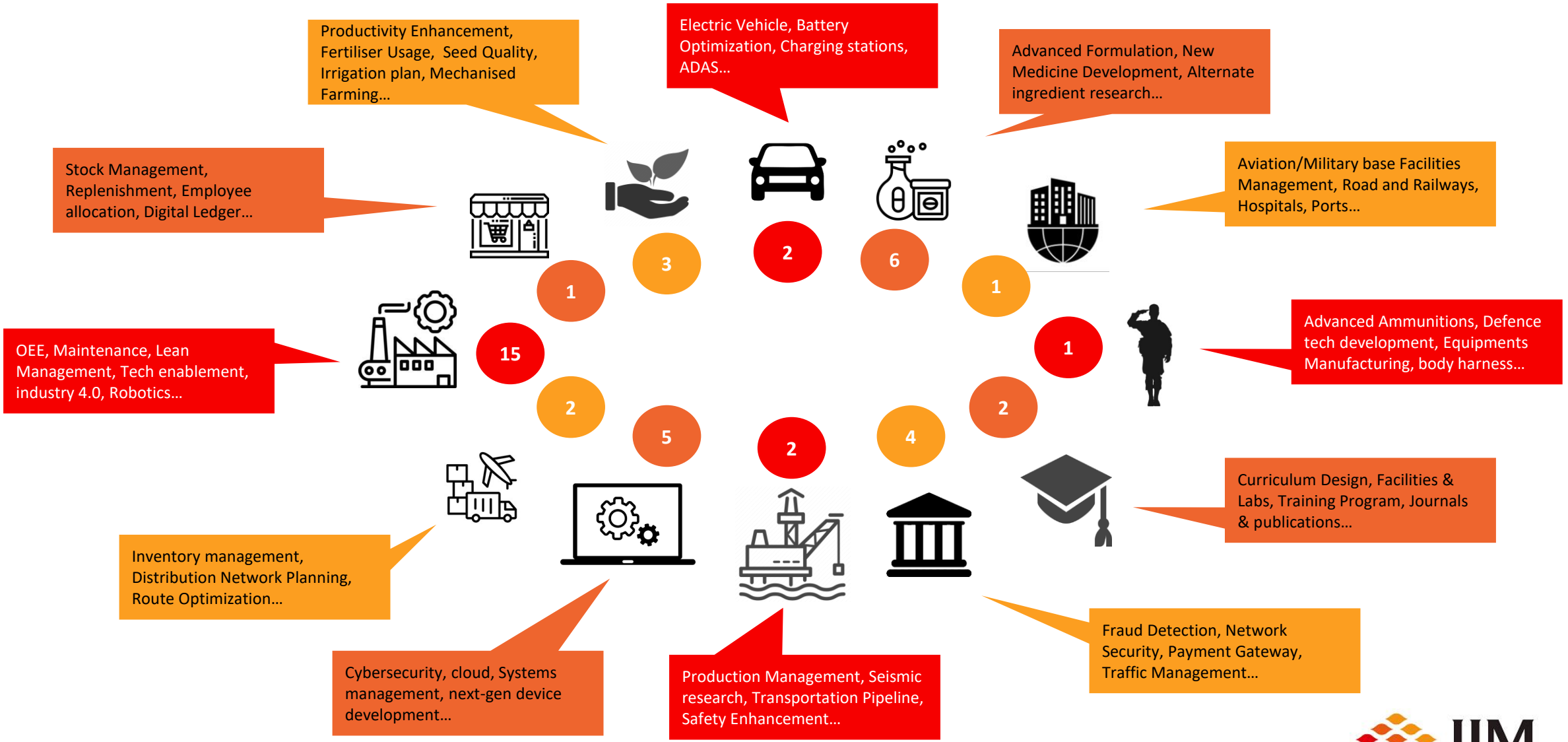
Project Management

Industry Talk

Ramani k Sarangi, Director, PWC

Manohar Thakur, Project Manager, TE Connectivity

Industry Specifics…



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Case Study

4

Project – as it should be…

- Temporary endeavor undertaken to create a **unique** product, service, or result
- Temporary nature signifies Definite Beginning & End
- Tangible Outcome or Intangible Outcome

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Project Phases

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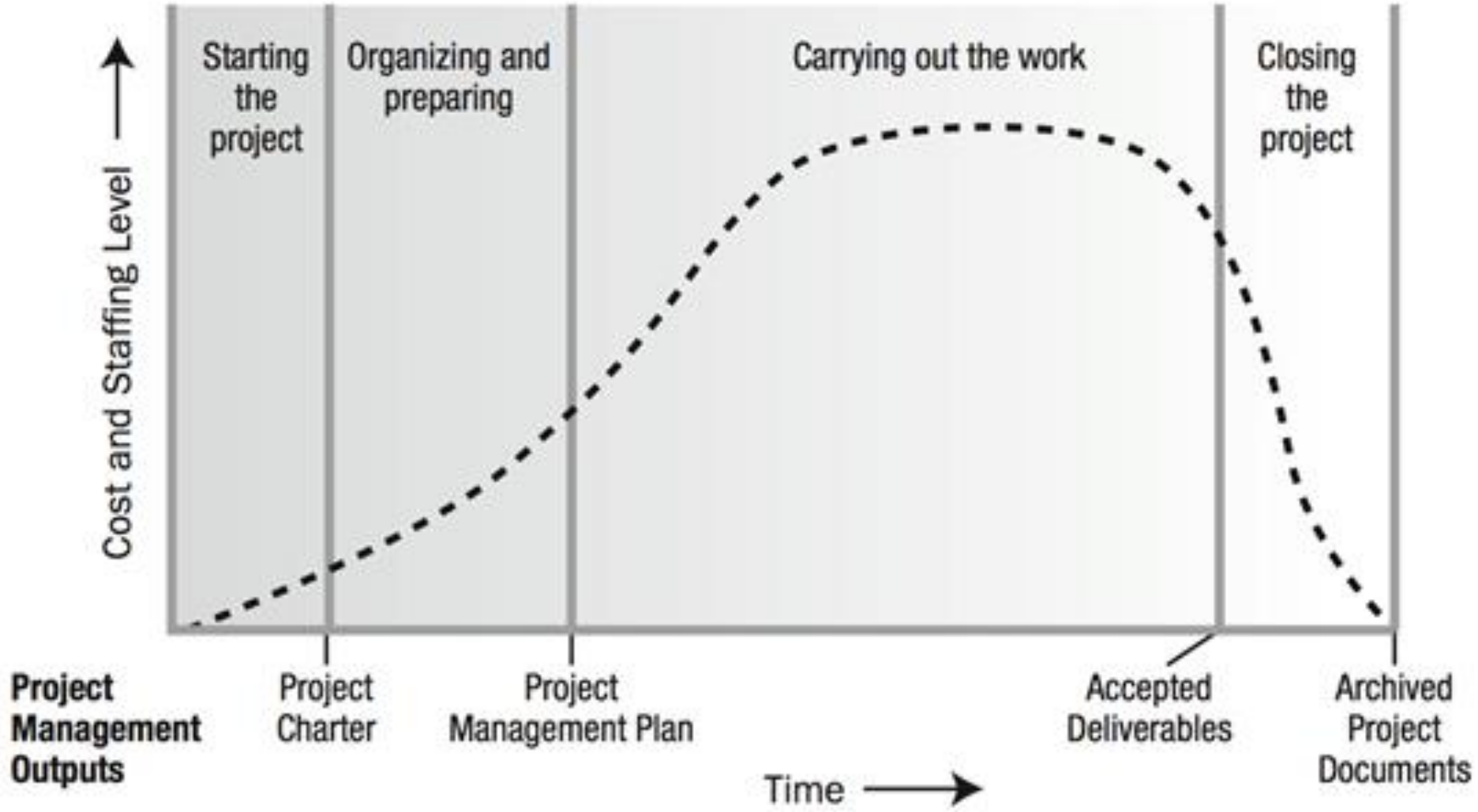
Project Lifecycle



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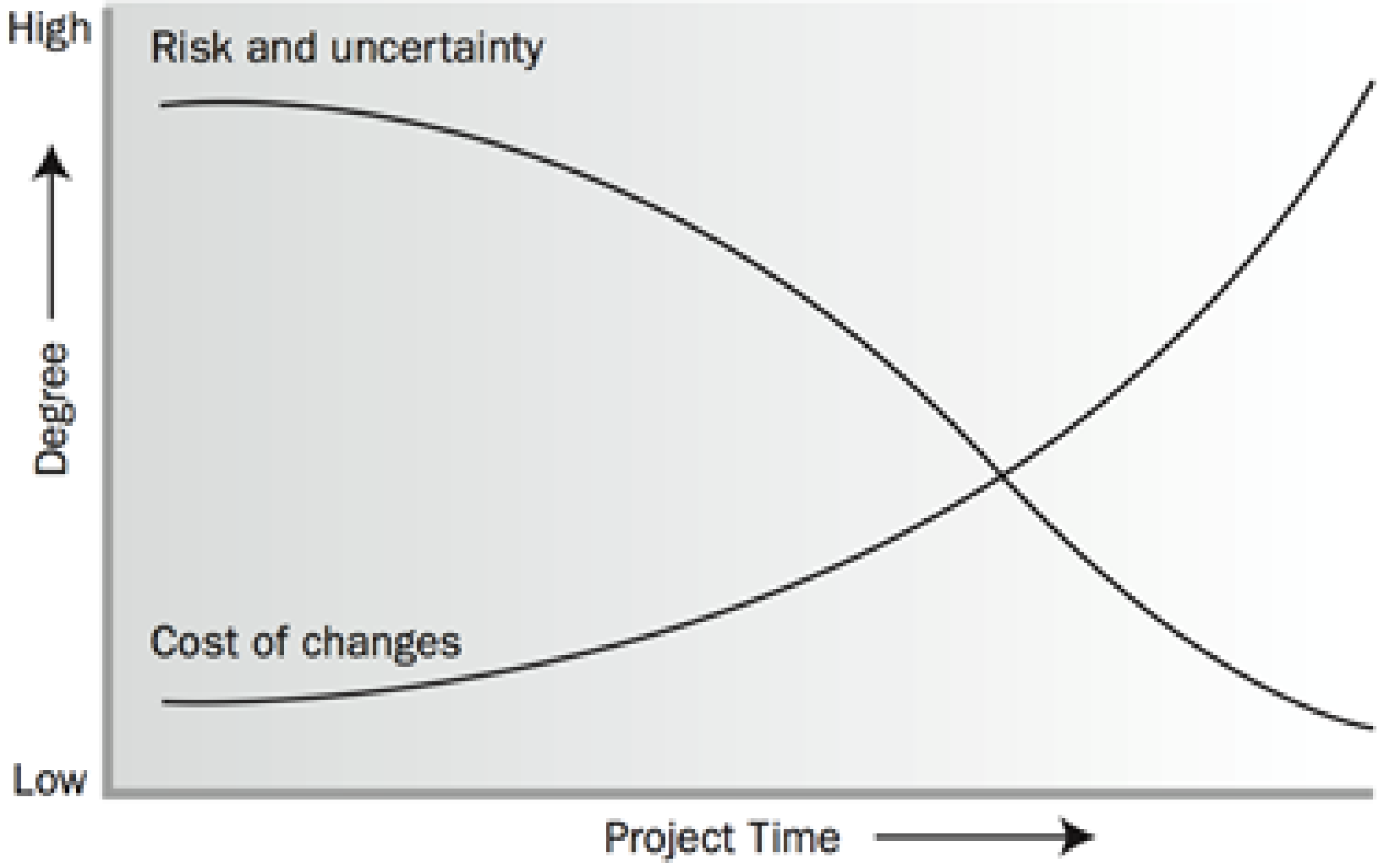
Impact of Variables



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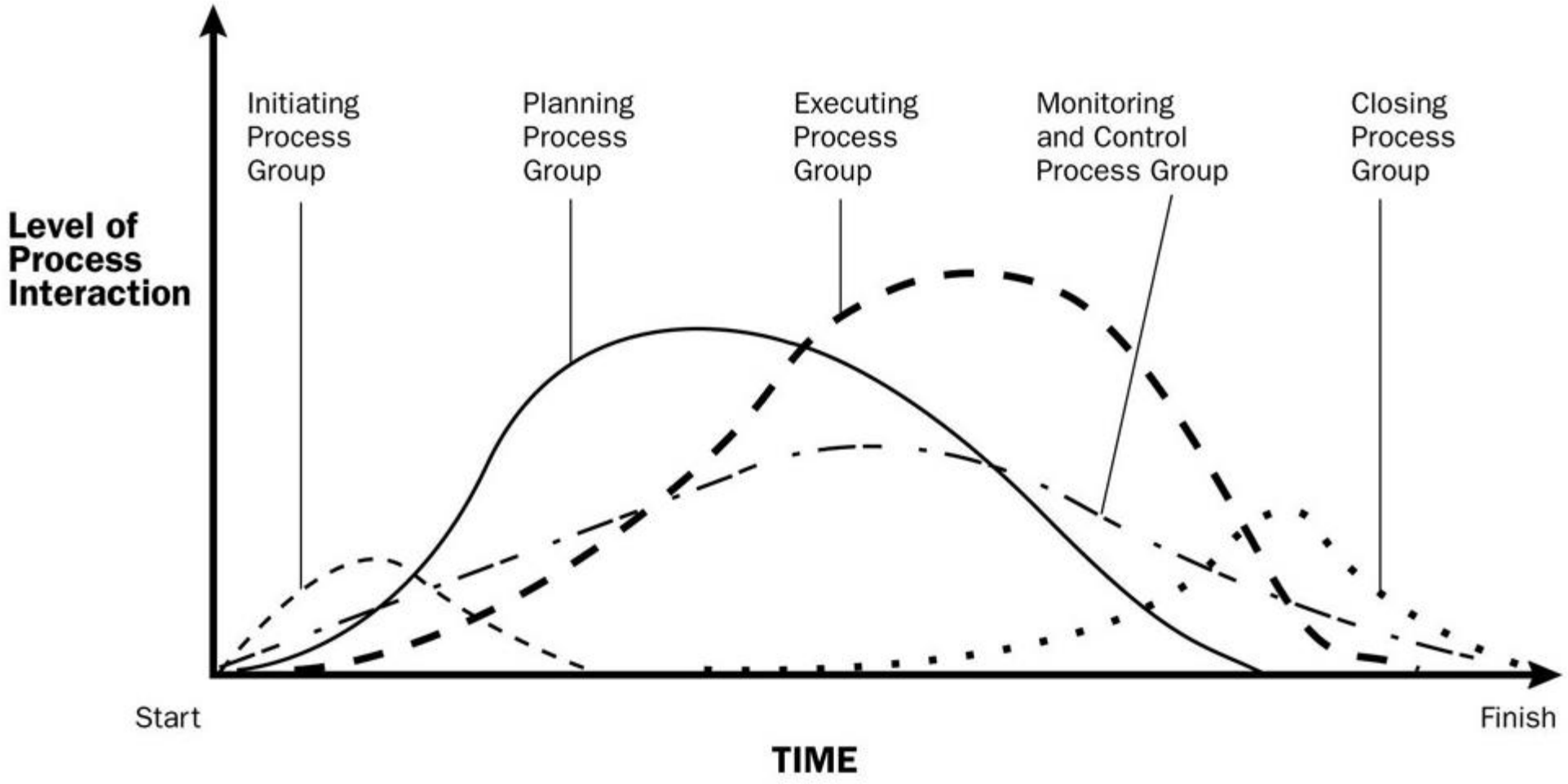
Process Group Interactions



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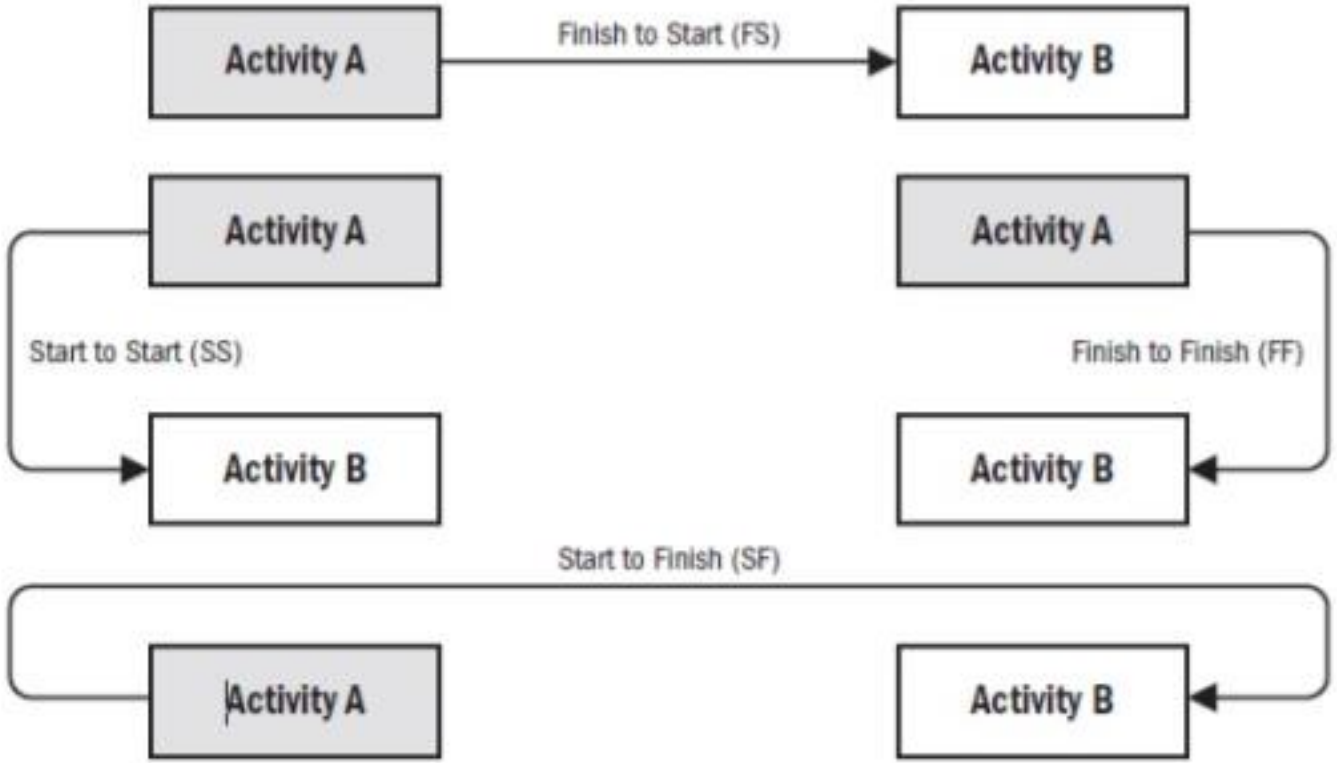
Precedence Diagram



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Earned Value Management (EVM)

Schedule Variance	Cost Variance	Schedule Performance Index	Cost Performance Index
EV – PV	Budget Deficit / Surplus EV-AC @End of Project PV-AC	It measures how efficiently the project team is using its time EV/PV SPI<1.0 Less Work Done than Planned SPI>1.0 More Work Done than Planned	It measures the cost efficiency of the budgeted resources EV/AC CPI<1.0 Cost Overrun CPI>1.0 Cost Underrun

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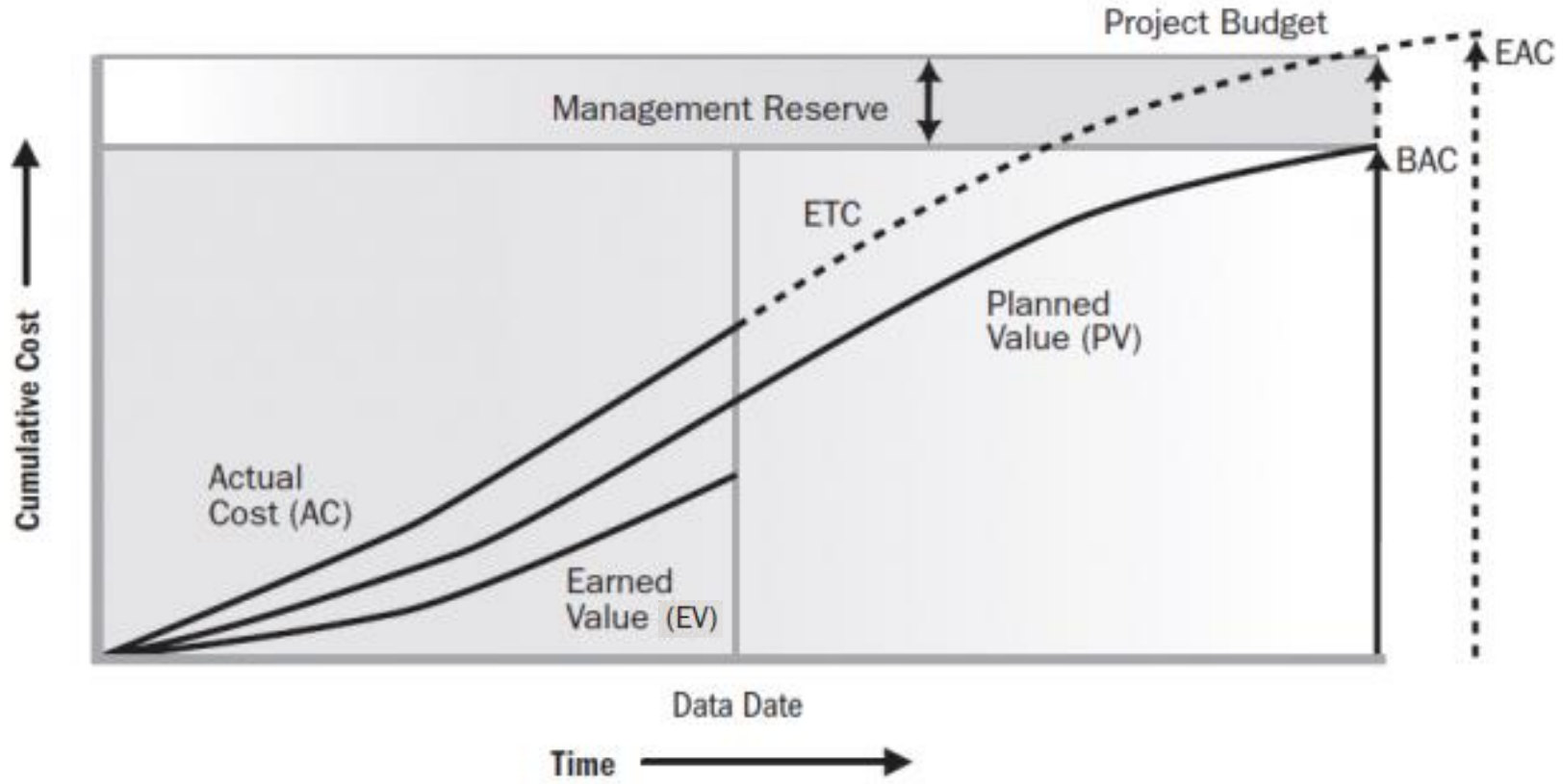
Earned Value Management (EVM)



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Early Warning / Forecasting

Estimate At Completion
EAC

1. EAC = AC + ETC
2. EAC = AC + (BAC – EV)
3. EAC = BAC / CPI
4. EAC = AC+(BAC – EV)/(CPI*SPI)

Estimate To Complete
ETC

Estimate To Complete (ETC) involves making projections of conditions and events in the project's future based on current performance information and other knowledge available at the time of forecast

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TCPI

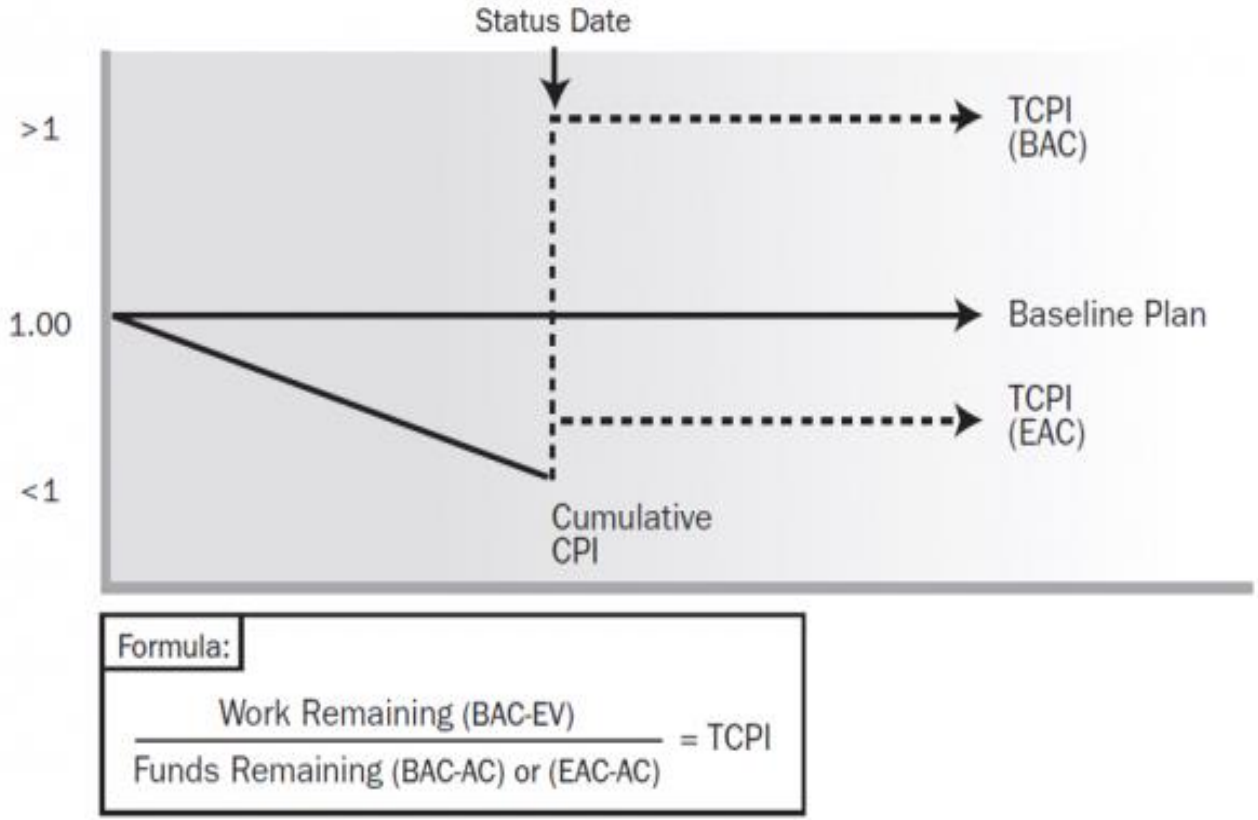
To Complete Performance Index indicates the Cost Performance required to be achieved with remaining resources.

TCPI (BAC) = (BAC-EV) / (BAC-AC)

TCPI (EAC) = (BAC-EV) / (EAC-AC)

TCPI (BAC) is expressed as Cost to finish the outstanding work to the remaining budget. Whether TCPI (BAC) is achievable is a judgement call based on a number of considerations such as risk, schedule, technical performance etc.

TCPI (EAC) indicates the current level of performance



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Performance Reviews

Variance Analysis

An explanation of the Cost Variance or Schedule Variance by identifying cause, impact, corrective actions, etc.

Variance At Completion

VAC = EV - PV

Trend Analysis

performance over time to track improvement or deterioration

BAC Vs EAC

Earned Value Performance

Compares the performance measurement baseline to actual schedule and cost performance

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Summary So Far...

Ref: https://youtu.be/39_O-AnzTQg?si=d1VyzmNrkQTjkVLh

Project Management Techniques

Waterfall

- Traditional Approach – Tasks to be completed in sequence
- To be used for projects with maximum inputs known
- Clear Structure and Easy to track
- Improved Risk and Quality Management

- Longer Delivery timelines
- Limited Flexibility for innovation
- Limited opportunity of getting feedback
- Longer planning and gestation period

Agile/Scrum

- Iterative and Adaptive approach
- To be used for projects with maximum unknowns
- Scrum management
- Frequent deliverables in sprints

- Shorter lead time for value delivery
- Flexible for innovation and improvisation
- Frequent feedback opportunities
- Backlog Management and grooming

Kanban

- Visual way of agile project Management
- Boards – To-Do, In-Progress, Done, Backlog
- Improved workflow
- Improved efficiency

- Limited work focus at a time
- Encourage acts of leadership at all levels

Lean

- Reduce waste in the process
- Identify value across work streams
- Continuous improvement
- Establish pull system for task assignment

- Problem solving tools & techniques (6 sigma)
- Ensures higher quality products/services
- Increased innovation & creativity
- Improved inventory management

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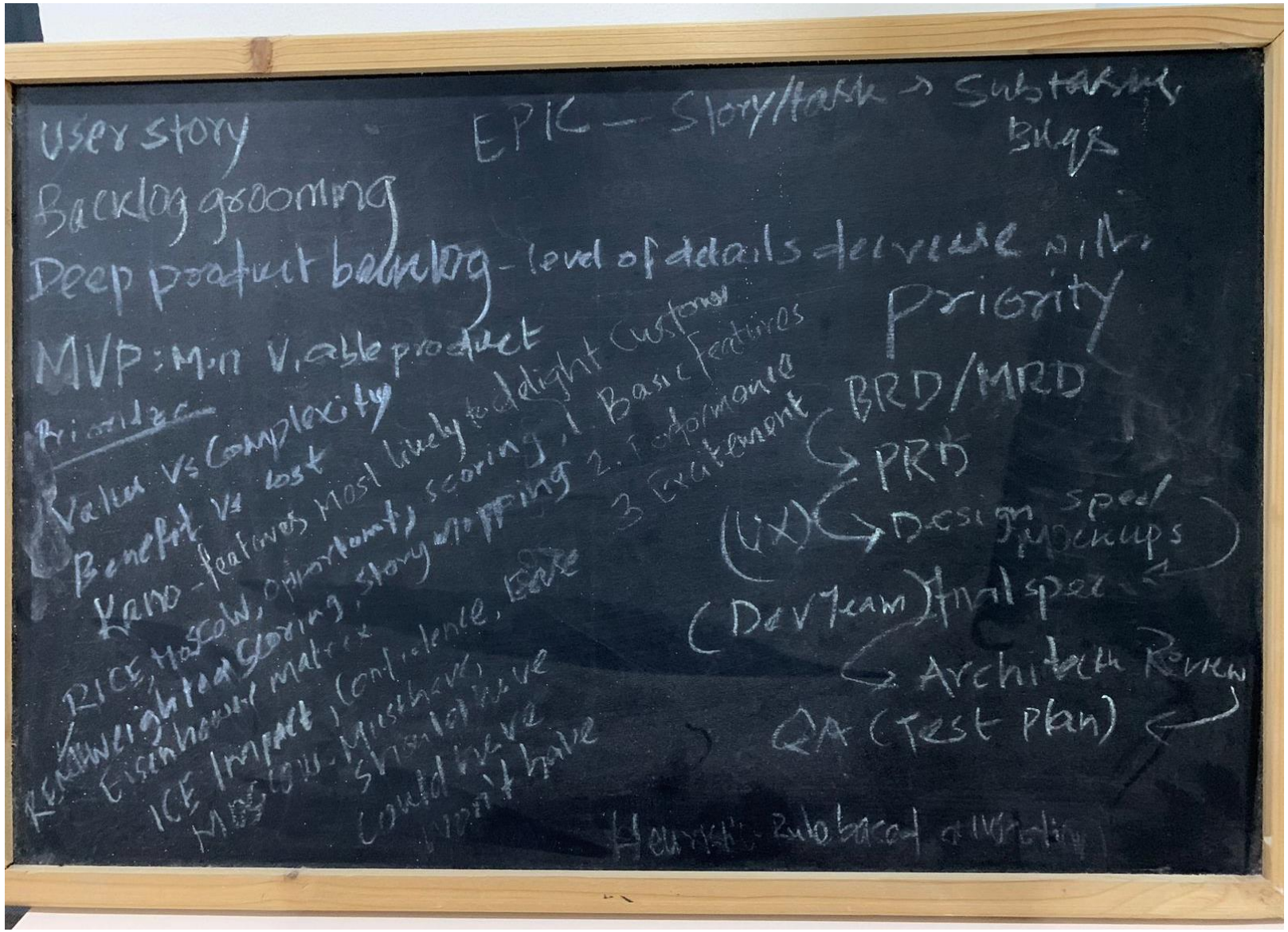
Agile Project Management



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Project Management Knowledge Areas

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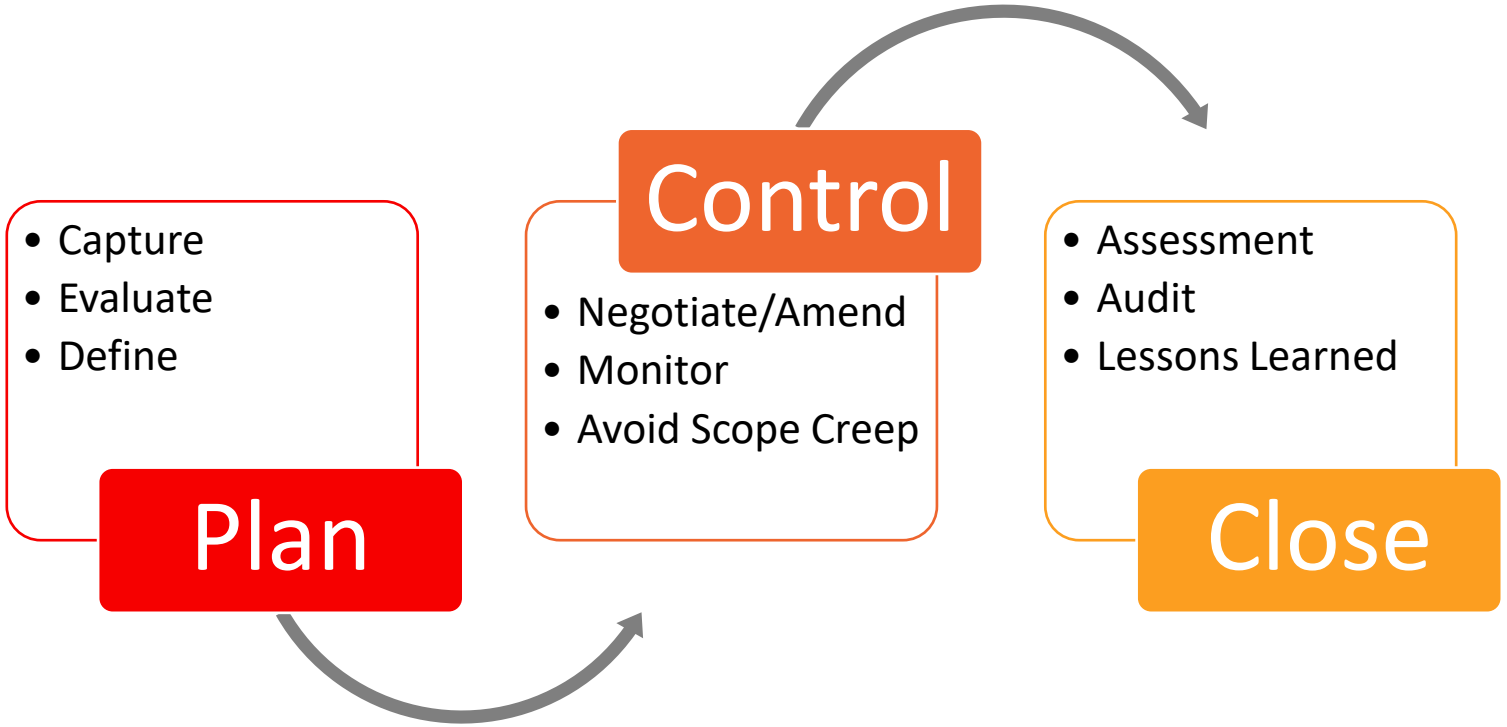
Scope Management

1. Plan
2. Conduct
3. Control



Scope: Detailed set of deliverables or features of a Project

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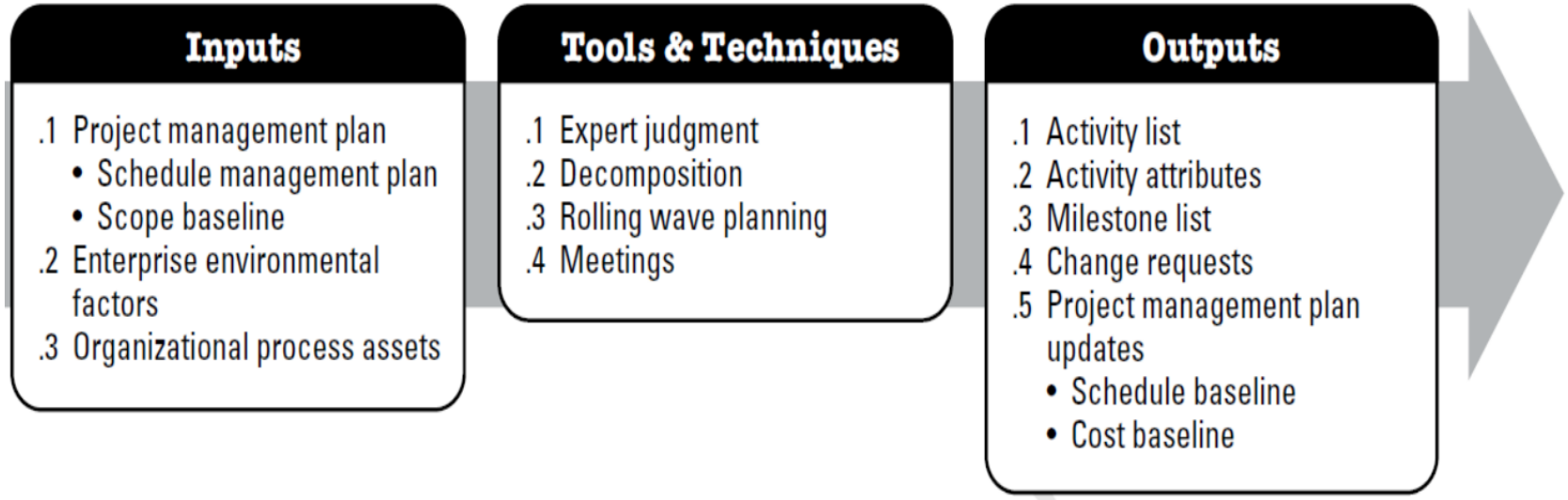
Schedule Management

1. **Define Tasks**
2. Identify Dependencies
3. Estimate Activity
4. Develop Schedule
5. Control Schedule



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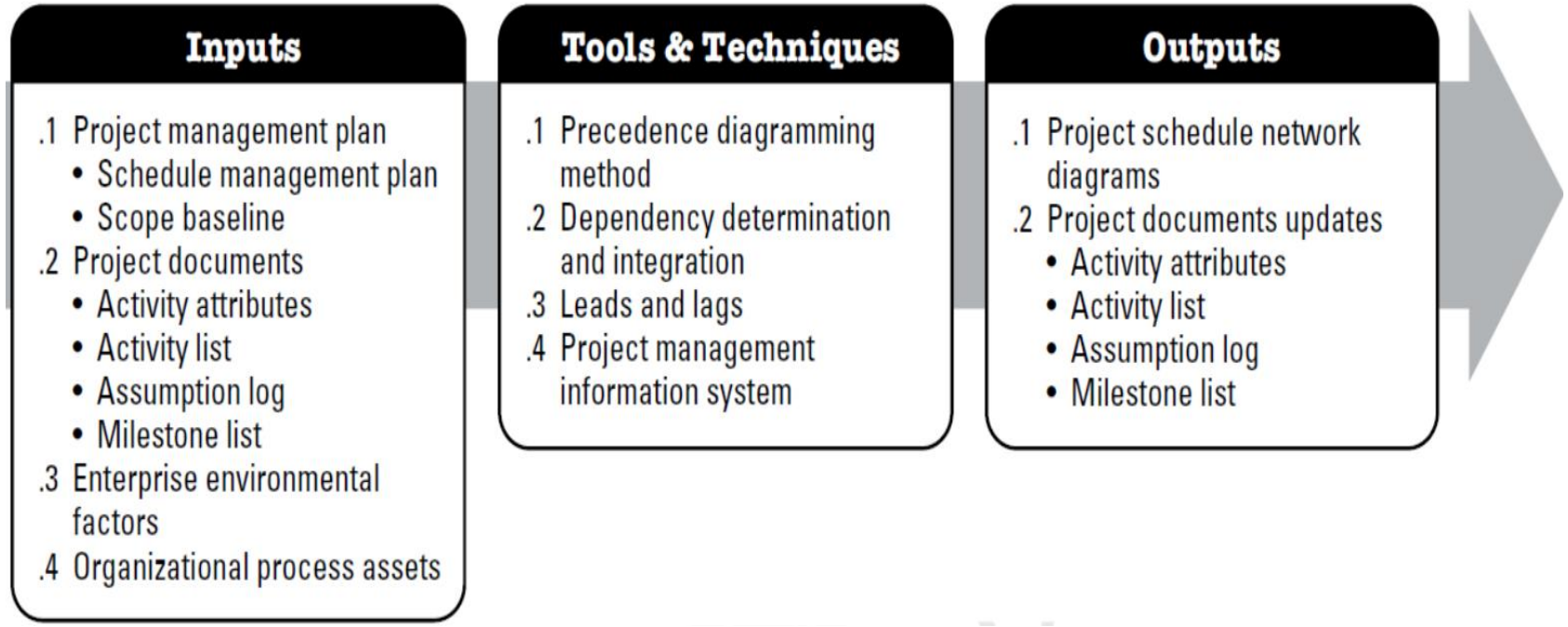

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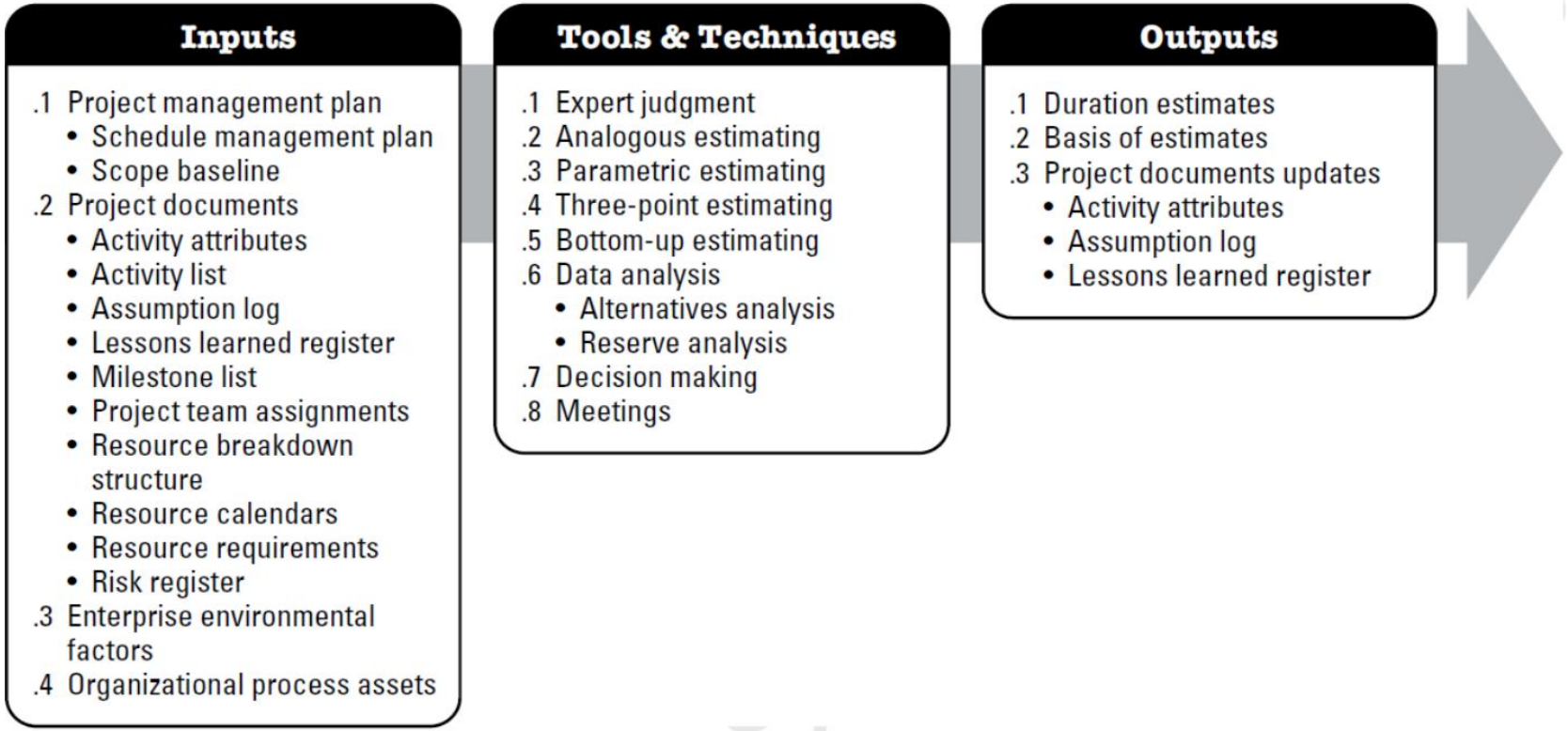

Inputs

.1 Project management plan
- Schedule management plan
- Scope baseline

.2 Project documents
- Activity attributes
- Activity list
- Assumption log
- Lessons learned register
- Milestone list
- Project team assignments
- Resource breakdown structure
- Resource calendars
- Resource requirements
- Risk register

.3 Enterprise environmental factors

.4 Organizational process assets

Tools & Techniques

.1 Expert judgment
.2 Analogous estimating
.3 Parametric estimating
.4 Three-point estimating
.5 Bottom-up estimating
.6 Data analysis
- Alternatives analysis
- Reserve analysis

.7 Decision making
.8 Meetings

Outputs

.1 Duration estimates
.2 Basis of estimates
.3 Project documents updates
- Activity attributes
- Assumption log
- Lessons learned register

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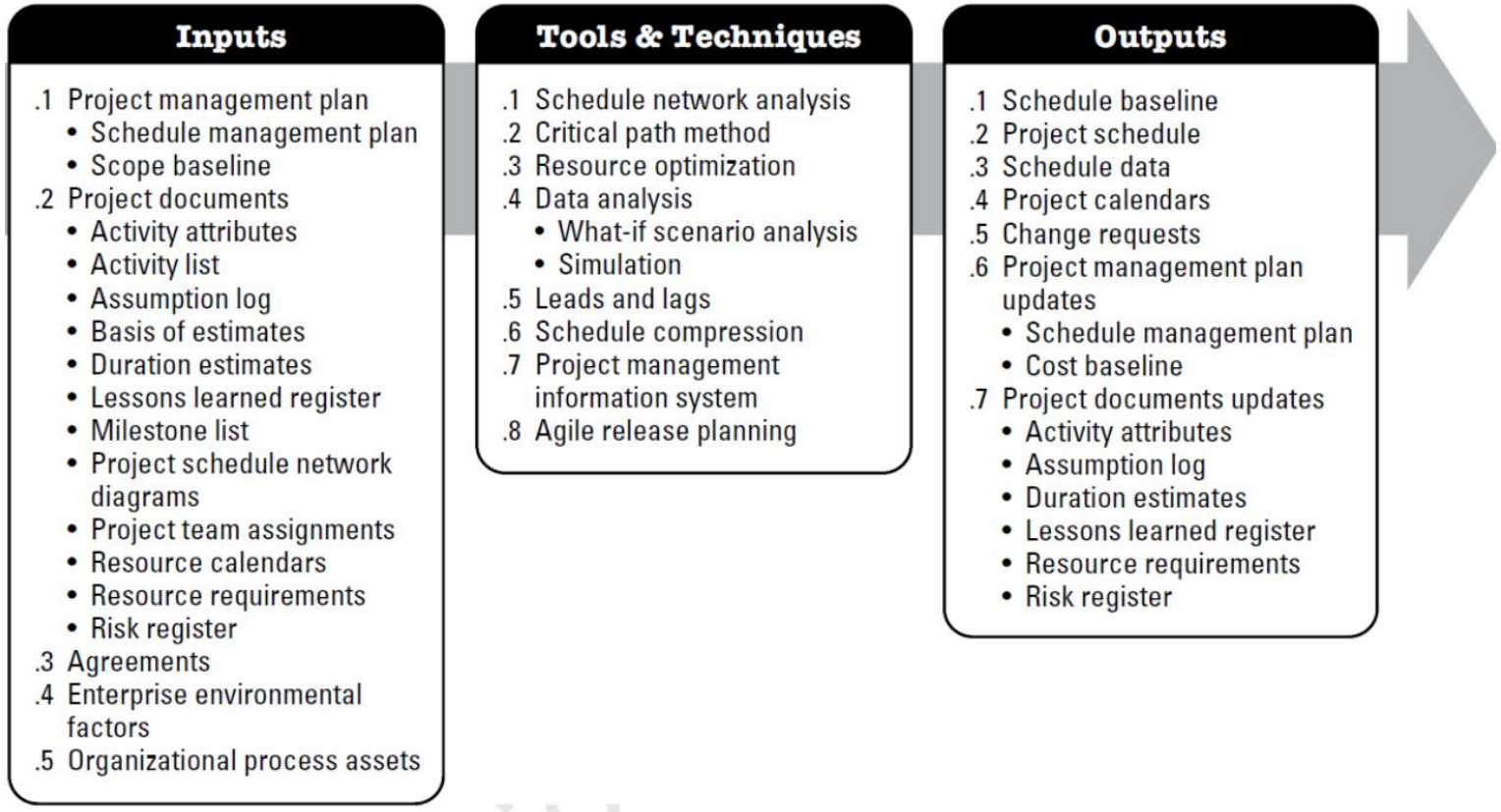

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4. Develop Schedule
5. **Control Schedule**

Inputs	Tools & Techniques	Outputs
.1 Project management plan • Schedule management plan • Schedule baseline • Scope baseline • Performance measurement baseline .2 Project documents • Lessons learned register • Project calendars • Project schedule • Resource calendars • Schedule data .3 Work performance data .4 Organizational process assets	.1 Data analysis • Earned value analysis • Iteration burndown chart • Performance reviews • Trend analysis • Variance analysis • What-if scenario analysis .2 Critical path method .3 Project management information system .4 Resource optimization .6 Leads and lags .7 Schedule compression	.1 Work performance information .2 Schedule forecasts .3 Change requests .4 Project management plan updates • Schedule management plan • Schedule baseline • Cost baseline • Performance measurement baseline .5 Project documents updates • Assumption log • Basis of estimates • Lessons learned register • Project schedule • Resource calendars • Risk register • Schedule data

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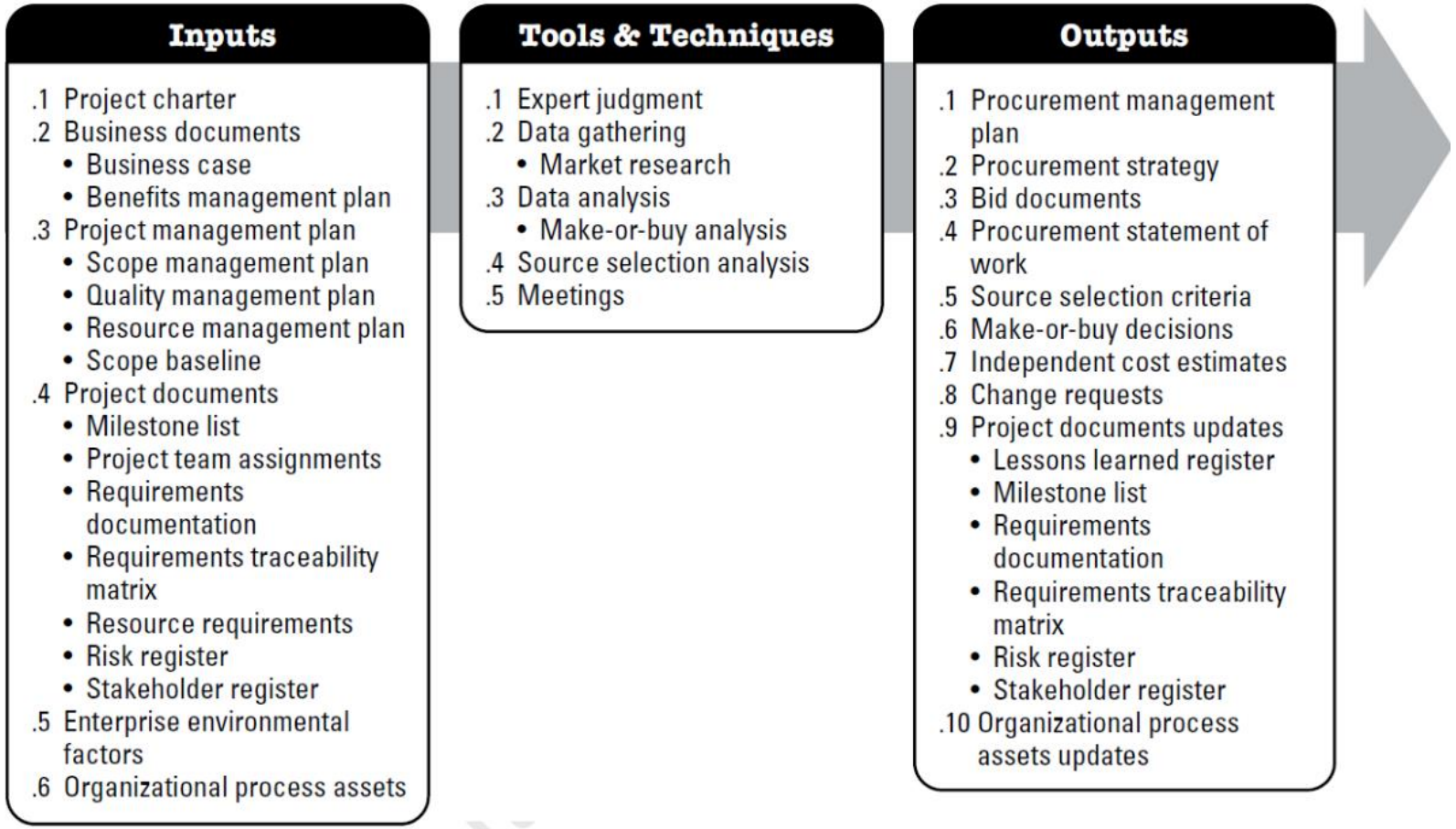
Procurement Management

1 **Plan**

2 **Conduct**

3 **Control**



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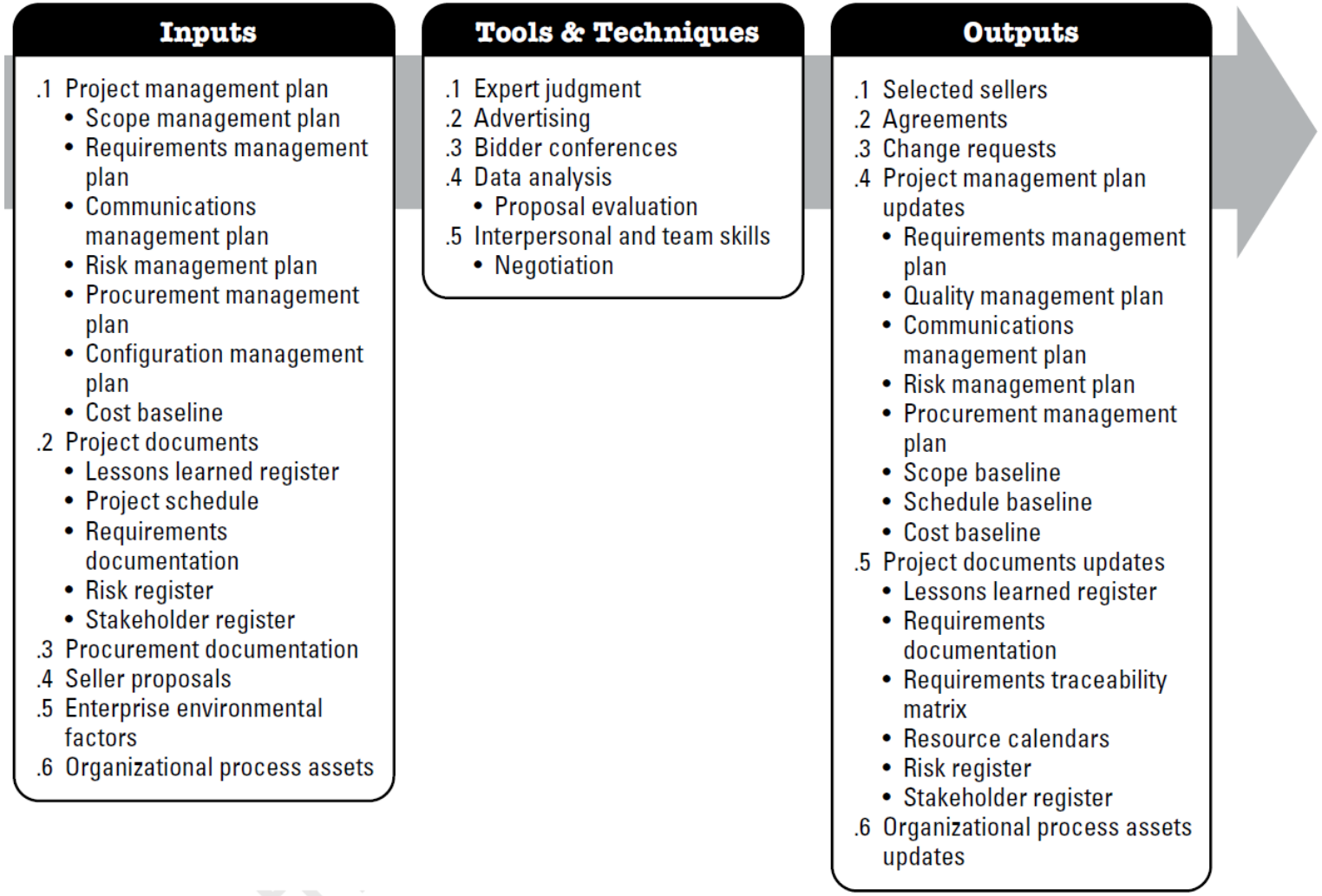

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Procurement Management

1 Plan

2 Conduct

3 Control

Inputs	Tools & Techniques	Outputs
.1 Project management plan • Requirements management plan • Risk management plan • Procurement management plan • Change management plan • Schedule baseline .2 Project documents • Assumption log • Lessons learned register • Milestone list • Quality reports • Requirements documentation • Requirements traceability matrix • Risk register • Stakeholder register .3 Agreements .4 Procurement documentation .5 Approved change requests .6 Work performance data .7 Enterprise environmental factors .8 Organizational process assets	.1 Expert judgment .2 Claims administration .3 Data analysis • Performance reviews • Earned value analysis • Trend analysis .4 Inspection .5 Audits	.1 Closed procurements .2 Work performance information .3 Procurement documentation updates .4 Change requests .5 Project management plan updates • Risk management plan • Procurement management plan • Schedule baseline • Cost baseline .6 Project documents updates • Lessons learned register • Resource requirements • Requirements traceability matrix • Risk register • Stakeholder register .7 Organizational process assets updates

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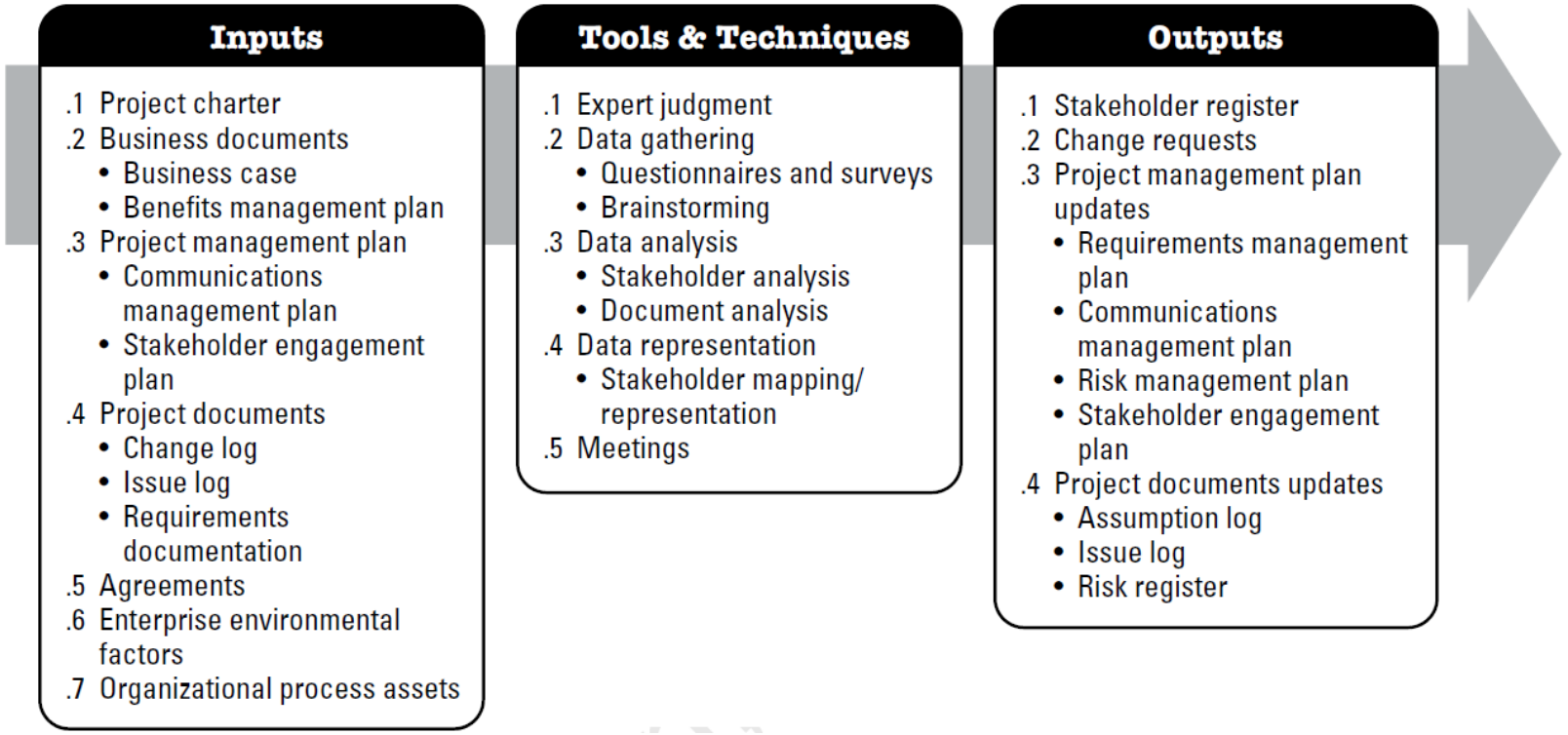
Stakeholder Management

1. **Identify Stakeholder**
2. Plan Stakeholder Engagement
3. Manage Stakeholder Engagement
4. Monitor Stakeholder Engagement



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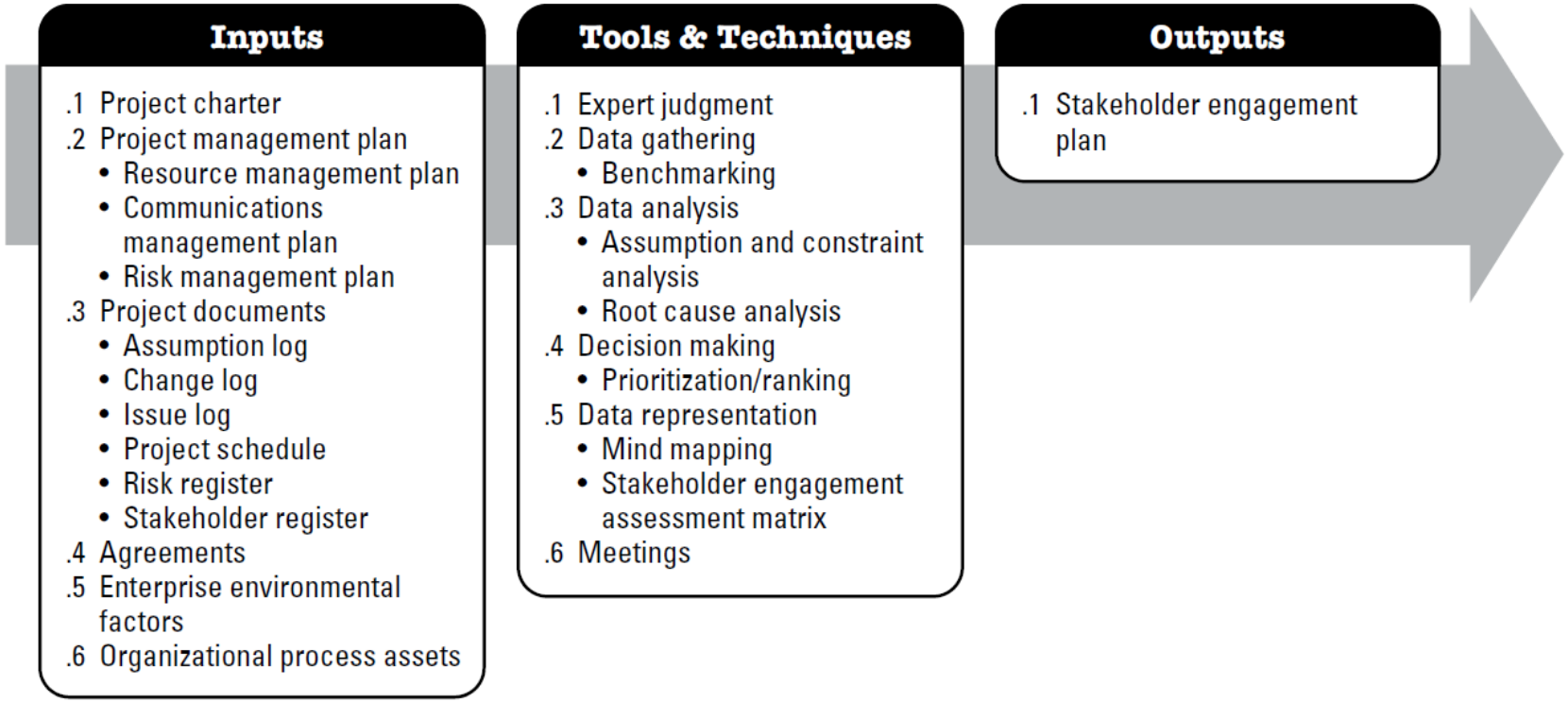

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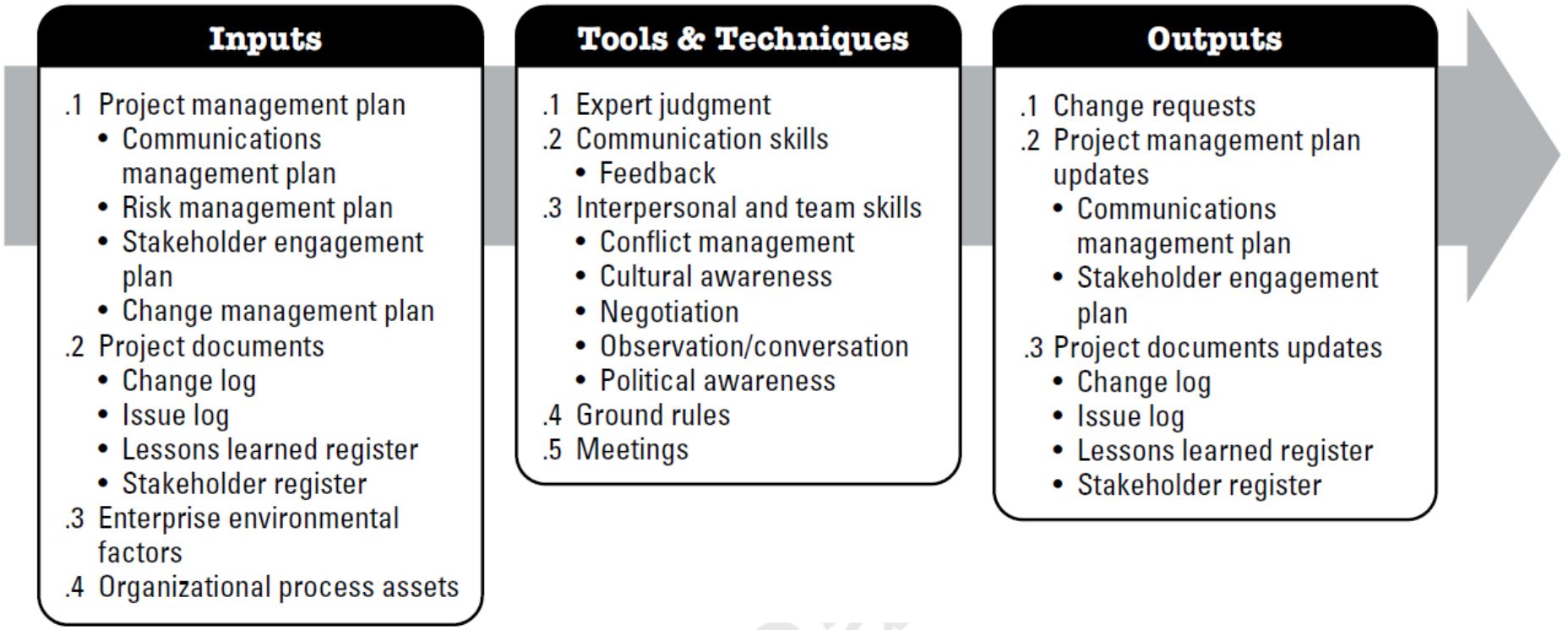

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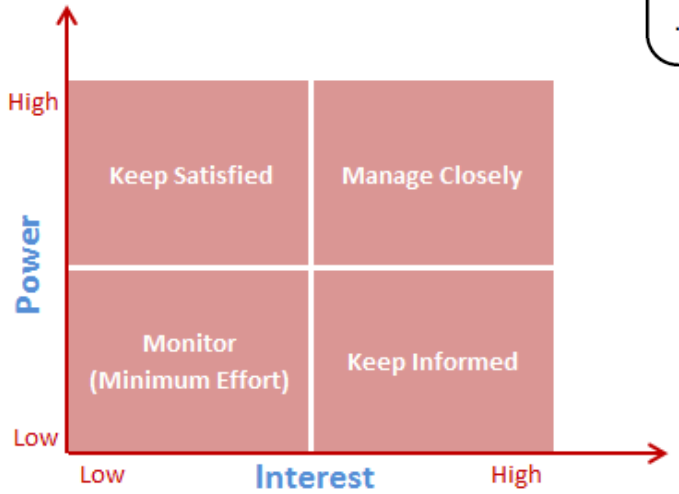

Inputs	Tools & Techniques	Outputs
.1 Project management plan • Resource management plan • Communications management plan • Stakeholder engagement plan .2 Project documents • Issue log • Lessons learned register • Project communications • Risk register • Stakeholder register .3 Work performance data .4 Enterprise environmental factors .5 Organizational process assets	.1 Data analysis • Alternatives analysis • Root cause analysis • Stakeholder analysis .2 Decision making • Multicriteria decision analysis • Voting .3 Data representation • Stakeholder engagement assessment matrix .4 Communication skills • Feedback • Presentations .5 Interpersonal and team skills • Active listening • Cultural awareness • Leadership • Networking • Political awareness .6 Meetings	.1 Work performance information .2 Change requests .3 Project management plan updates • Resource management plan • Communications management plan • Stakeholder engagement plan .4 Project documents updates • Issue log • Lessons learned register • Risk register • Stakeholder register

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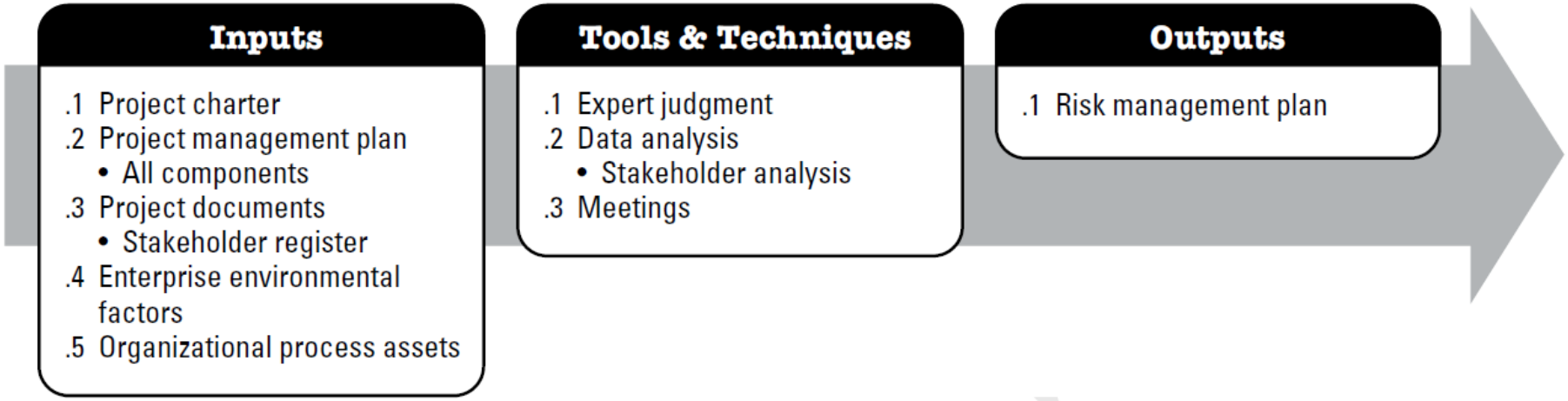
Risk Management

1. **Plan Risk Framework**
2. Identify Risks
3. Perform Qualitative Risk Analysis
4. Perform Quantitative Risk Analysis
5. Plan Risk Responses
6. Implement Risk Responses
7. Monitor Risks



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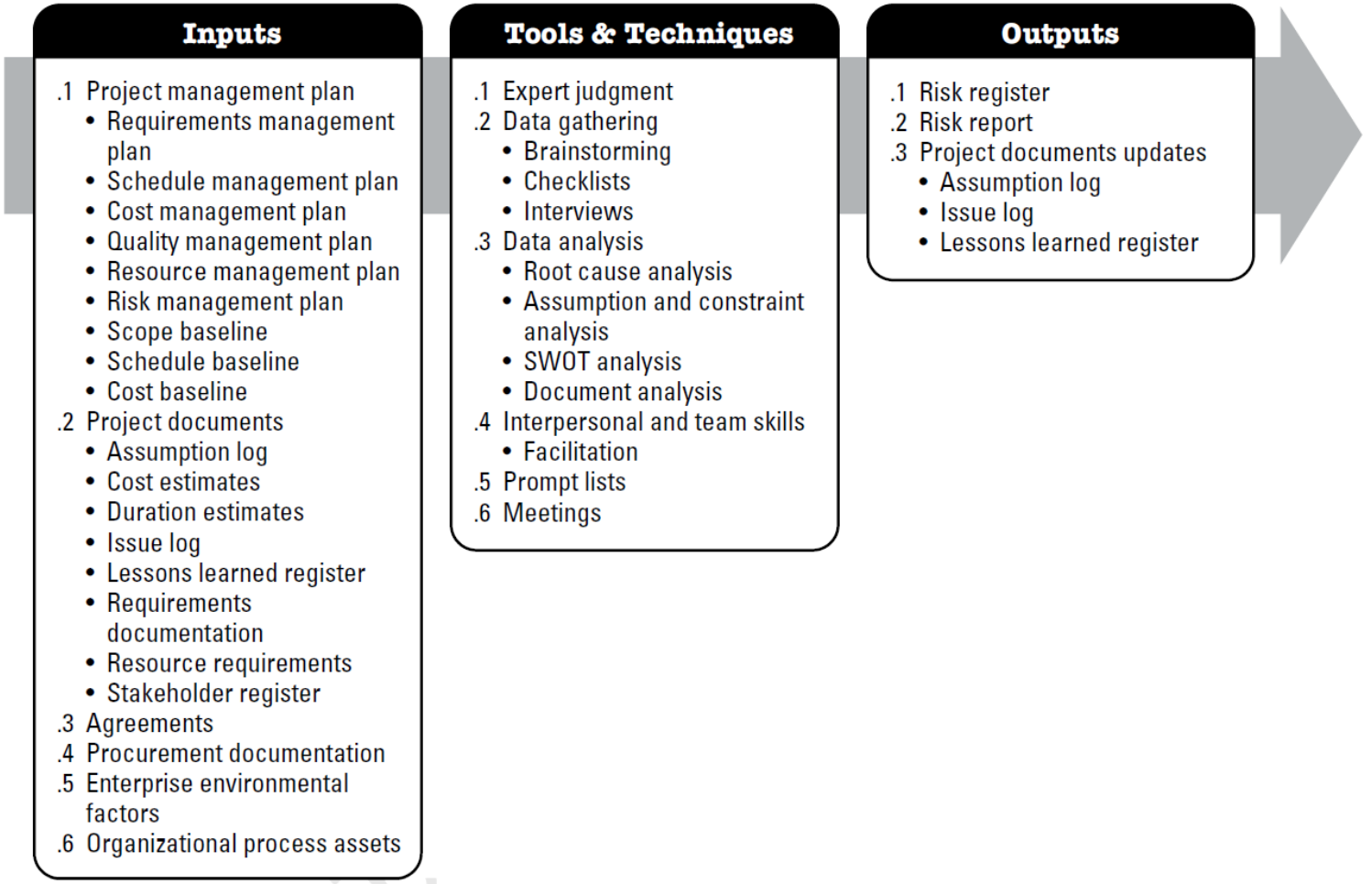

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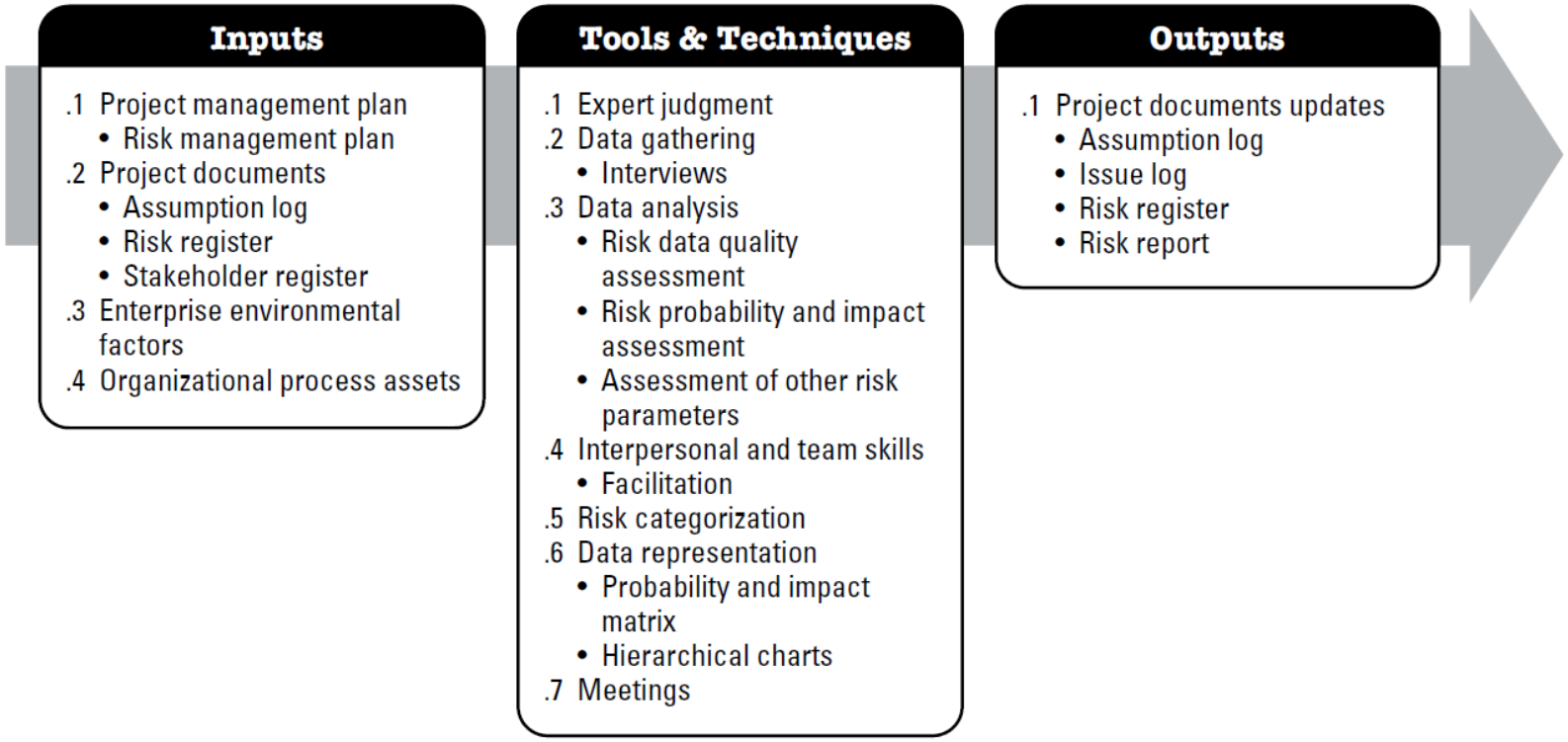

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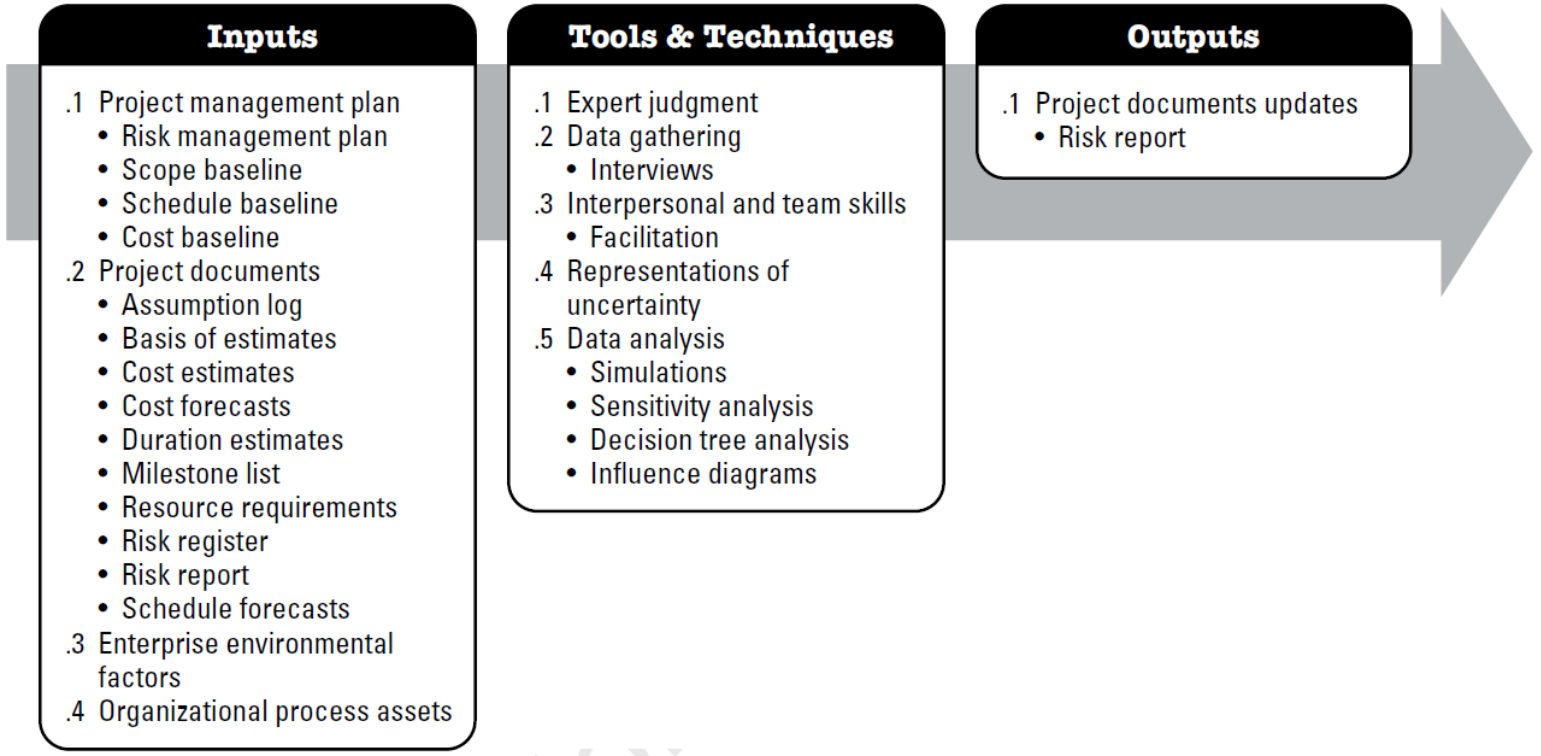

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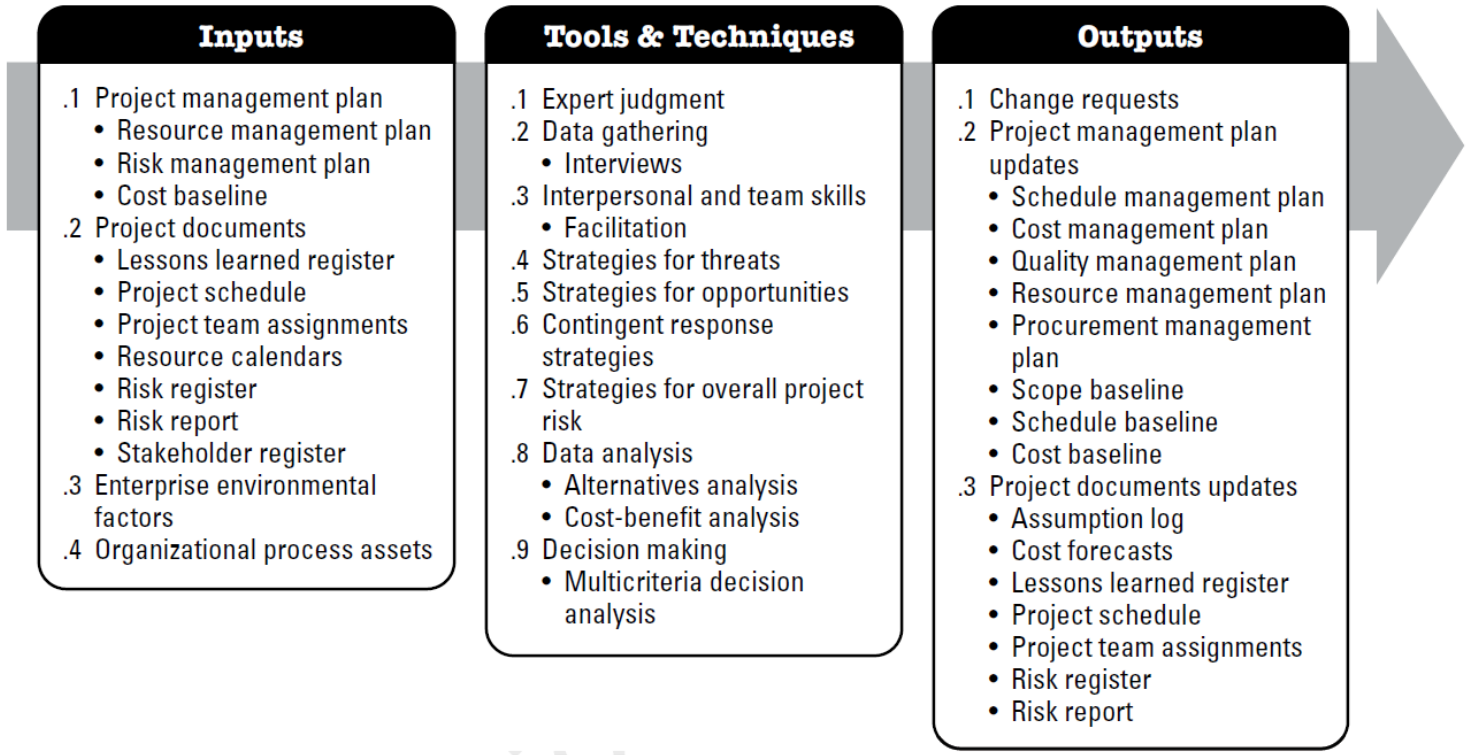

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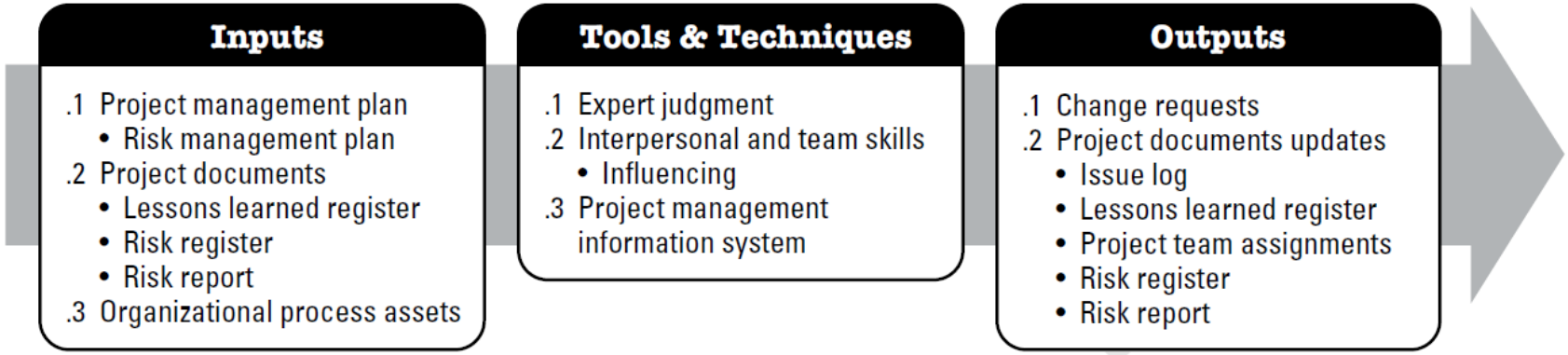
Risk Management

1. Plan Risk Framework
2. Identify Risks
3. Perform Qualitative Risk Analysis
4. Perform Quantitative Risk Analysis
5. Plan Risk Responses
6. **Implement Risk Responses**
7. Monitor Risks



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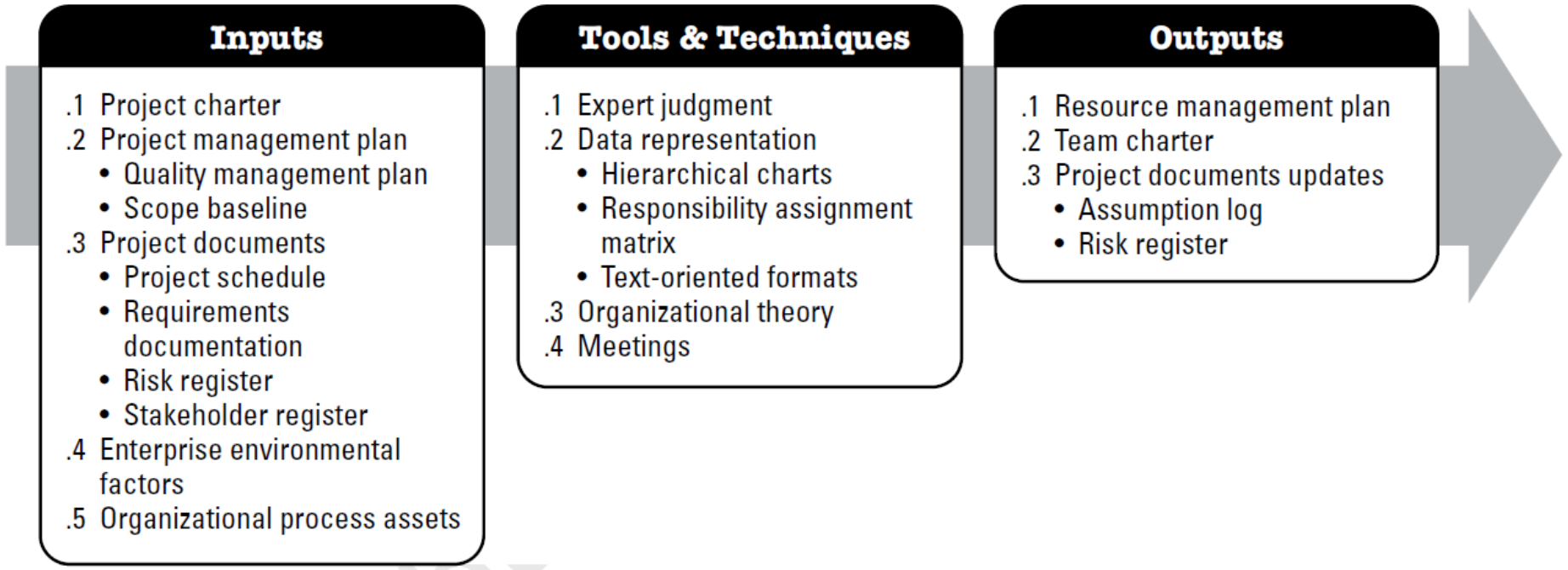
Resource Management

1. **Plan Resource Management**
2. Estimate Activity Resources
3. Acquire Resources
4. Develop Team
5. Manage Team
6. Control Resources



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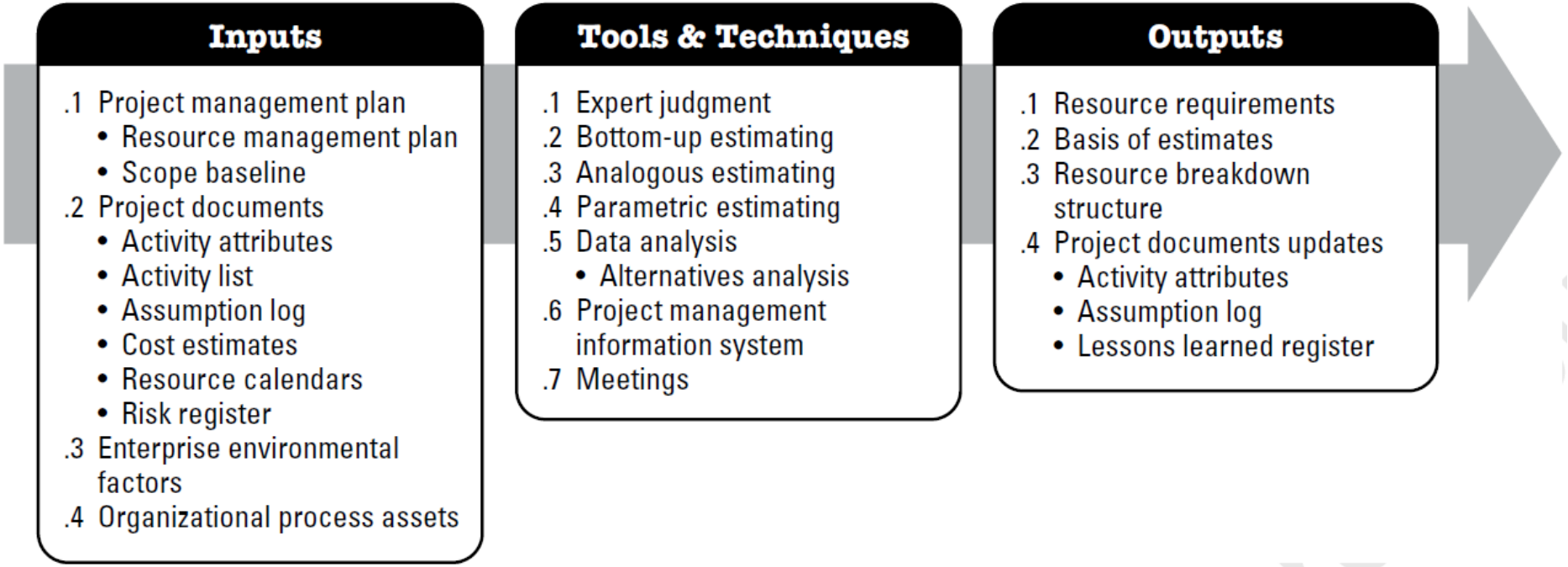

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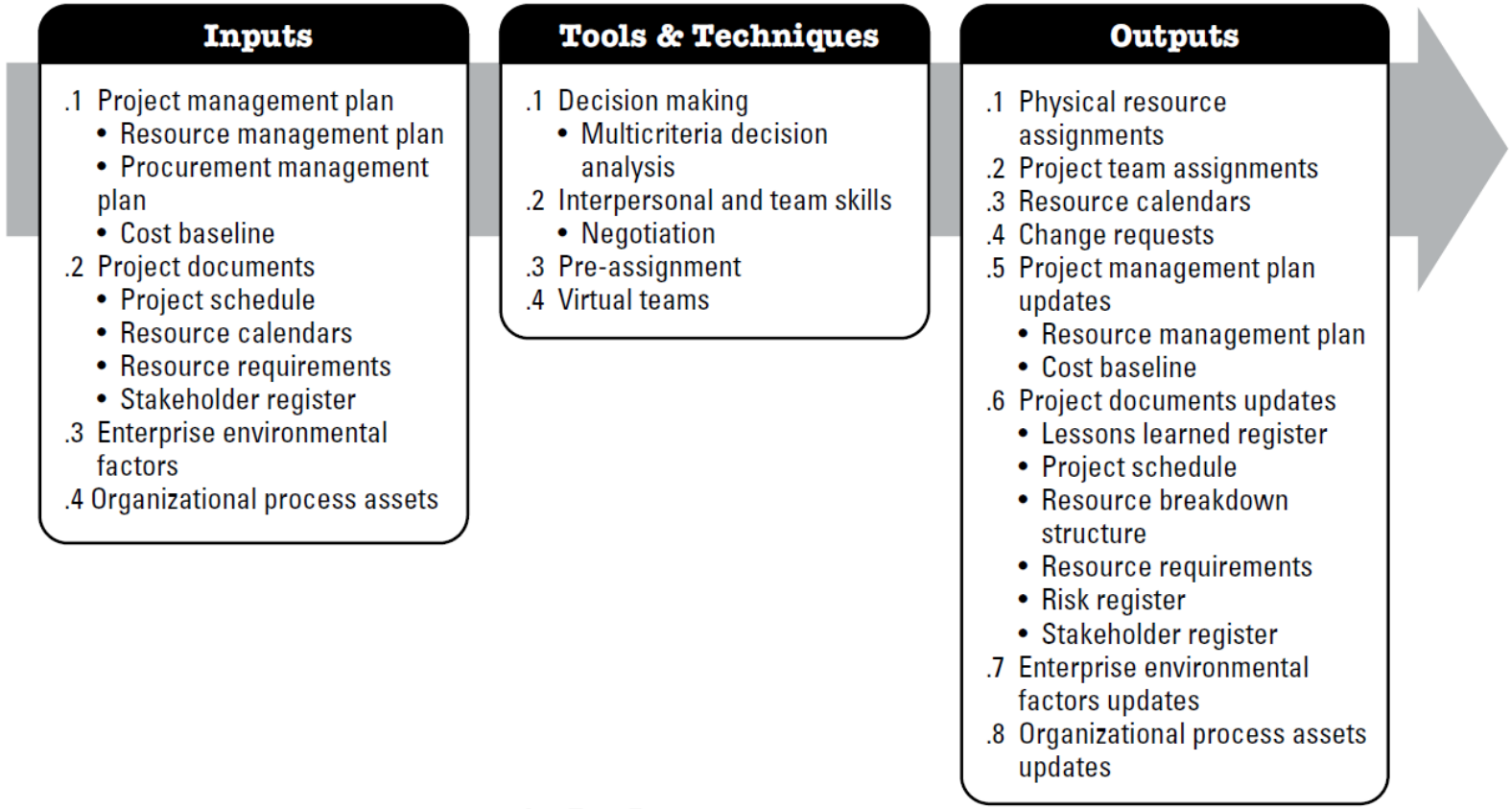

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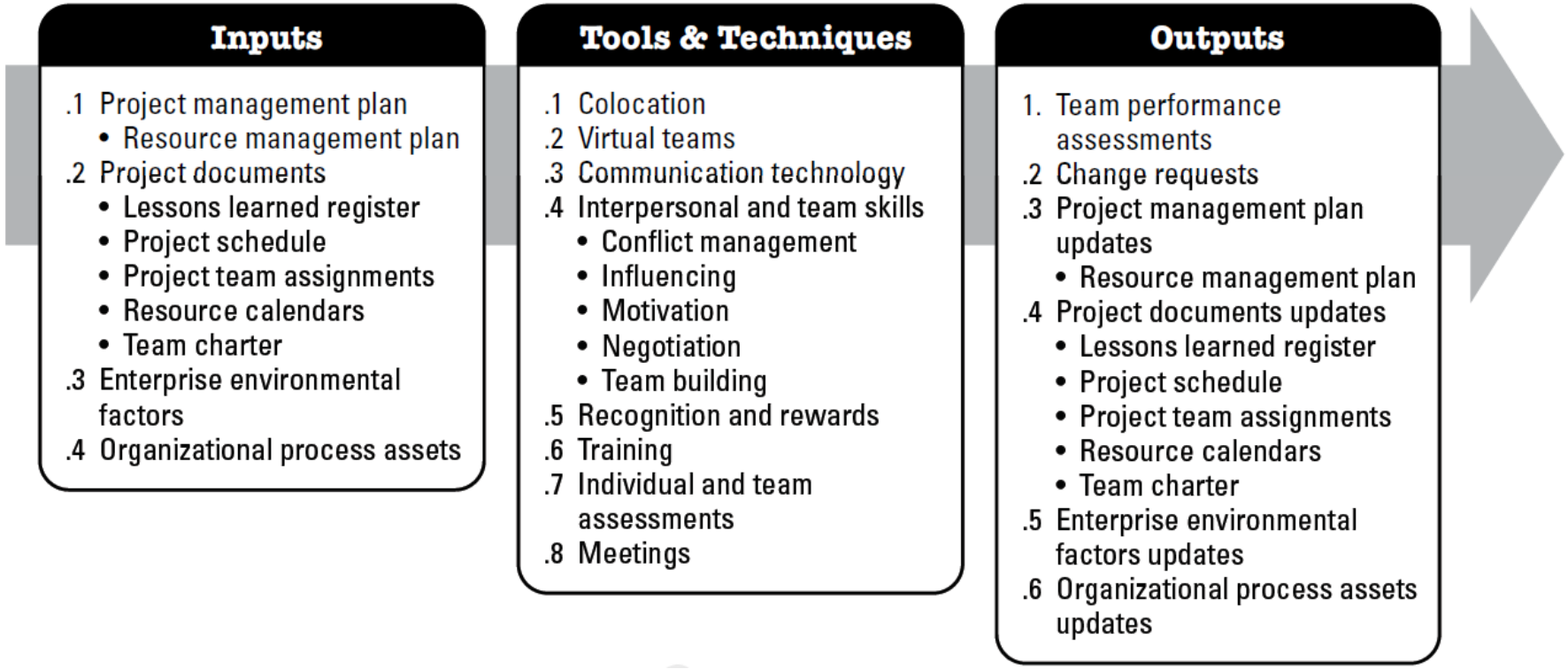

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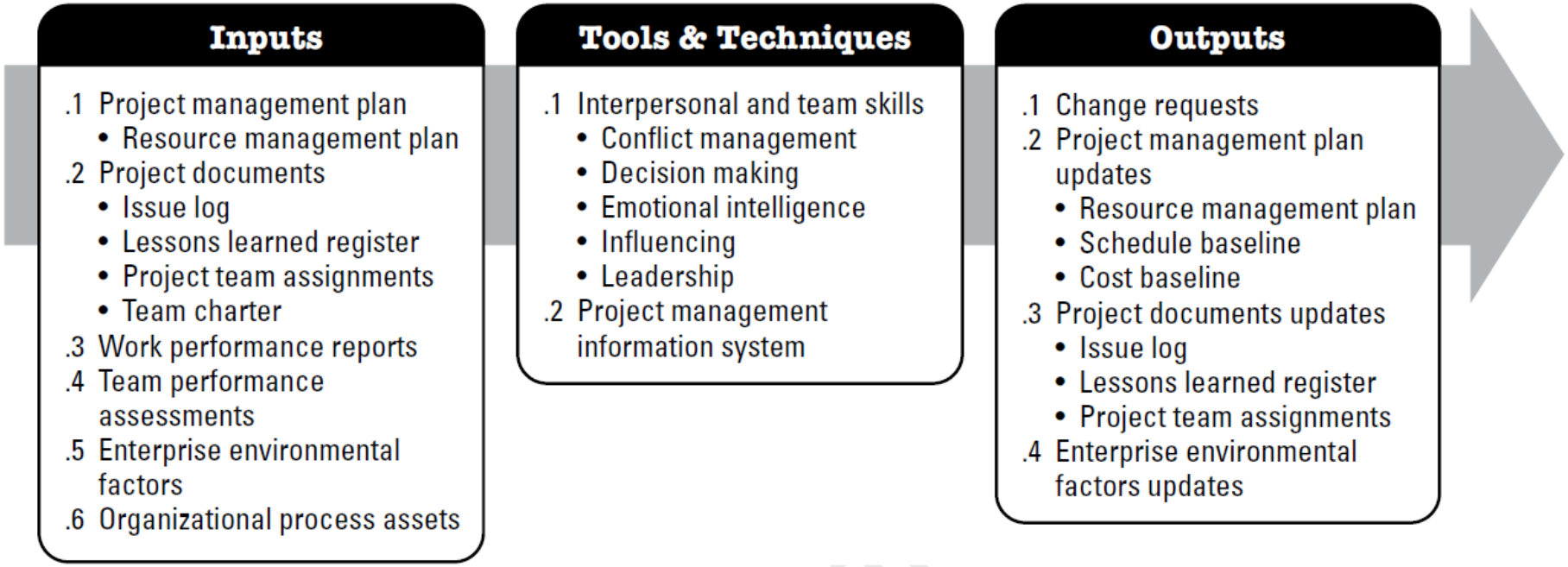

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Inputs

.1 Project management plan
- Resource management plan

.2 Project documents
- Issue log
- Lessons learned register
- Physical resource assignments
- Project schedule
- Resource breakdown structure
- Resource requirements
- Risk register

.3 Work performance data

.4 Agreements

.5 Organizational process assets

Tools & Techniques

.1 Data analysis
- Alternatives analysis
- Cost-benefit analysis
- Performance reviews
- Trend analysis

.2 Problem solving

.3 Interpersonal and team skills
- Negotiation
- Influencing

.4 Project management information system

Outputs

.1 Work performance information

.2 Change requests

.3 Project management plan updates
- Resource management plan
- Schedule baseline
- Cost baseline

.4 Project documents updates
- Assumption log
- Issue log
- Lessons learned register
- Physical resource assignments
- Resource breakdown structure
- Risk register

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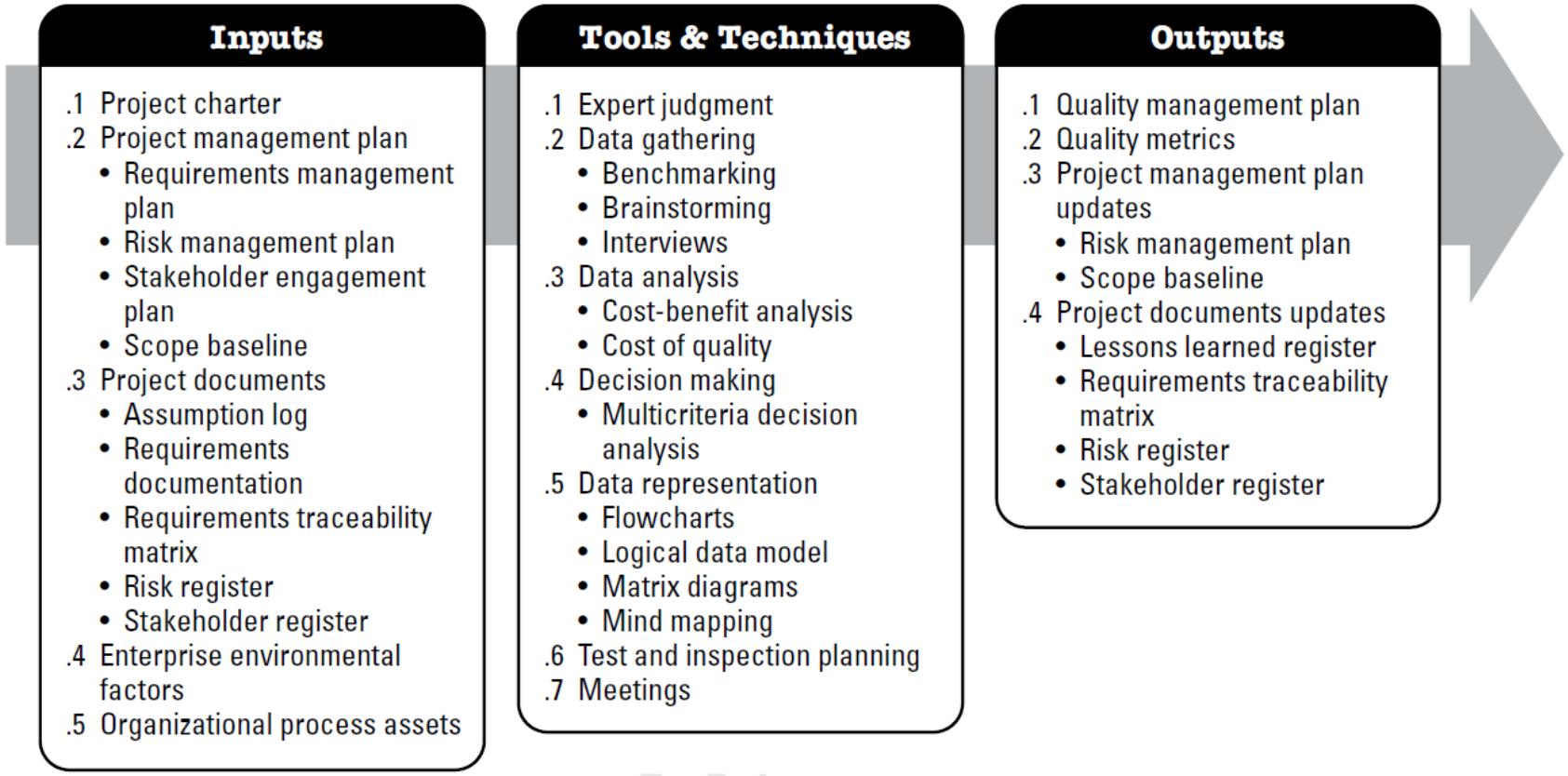
Quality Management

1. **Plan Quality**
2. Manage Quality
3. Control Quality



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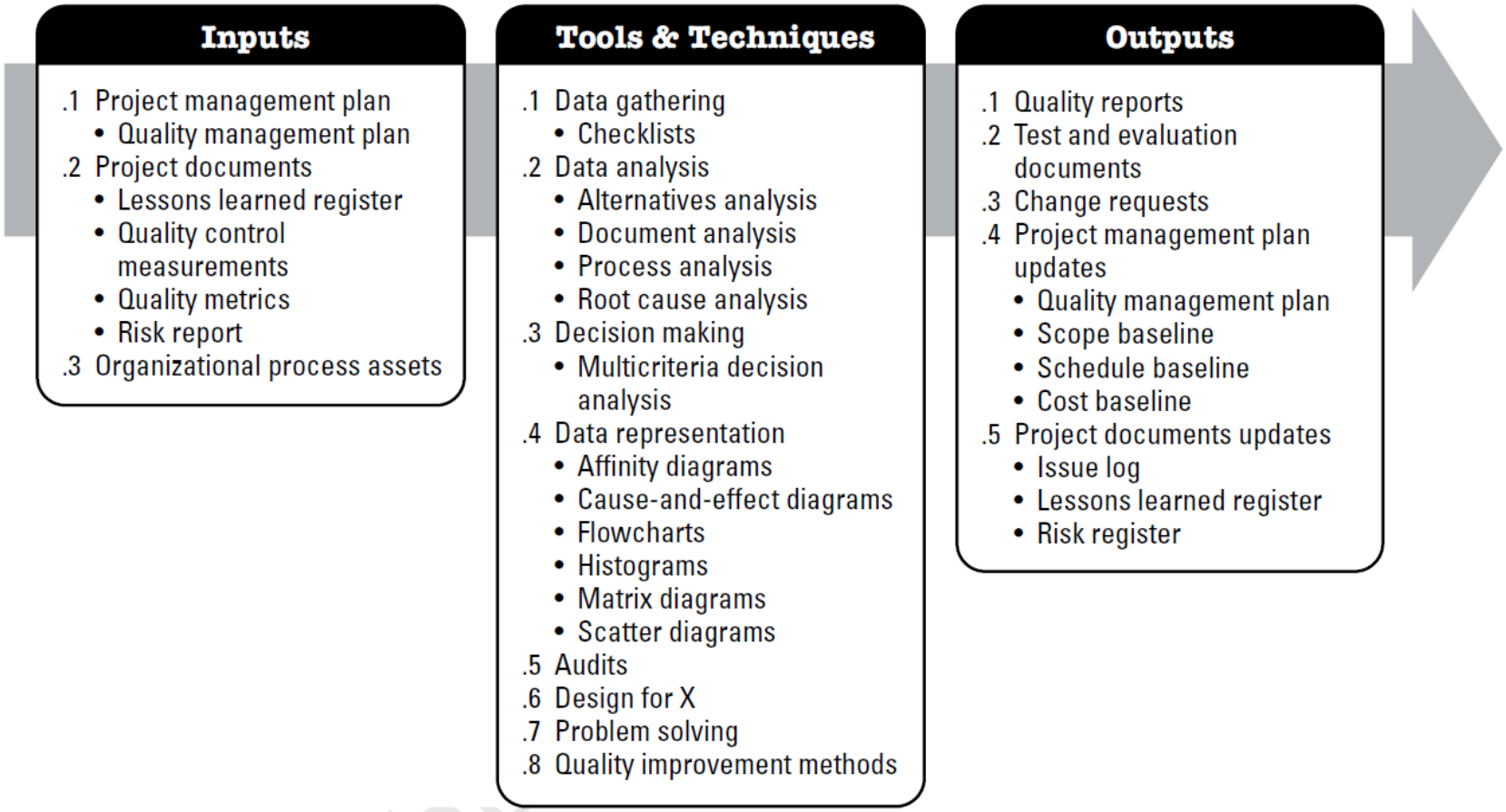
Quality Management

1. Plan Quality
2. **Manage Quality**
3. Control Quality



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Quality Management

1 Plan Quality

2 Manage Quality

3 Control Quality

Inputs	Tools & Techniques	Outputs
.1 Project management plan • Quality management plan .2 Project documents • Lessons learned register • Quality metrics • Test and evaluation documents .3 Approved change requests .4 Deliverables .5 Work performance data .6 Enterprise environmental factors .7 Organizational process assets	.1 Data gathering • Checklists • Check sheets • Statistical sampling • Questionnaires and surveys .2 Data analysis • Performance reviews • Root cause analysis .3 Inspection .4 Testing/product evaluations .5 Data representation • Cause-and-effect diagrams • Control charts • Histogram • Scatter diagrams .6 Meetings	.1 Quality control measurements .2 Verified deliverables .3 Work performance information .4 Change requests .5 Project management plan updates • Quality management plan .6 Project documents updates • Issue log • Lessons learned register • Risk register • Test and evaluation documents

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Cost Management

1

Unit of Measurement

Each unit used in Measurements

2

Level of Precision

Rounding activity cost estimates Up or Down

3

Level of Accuracy

Acceptable Range e.g. +/- 5%

4

Control Thresholds

Variance Thresholds (Deviations from the baseline)

5

Performance Measurements

Earned Value Management

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Artificial Intelligence for Projects

Applications & Use Cases

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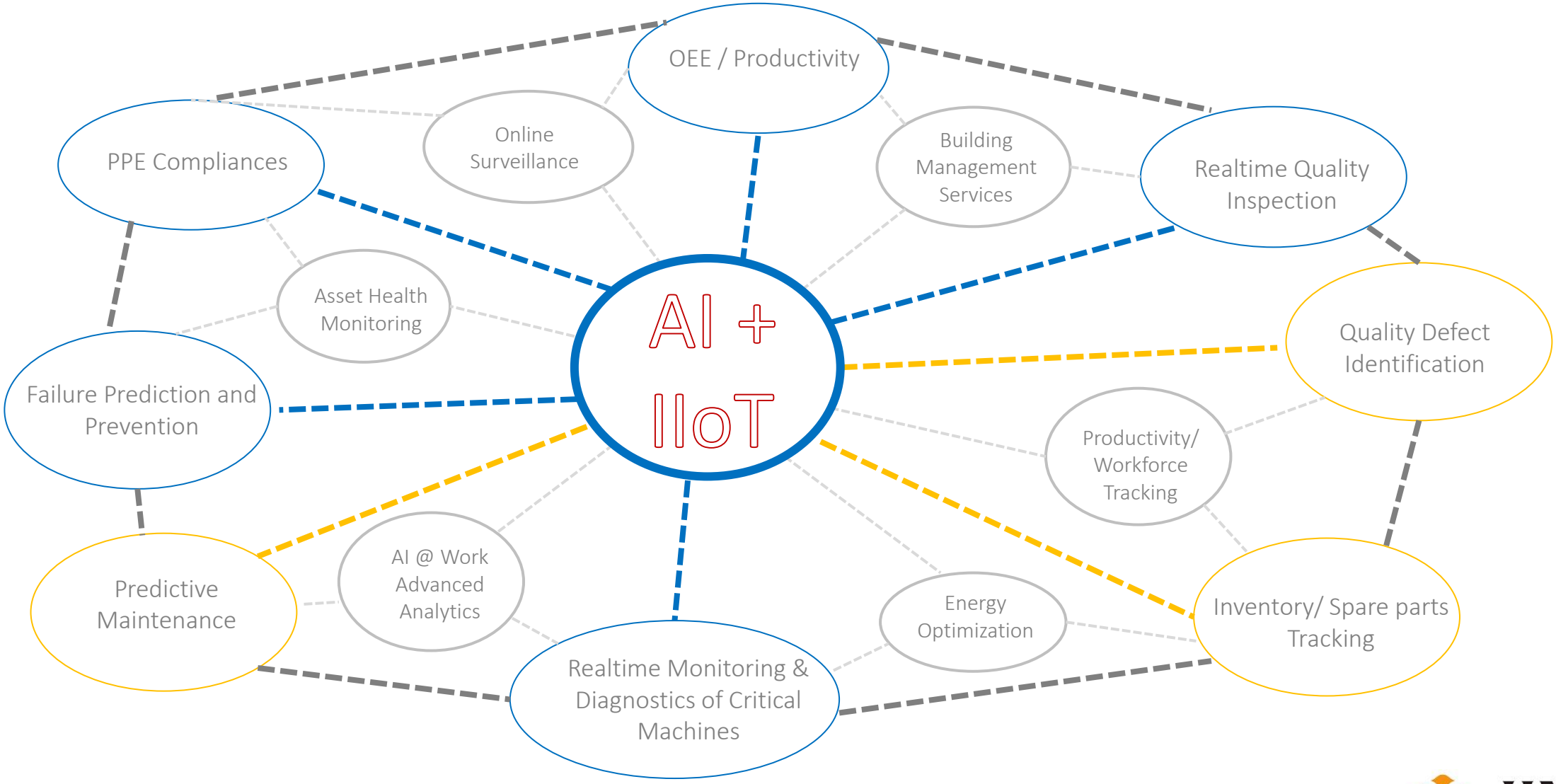
4th Industrial Revolution & AI



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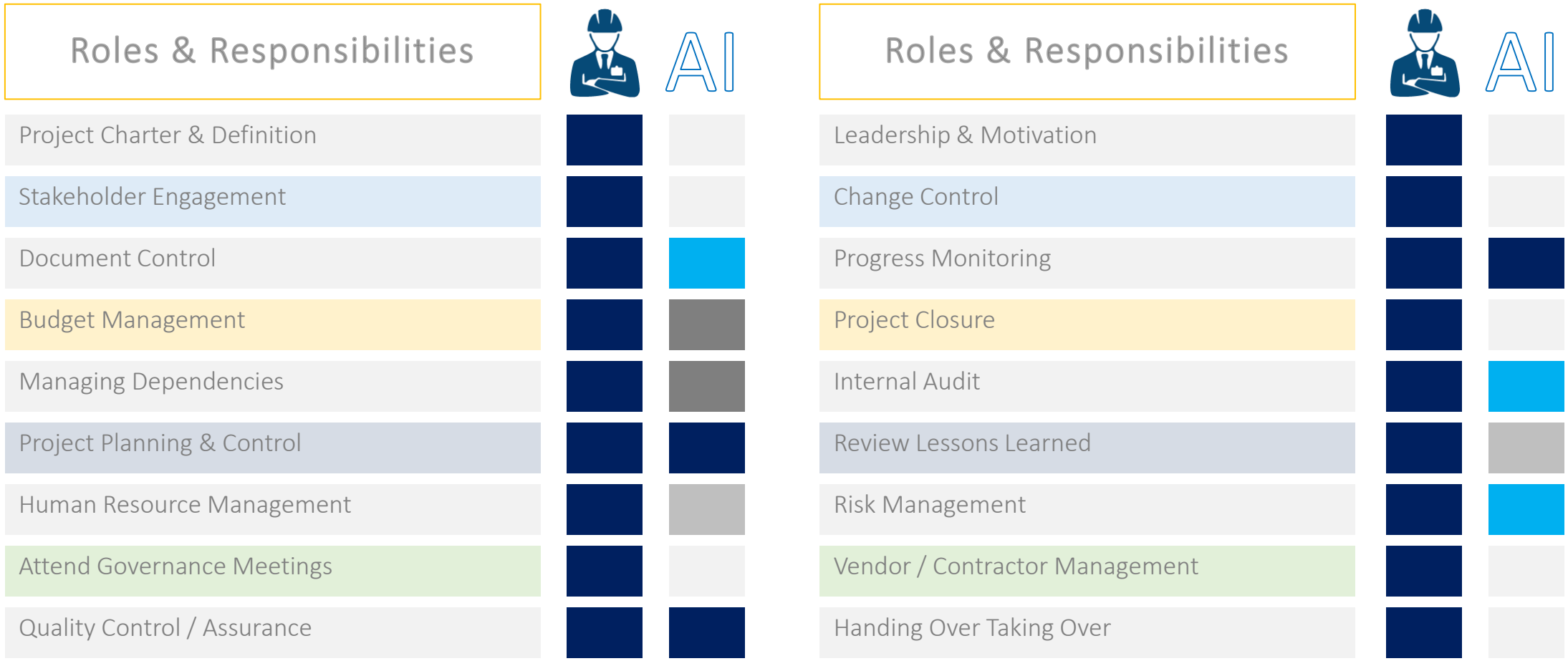
AI Vs Project Manager



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Artificial Intelligence as it is

Concepts

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Artificial Intelligence

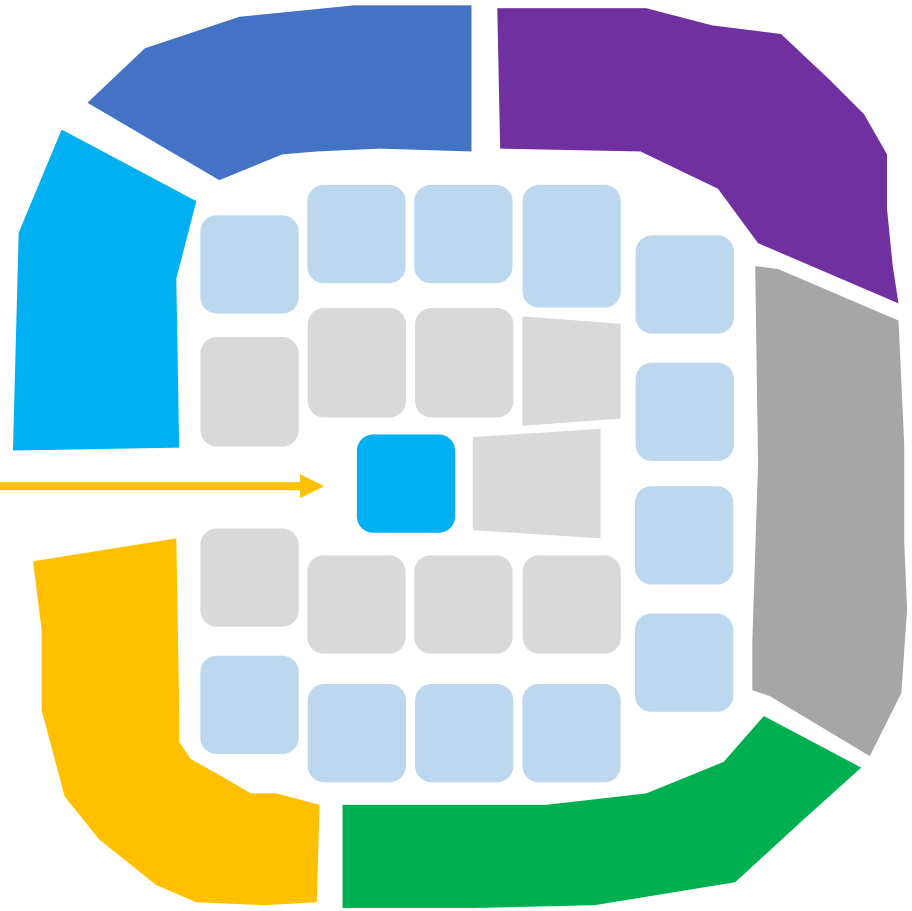
AI	AI brings in the power of human intelligence to perform millions of tasks without any physical presence of humans. AI is an ensemble of various techniques aimed to solve problems which otherwise require human intelligence like pattern recognition, learning, generalization etc. by embedding intelligence in machines through advance coding and training
ANI	Performs one cognition task with highest possible accuracy
AGI	It is a set of programs and services capable of producing real cognition on the input data feed
ML/DL	"Machine Learning" is a subset of AI that uses statistical techniques and Deep Neural Networks to give computers the ability to learn from data without being explicitly programmed
Learning	"Learning" refers to the process of internal adjustments within the structure of the program, to deliver the best possible outcomes, achieved through the set of algorithms based on the newly ingested data

AI Lifecycle

Business Objectives → Use Cases

Evaluation → Prioritization → Selection

Success → Implementation



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Key Roles

OS & Programming Language

Data Base (SQL & NoSQL)

ETL & Data Warehousing

Big Data & Realtime Frameworks

Cloud

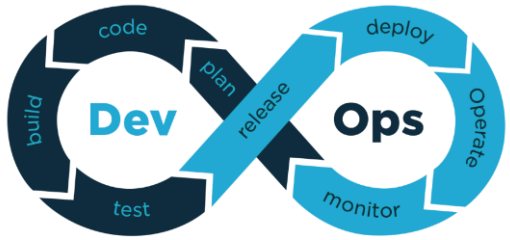
Data Engineer

Brain Behind the solution

R&D

Execution

Data Scientist



Owner of CI/CD Pipeline

Maintenance of Models & Services

DevOps Engineer

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Benefits of AI

1

Automation of repetitive tasks thus reducing the chances of human error and getting the accuracy of machines.

This provides projects managers ample time to spend on problem solving rather than working of mechanical issues.

2

Optimization of Resource Scheduling and allocation

(use historical data to calculate time to perform specific task, specific resource requirements to deliver the task, etc.)

Leveraging the historical data to generate accurate predictions for matter of interest.

3

Assessment of Risk based on the project dynamics to absorb the effect of key influencers such as scope, Resources, and Budget.

4

Faster and accurate decision making through real time notifications and updates.

5

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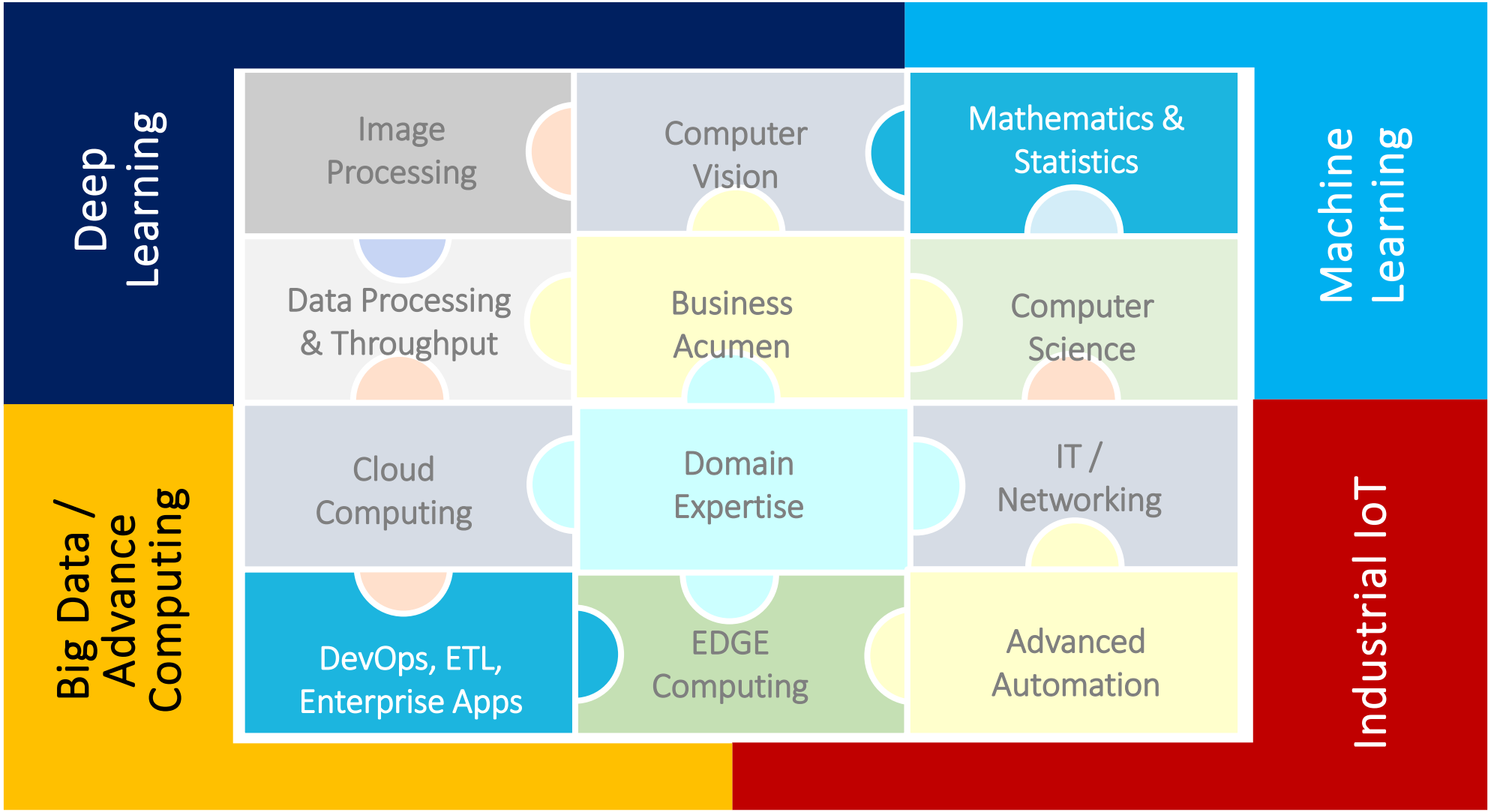
Data Science



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Data Scientist

Data science is a multi-disciplinary field that uses scientific methods, processes, algorithms and systems to extract knowledge and insights from structured and unstructured data.

Business Case

Analytics Use Cases

- Productivity, Quality, Availability - OEE
- Sentiment Analysis
- Market Basket Analysis, Recommender Algos
- Upselling & Cross Selling
- Predictive Maintenance
- Fraud Detection & Risk Modeling
- Behavioral Analytics
- Next Best Action
- Churn Analysis
- Pattern Identification & Recognition

Solution Approach

Data Ingestion & Examination
Data Quality
Data Sufficiency
Connectivity

Data Preparation & Exploration
Data Cleansing
Visualization
EDA
Reports & Graphs

Model(s)/Algorithm
Development
Validation
Testing
Deployment

CI / CD
Version Control
Maintenance
Monitoring
Feedback / Integration

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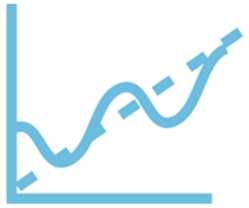
Algorithms

Tree Based / Ensemble

CART
ID3
Random Forest
Bagging
Boosting
AdaBoost
C4.5 / C5.0
CHAID
Decision Stump / M5
Weighted Average (Blending)
Stacking
GBM
GBRT

Time-Series

ARMA
ARIMA
SARIMA
SARIMAX
Holt Winters

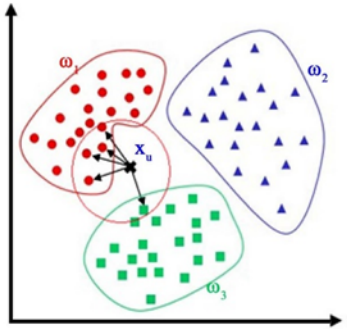


Classification

AODE
BBN
BN
LARS
Naïve Bayes
Gaussian Naïve Bayes
Multinomial Naïve Bayes

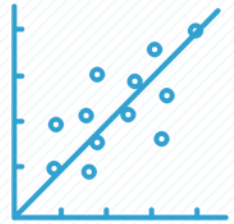
Clustering

k-means
kNN
EM
LVQ
SOM
Ranking SVM
one class SVM
Hierarchical Clustering
Locally Weighted Learning
Affinity propagation



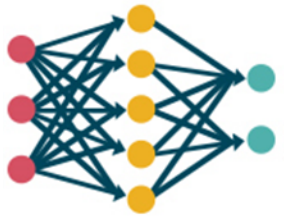
Regression

Logistic Regression
Linear Regression
Ridge Regression
LASSO
Elastic Net
LARS



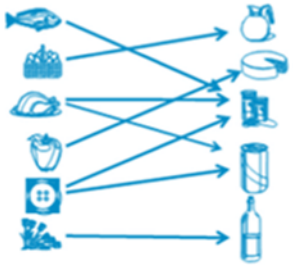
Neural Nets

LSTM
MLP
Back Propagation
Hopfield Network
RBFN
Stochastic Gradient Descent



ARM

Collaborative-Filtering (CF)
Apriori Algorithm
ECLAT



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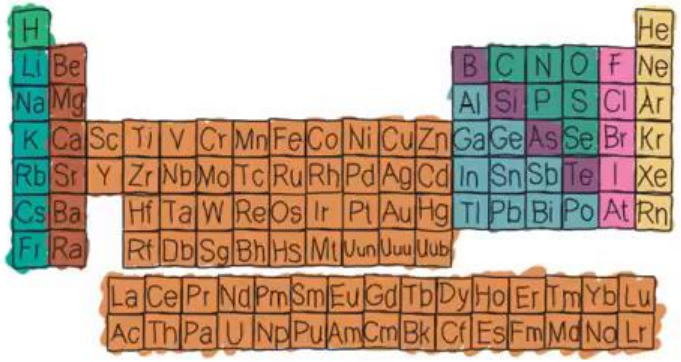
DevOps Explained



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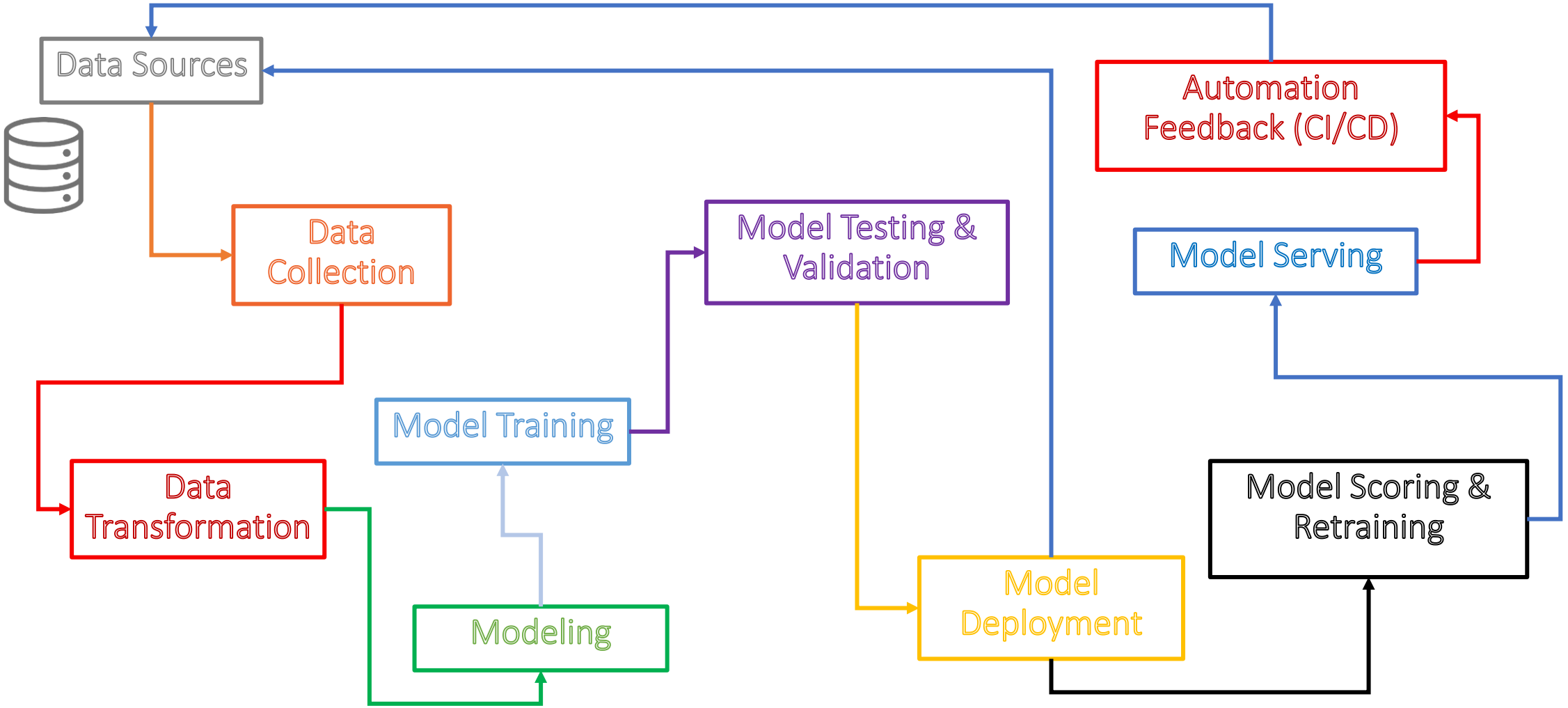
Building from Scratch



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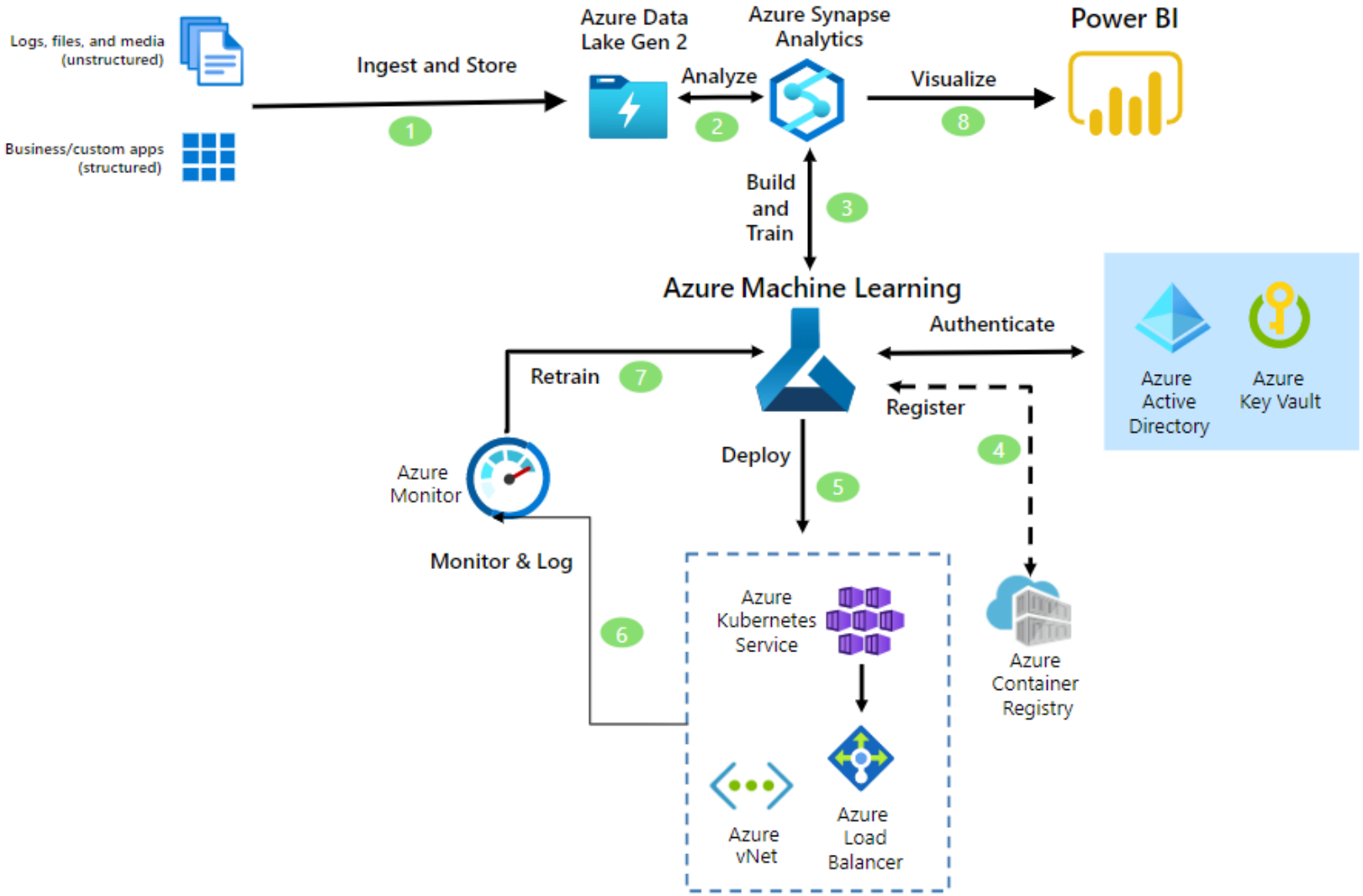
Sample Architecture - Azure



Source: Azure

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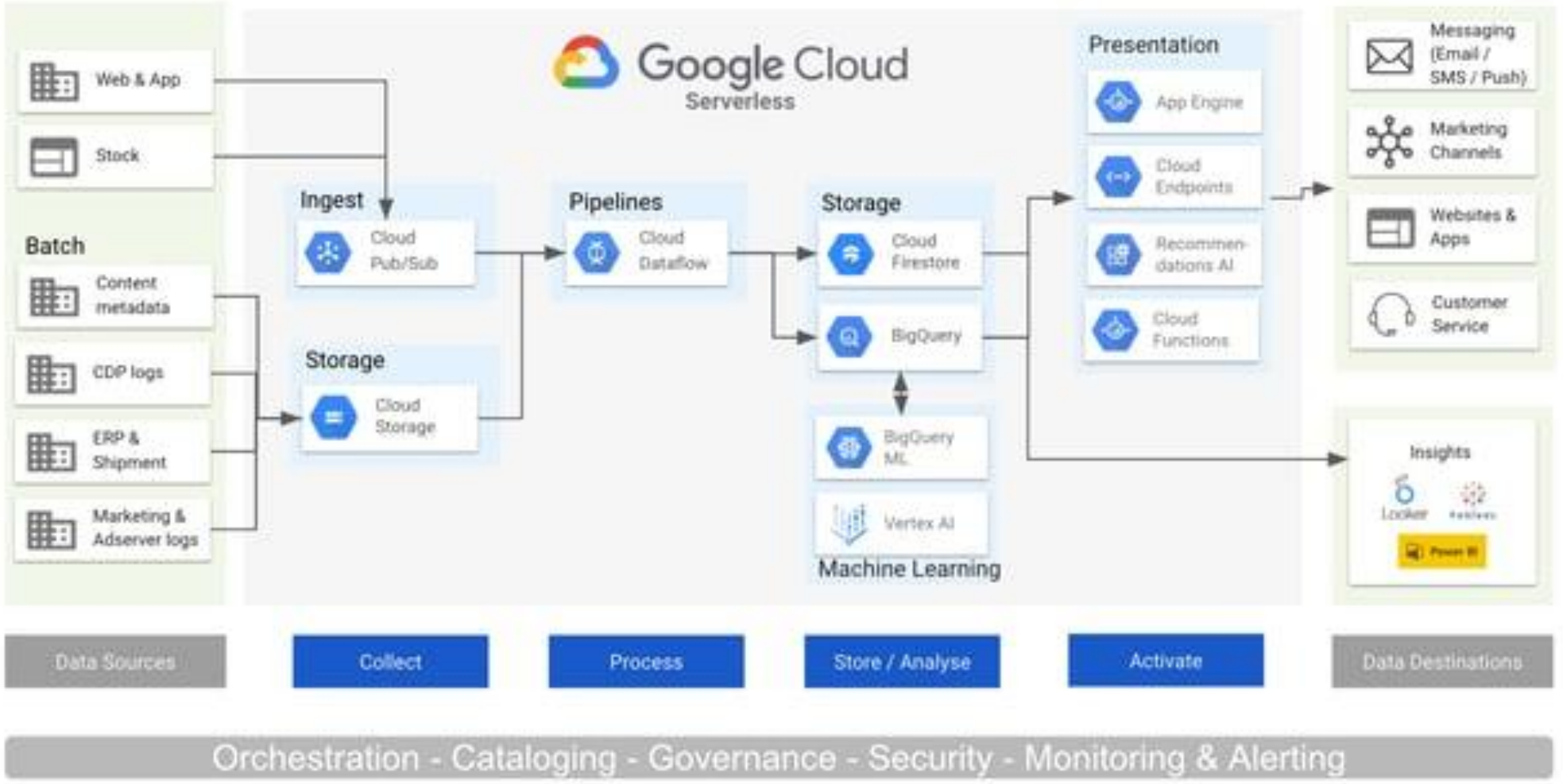
Sample Architecture - GCP



Source: https://www.crystalloids.com/insights/3-best-practices-to-design-cdp-architectures-on-google-cloud-platform

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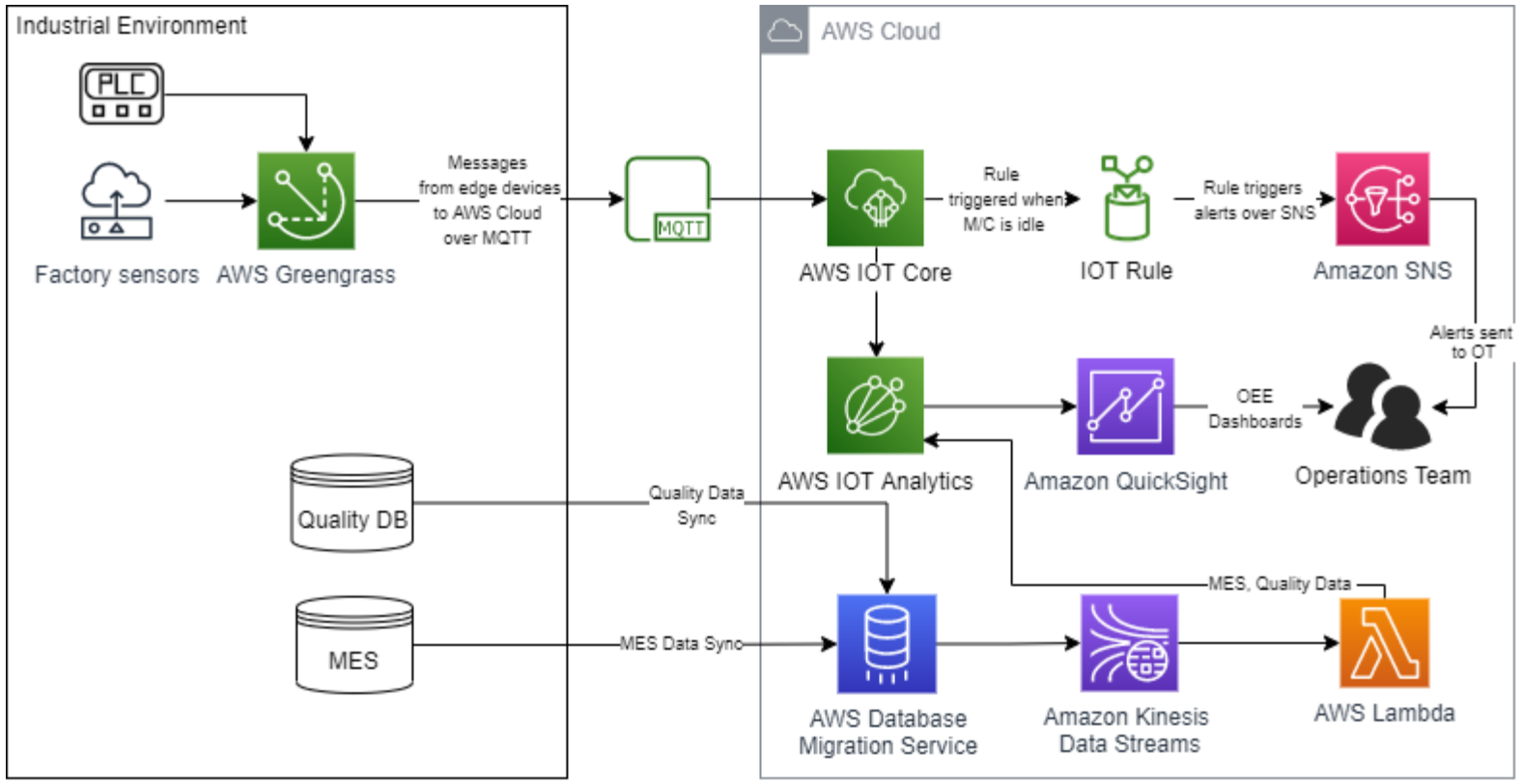
Sample Architecture - AWS



Source: https://aws.amazon.com/blogs/architecture/field-notes-tracking-overall-equipment-effectiveness-with-aws-iot-analytics-and-amazon-quicksight/

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Discussion on Use Cases

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Thank You…

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