Quality assessment	Each thread and opportunities will be analyzed and clarified if necessary, so that the risks can be effectively assessed	Contractor, Client and consultant	1 Week
Definition of probability and impact	A 1-5 scale will be used for probability and for impact: Interpretation of scale for probability: • 1 means Rare • 2 means Unlikely • 3 means Possible • 4 means Likely • 5 means Almost Certain Interpretation of scale for Impact: • 1 means little impact • 2 means Low Impact • 3 means Medium Impact • 4 means High Impact • 5 means Very High Impact	Client and consultant	1 Week

Utilizes Philosophical Modular

Example of Risk matrix

Probability X Impact Matrix

(Probability x Impact) Matrix						
Probability	5	5	10	15	20	25
	4	4	8	12	16	20
	3	3	6	9	12	15
	2	2	4	6	8	10
	1	1	2	3	4	5
		1	2	3	4	5
Impact On Selected Objective						

Risk Scoring & Ranking

Translate Score To Risk Rank	
Score	Risk Ranking
1 – 6	Low
7 – 14	Moderate
15 – 15+	High

Evaluating Impact of a Threat on Major Project Objectives						
Impact Description		Very Low	Low	Moderate	High	Very High
Impact Score		1	2	3	4	5
OBJECTIVE	Time	1 -3 Days	4 -7 Days	8-13 Days	14-20 Days	21 - 30 Days
	Cost	Insignificant Cost Increase	1%- 2% Cost Increase	>2% –< 6% Cost Increase	>6% - <10% Cost Increase	> 10% Cost Increase
	Scope	Scope decrease is barely noticeable	Changes in project features with < 5% Cost Increase	Changes in project features with 5-10% Cost Increase	Client does not agree that Scope meets the purpose and need	Scope does not meet purpose and need
	Safety	Very minor injury (small cut)	Minor injury (first aid required)	Severe injury (hospitalized)	Temporary impairment (broken bone,deep cut)	Fatal Accident
	Quality	Quality deficiencies barely noticeable	Deficiencies approved by Site team	Deficiencies require Project manager approval	Deficiencies require Client approval	Deficiencies is Not Acceptable

Utilizes Philosophical Modular

Perform Quantitative Risk Analysis

Method	Details	Responsibility	Time budget
Sensitivity Analysis	Also known as “what if” analysis, sensitivity analysis uses the power of the computer to examine the effects of variations in different project variables. For, example, if you vary the duration of a given task, what is the effect on project costs, quality and resource usage? Tornado diagrams may be used to assess the potential impact of highly uncertain variables on the rest of the project.	Contractor	Cycle of reporting each 3 Months
Modeling and Simulation	Using data from subject matter experts, computer software program uses random number generators and input values from a probability distribution to simulate possible project outcomes	Contractor	Cycle of reporting each 3 Months

Perform Risk Response

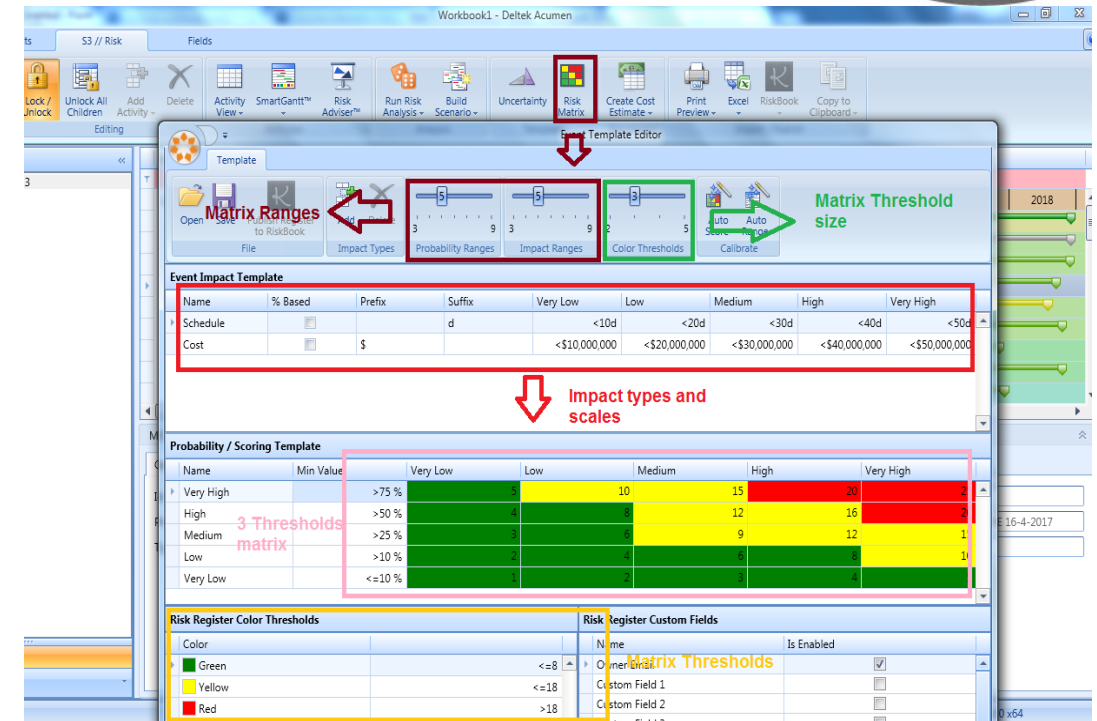
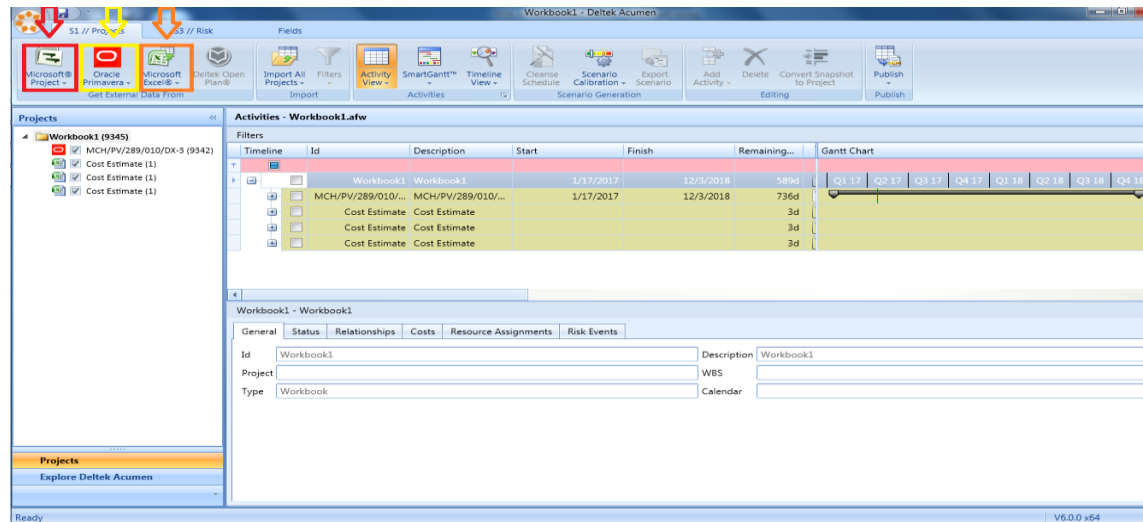
Method	Details	Responsibility	Time budget
Deterring Responses	risk - Avoidance: this is where the risk is not accepted, and steps are taken to eliminate the risk condition or protect the project objectives from its impact. - Acceptance: also called risk assumption, or retention. This is where an acknowledgement of the existence of a particular risk situation occurs, with the conscious decision to accept the associated level of risk and wait to see what happens. Active acceptance requires assigning a contingency plan and some contingency reserves to deal with risk should it materialize. Passive acceptance on the other hand, requires no action, leaving managers to deal with risks as they occur. - Transference: also known as risk sharing or deflection which simply transfers the risk responsibility to another party and can be achieved through insurance, performance bonding, warranties and guarantees, and contracting. - Mitigation or control: this involves reducing the risk size in order to make it more acceptable to the project or the organization, by reducing its probability and/or impact.	All Stockholders	Cycle of reporting each Month
Reporting	Risk response plan will be created /sent to the management, client and consultant for their approval	Contractor	Cycle of reporting each Month
Go/no -GO meeting with management	A meeting with management, client and consultant will be hold to review the total impact risk remain in the project	All Stockholders	During progress meeting

Stage 03

How to use the Power of Technologies to Cover all those practices?

Model Setup - Matrix

Acumen Risk has been built on integration with **MS project and Primavera** schedules as well as cost data models from external data sources such as MS excel. Additionally, Acumen Risk can Import risk register data from external data sores (e.g. From MS excel and Enterprise project risk registers).



How to use the Power of Technologies to Cover all those practices?

- Discrete Risk Events - Build Risk Register assigned with the baseline

Activities
View the project schedule and set duration uncertainties.

Risk Register
Create and maintain project risks and integrate them into cost/schedule model.

To create Risk Register

Risk/ event Details

Id: R1 Name: There is a risk that Receiving for IFC without final Authorities approval
Type: ☒ Threat ☐ Opportunity ☐ Calendar Event ☐ Risk Window

Select the Probability, impact before and after mitigation

Risk	Enabled	Absol...	ID	Type	Name	Current Probability	Schedule	Cost	Score	Mitigat
R1	☒		R1	Threat	There is a risk that Receiving for IFC without final Authorities approval	High	High	Low	16	
R2	☒		R2	Threat	Changes to plan requirements from DM, DCD & DEWA.	High	Very High	High	16	
R3	☒		R3	Threat	Dubai Civil Defense Approval and its associated design changes if any will impact the construction...	Low	High	Low	16	
R4	☒		R4	Threat	Risk of receiving comment from DEWA to change the current cable tray system to trench system...	Very High	High	Medium	16	
R5	☒		R5	Threat	Dubai Police Design NOC	High	Very High	High	16	
R6	☒		R6	Threat	DEWA HV Side NOC is Required on /or Before 8 April 2017	Medium	High	Very Low	12	
R7	☒		R7	Threat	DEWA and Etisalat Approval process	Medium	Medium	Very Low	9	
R8	☒		R8	Threat	Medical Equipments Deign Information to Be Released on/or Before 22 March 2017	Medium	Medium	Negligible	9	
R9	☒		R9	Threat	Kitchen Equipments Deign Information to Be Released on/or Before 6 March 2017	High	Very High	Medium	15	
R10	☒		R10	Threat	Delay in facade material approval by DCD	Low	Low	Negligible	15	
R11	☒		R11	Threat	Design Drawings and Approval of the BMS Drawings, Controls Sequences & Programming.	Low	Low	Negligible	15	
R12	☒		R12	Threat	Redoing of completed work	Low	High	Medium	15	
R13	☒		R13	Threat	Potential lack of resources to perform the required tasks by the Contractor	Medium	Very High	Negligible	15	
R14	☒		R14	Threat	Late sign-off on Façade material and exact color from client and engineer.	Very Low	Very High	Negligible	15	
R15	☒		R15	Threat	Late delivery of elevator, escalators, BMU, chillers, or other long lead items have delay in delivery...	Very Low	Very Low	Negligible	15	
R16	☒		R16	Threat	Water Level	Low	Medium	Negligible	15	
R17	☒		R17	Threat	casting plan will be 24 Hr, and the inspection should be 2Hr	Low	Medium	Negligible	15	
R18	☒		R18	Threat						
R19	☒		R19	Threat						

How to use the Power of Technologies to Cover all those practices?

Risk events must be mapped to the activity/ cost element by two procedure; first one WBS element (in this case the impact will be mapped across all activities in the same WBS), the second procedure is directly mapped to individual activity (in this case the impact will be mapped across this activity) .

The screenshot displays the 'Risk Register' window in a software application. The top ribbon contains various tools like 'Delete Risk Event', 'Exchange Panels', 'Run Risk Analysis', 'Build Scenario', 'Uncertainty', 'Risk Matrix', 'Create Cost Estimate', 'Print Preview', 'Excel', 'RiskBook', and 'Copy to Clipboard'. The main area shows a table of risks with columns for 'Risk' (Enabled, Absolu..., ID, Type, Name), 'Current' (Probability, Schedule, Cost), and 'Mitigat' (Score, Enablec). Four risks are listed: R1, R2, R3, and R4. Below this, a 'Mappings' section is highlighted with a red box, showing a table with columns for 'Mapping' (R..., Activity), 'Current' (Min Pro..., Max Pro..., Min Durati..., Max Durat..., Min Cost, Max Cost), 'Mitigation' (Duration, Cost), and 'Mitigated' (Min Proba..., Max Proba..., Min Durati..., Max C). Two mappings are shown for risk R2, both with a probability of 50% and a duration of 20d. A red arrow points from the 'Mappings' section to a red text box below it.

Select the Probability, impact schedule , impact cost, and Location in the WBS/ Activity

How to use the Power of Technologies to Cover all those practices?

Running Risk Analysis - Simulation Options

The screenshot displays the 'Simulation' options in the Deltek Acumen software. The interface includes a toolbar with various icons for editing, activities, and risk management. The main window shows a list of tasks with their IDs and descriptions. The 'Simulation' panel is open, showing options for running risk analysis.

Simulation Options:

- Number of Iterations: 1000
- Complete Automatically: ☒ Perform risk analysis until results converge to given accuracy.
- Automatic Accuracy: 1%
- Convergence Iterations: 100

Scenarios:

- ☐ **Uncertainty Only (No Risk Events)**
Perform the risk analysis including only duration uncertainty.
- ☒ **Uncertainty and Risk Events (No Mitigation)**
Perform the risk analysis including both uncertainty and pre-mitigated risk events.
- ☐ **Uncertainty and Risk Events (Mitigated, Excluding Overhead)**
Perform the risk analysis including both uncertainty and pre-mitigated risk events, but without the cost/schedule effort required for mitigation.
- ☐ **Uncertainty and Risk Events (Mitigated, Including Overhead)**
Perform the risk analysis including both uncertainty and pre-mitigated risk events, and including the cost/schedule effort required for mitigation.

Interaction:

- ☒ **Automatic**
Automatically run all of the risk analysis iterations using multiple CPU cores. (Fastest)
- ☐ **Interactive**
Automatically run risk analysis iterations and view the values changing during the execution. (Fast)
- ☐ **Diagnose**
Manually run each risk analysis iteration and view the values changing during execution. (Slow)

Repeatability:

- ☒ **Use Fixed Seed**

How to use the Power of Technologies to Cover all those practices?

Running Risk Analysis - Simulation Options

The screenshot shows the 'Simulation' dialog box in the Risk Register application. The 'Number of Iterations' is set to 1000. The 'Complete Automatically' checkbox is checked. The 'Automatic Accuracy' is set to 1%. The 'Convergence Iterations' is set to 100. The 'Scenarios' section is expanded, showing various risk analysis options. The 'Uncertainty and Risk Events (Mitigated, Including Overhead)' option is selected. The 'Interaction' section is also expanded, showing options like 'Automatic', 'Interactive', and 'Diagnose'. The 'Repeatability' section is expanded, showing the 'Use Fixed Seed' option.

Simulation

- Number of Iterations: 1000
- Complete Automatically: ☒ Perform risk analysis until results converge to given accuracy.
- Automatic Accuracy: 1%
- Convergence Iterations: 100

Scenarios

- ☐ **Uncertainty Only (No Risk Events)**
Perform the risk analysis including only duration uncertainty.
- ☒ **Uncertainty and Risk Events (No Mitigation)**
Perform the risk analysis including both uncertainty and pre-mitigated risk events.
- ☐ **Uncertainty and Risk Events (Mitigated, Excluding Overhead)**
Perform the risk analysis including both uncertainty and pre-mitigated risk events, but without the cost/schedule effort required for mitigation.
- ☐ **Uncertainty and Risk Events (Mitigated, Including Overhead)**
Perform the risk analysis including both uncertainty and pre-mitigated risk events, and including the cost/schedule effort required for mitigation.

Interaction

- ☒ **Automatic**
Automatically run all of the risk analysis iterations using multiple CPU cores. (Fastest)
- ☐ **Interactive**
Automatically run risk analysis iterations and view the values changing during the execution. (Fast)
- ☐ **Diagnose**
Manually run each risk analysis iteration and view the values changing during execution. (Slow)

Repeatability

- ☒ **Use Fixed Seed**

The screenshot shows the 'Simulation' dialog box in the Risk Register application, with a yellow highlight around the 'Repeatability' section. The 'Use Fixed Seed' option is selected. The 'Seed Value' is set to 1. The 'Use correlation to link activities' option is also selected. The 'Hierarchical Risk Models' section is expanded, showing the 'Use Correlation to Overcome the Central Limit Theorem' option. The 'Correlation Coefficient' is set to 50%.

Repeatability

- ☒ **Use Fixed Seed**
- Seed Value: 1

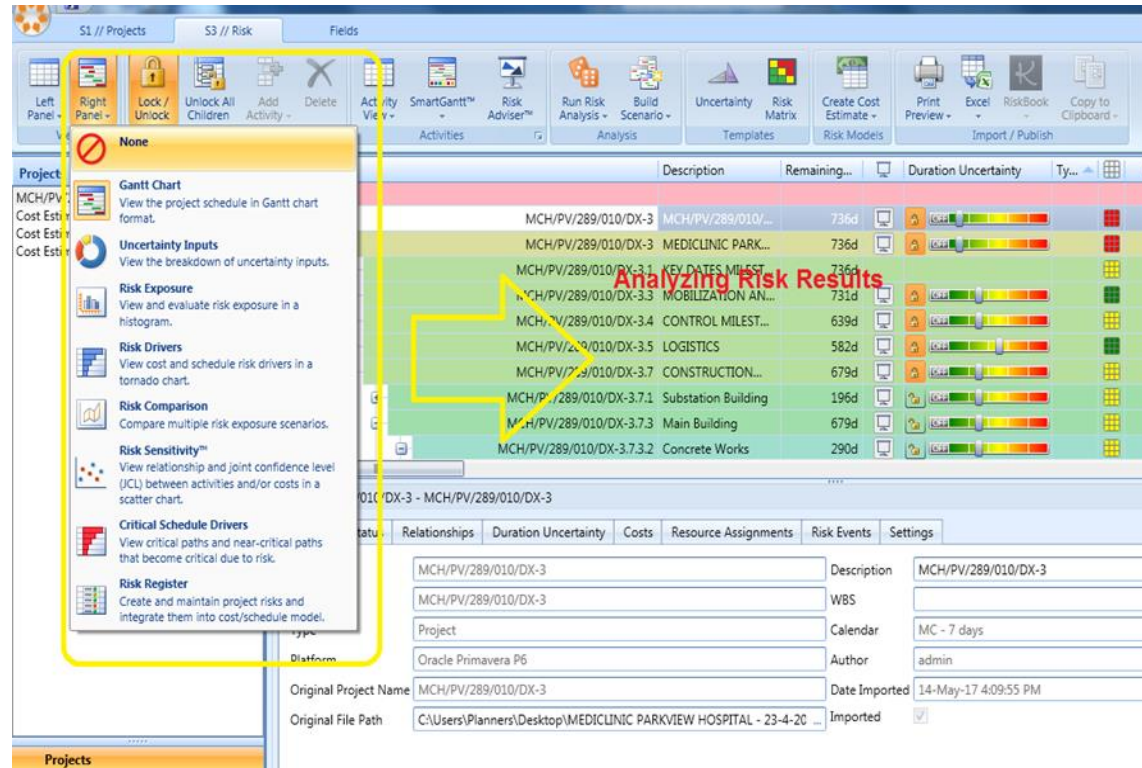
Hierarchical Risk Models

- ☒ **Use correlation to link activities**
- ☐ **Use Correlation to Overcome the Central Limit Theorem**
Correlation Coefficient: 50%

How to use the Power of Technologies to Cover all those practices?

Analyzing Risk Results

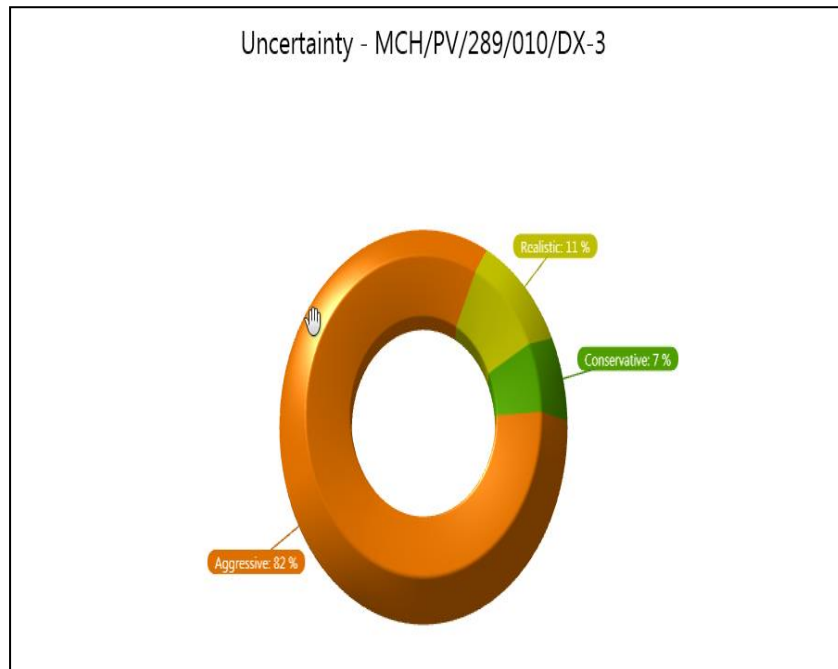
The acumen risk results can be analyzed a variety of different ways as an output from the model and risk analyses. Here the brief summary of the reports.



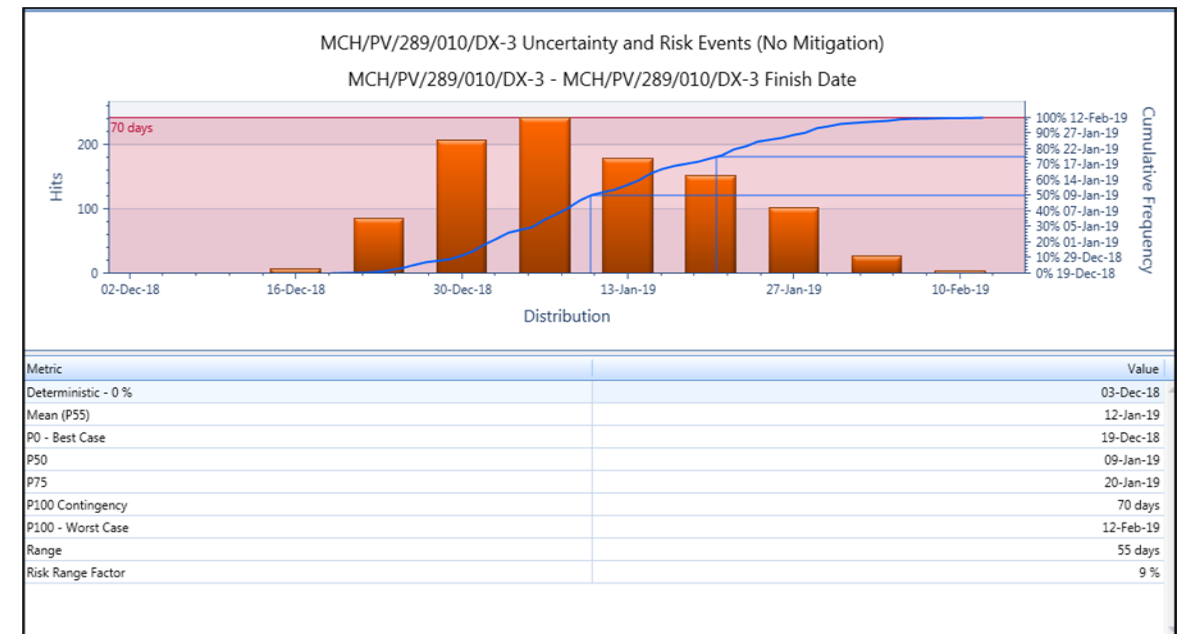
How to use the Power of Technologies to Cover all those practices?

Type of Risk Results

- Uncertainty inputs Report



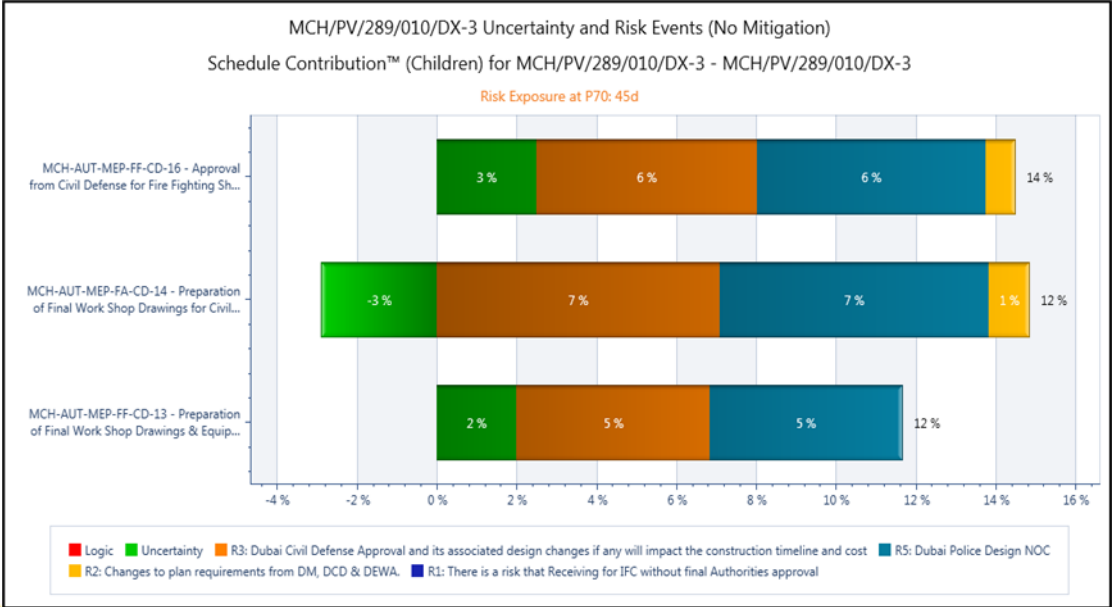
- Risk Exposure - Finish Date



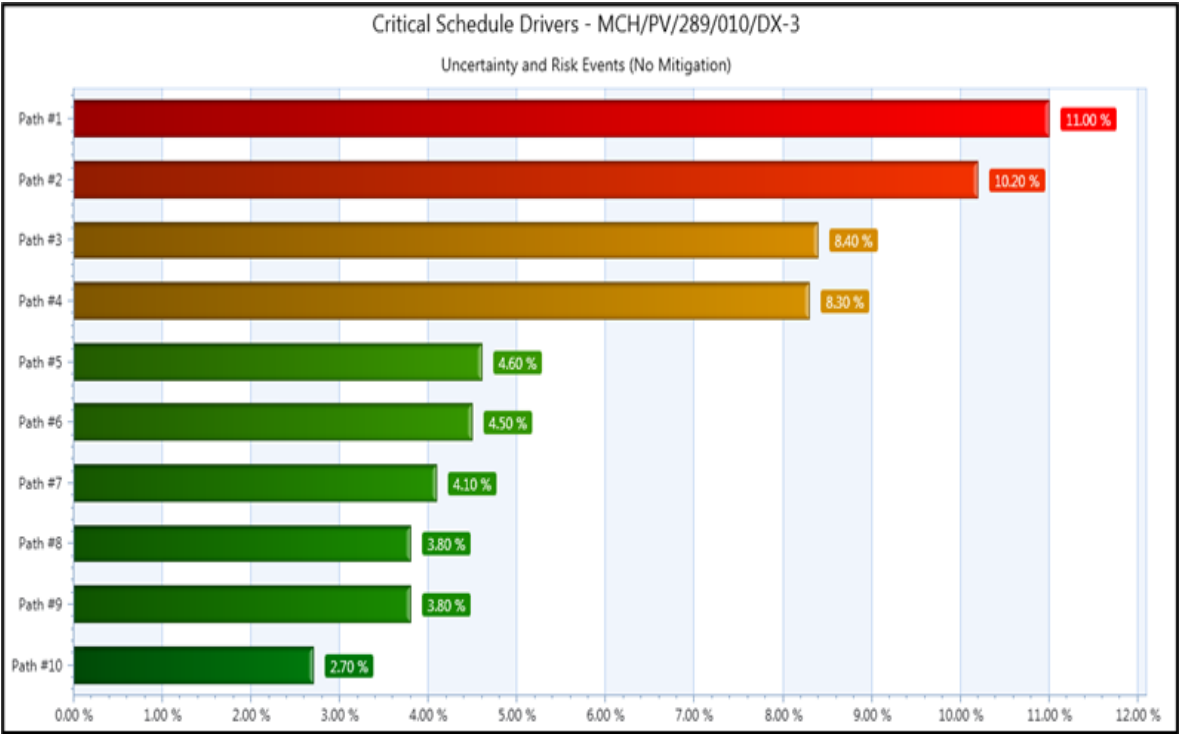
How to use the Power of Technologies to Cover PCs practices?

Type of Risk Results

- Risk Drivers



- Critical Schedule Driver



Stage 04

How to use the Power of Technologies to Cover PCs practices?

For the purpose of administration management, we are proposing to deploy two different software to serve as the business intelligence front-end processing and display engines: QlikSense and Power BI, in which currently the Power BI is the most popular in this field.

Two different applications can be created for that purpose:

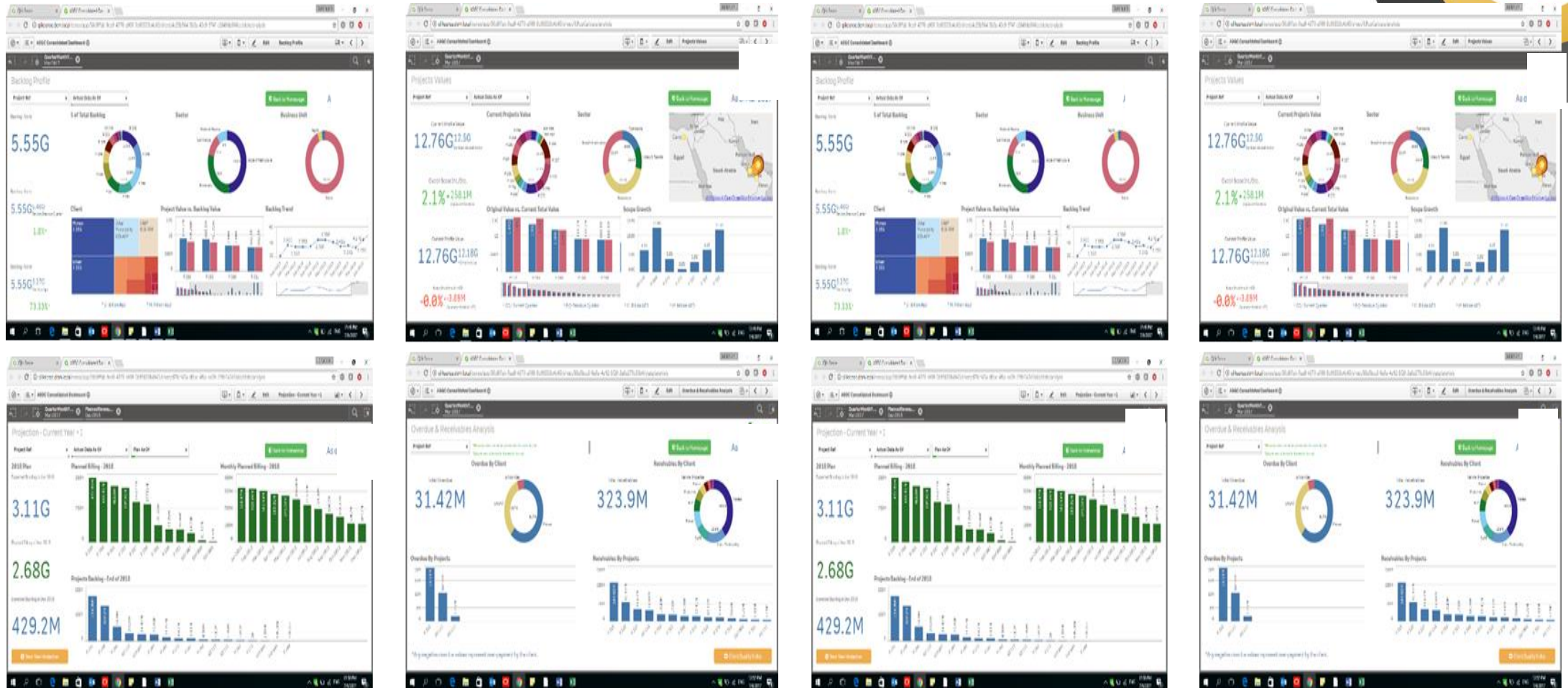
1. **Quarterly Consolidated Reporting” dashboard** → includes company across a wide range of aspects from Q01. The dashboard collects, processes, analyses, compiles, and presents the following:
 - Project values, approved variations and under-assessment variations.
 - Risk and management section and how it will affect the time and cost
 - Project backlog which is afterwards summed up for the company level and split among different clients and based on location and business unit as well.
 - Monthly, quarterly and yearly billing results with trends and analysis and comparisons to plans and adjusted plans.
 - Monthly, quarterly and yearly cash collected, due and overdue with KPIs to measure client quality index.
 - Quantities of concrete poured monthly across all projects.
 - Time Portfolio management which presents the completion date changes, extension of times, analyses delays, factors causing delays and planned vs Actual overall percentage completion.
 - “Areas of Concern” that needs management awareness or intervention and the proposed mitigation measures.
 - Manpower planning for all projects across the portfolio, actual allocation status and in-depth analysis of manpower efficiency.

How to use the Power of Technologies to Cover all those practices?

2. “Biweekly Projects Reporting” dashboard → Presents crucial data that helps in mitigating all risks and taking corrective actions for timely and cost-efficient delivery of projects. The dashboard collects, processes, analyses, compiles and presents the following:

- Project value, approved variations and under-assessment variations.
- Project backlog.
- Risk and management section and how it will affect the time and cost
- Monthly, quarterly and yearly billing results with trends and analysis and comparisons to plans and adjusted plans.
- In-depth KPIs that monitor projects different trades (Time and cost).
- EVM via providing CPI and SPI
- Time Portfolio management which presents the completion date changes, extension of times, analyzes delays, factors causing delays and planned vs Actual overall percentage completion.
- “Areas of Concern” that needs management awareness or intervention and the proposed mitigation measures.

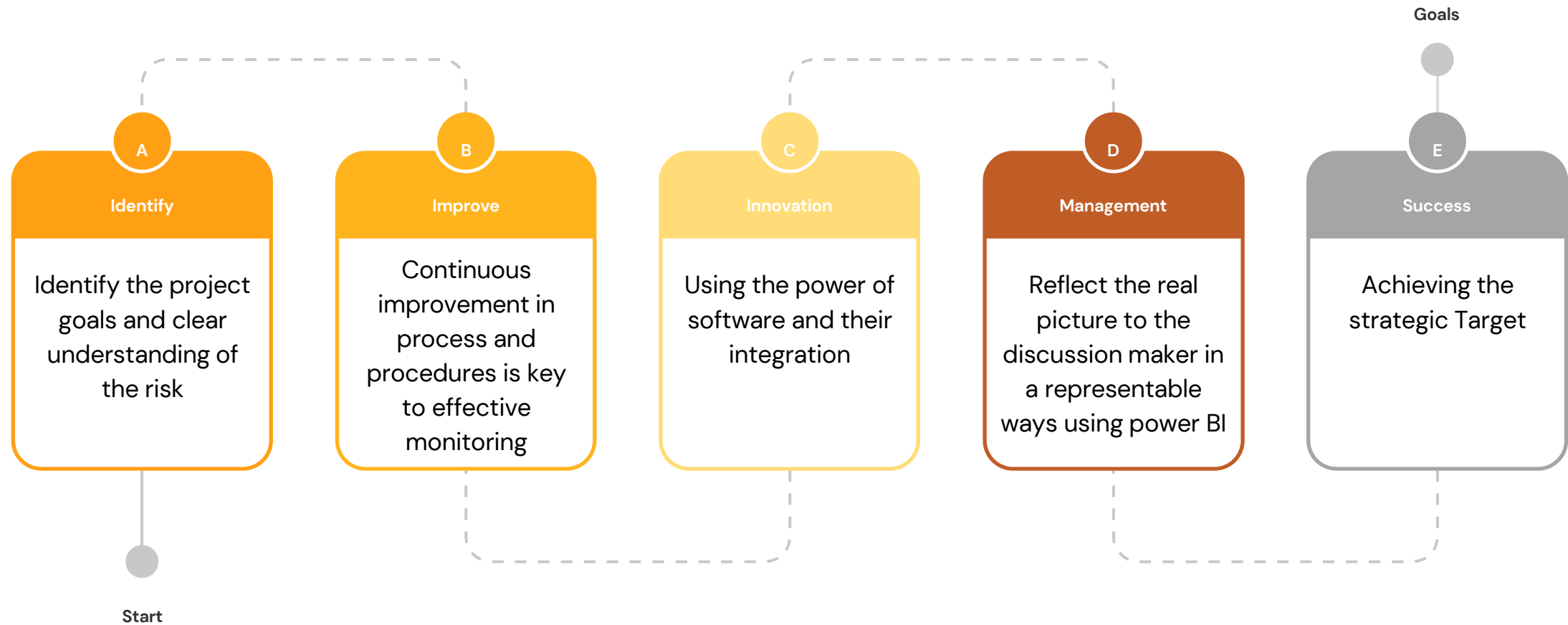
How to use the Power of Technologies to Cover all those practices?



Jacobs Challenging today.
Reinventing tomorrow.

Project Controls
EXPO
UAE, Middle East

Conclusion and Expected Outcomes



Jacobs

Challenging today.
Reinventing tomorrow.



Project Controls
EXPO
UAE, Middle East



THANK YOU



Jacobs

Challenging today.
Reinventing tomorrow.



Project Controls
EXPO
UAE, Middle East