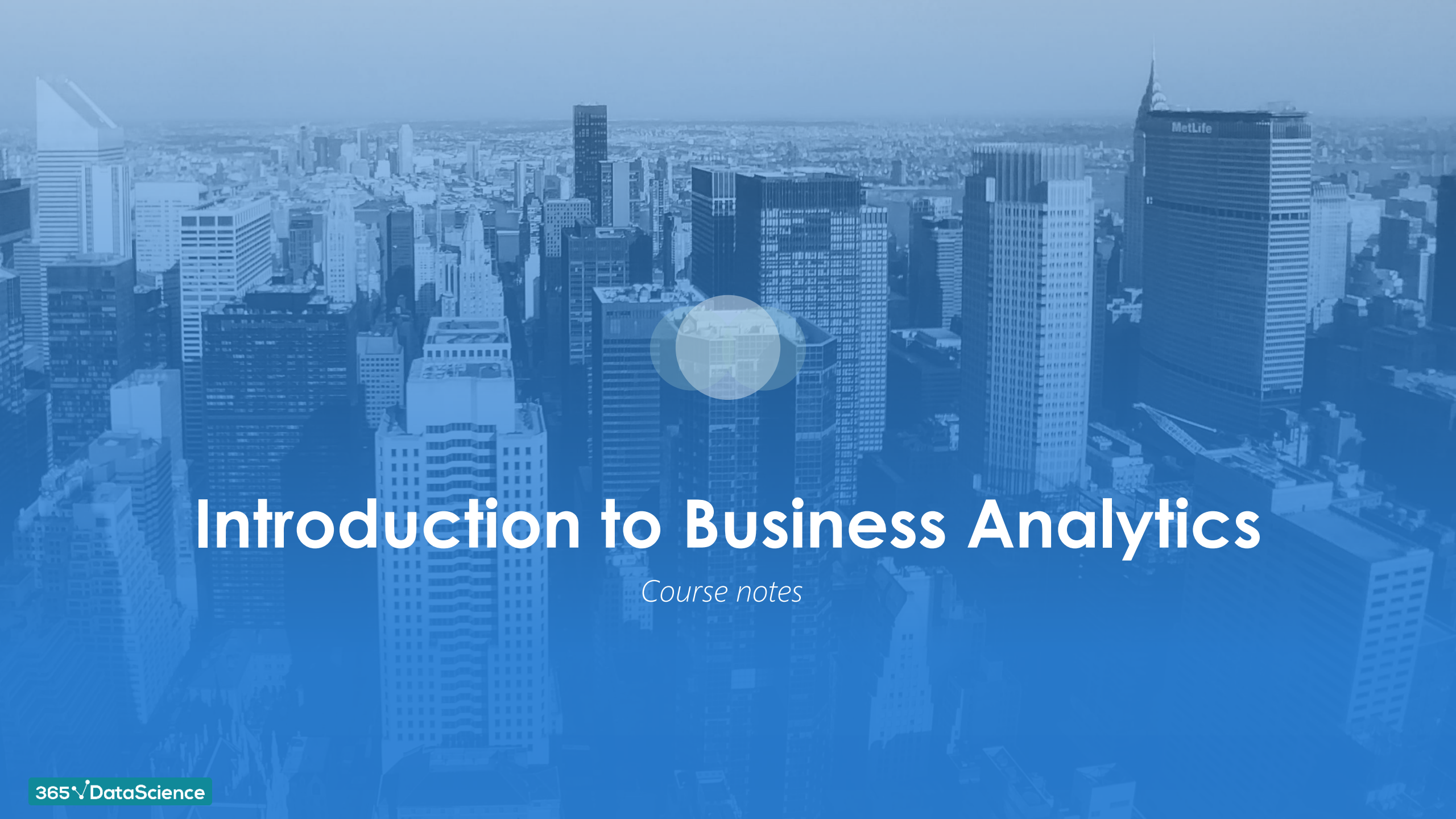


Introduction to Business Analytics

Course notes

365 DataScience

Managing expectations of different stakeholder groups

Different stakeholder groups and their expectations

Shareholders
- ✓ Maximize future profits

Employees
- ✓ Income
- ✓ Growth opportunities

Internal stakeholders

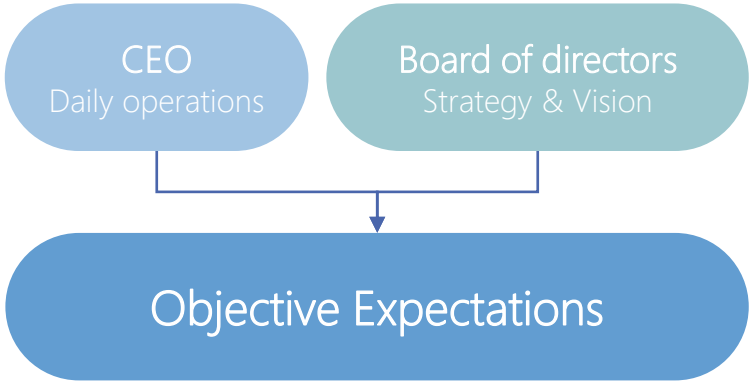
External stakeholders

Suppliers
- ✓ Be paid soon
- ✓ Earn more business

Customers
- ✓ Best product
- ✓ Cheap price

Authorities
- ✓ Job creation
- ✓ Tax collection

The CEO and the Board of Directors are collectively best qualified to set objective non-conflicting expectations for the company



We will focus on Objective Expectations

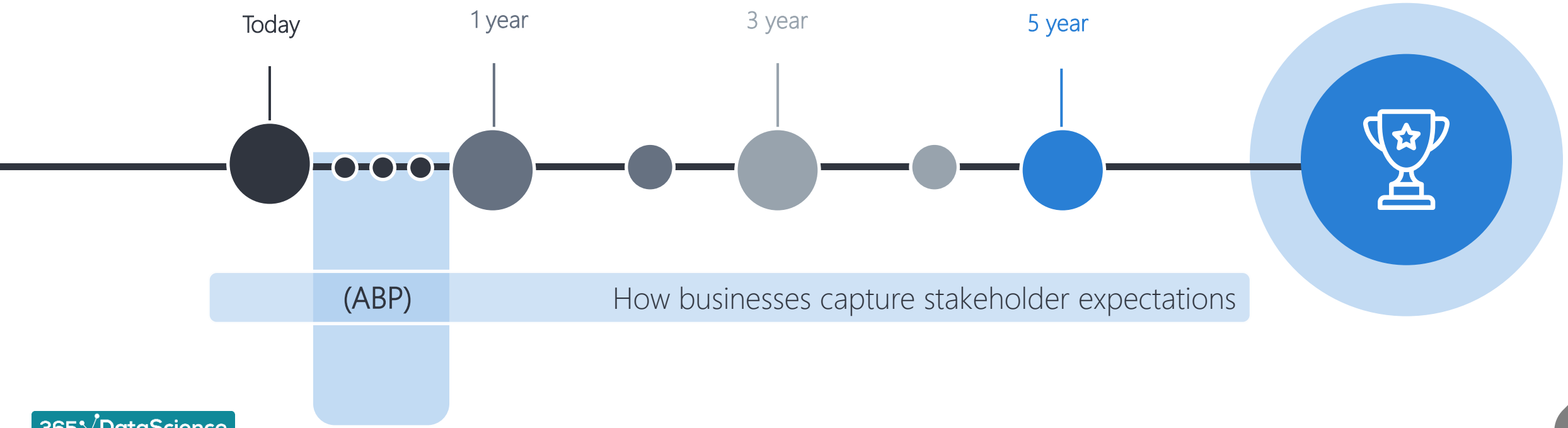
Long Range Plan And Annual Business Plan

Long Range Plan (LRP)

- ✓ A prediction of how the business would evolve in the next 3-5 years

Annual Business Plan (ABP)

- ✓ Same methods of preparation as long-range plan but much more detail
- ✓ Then track and see how you are progressing against expectations
- ✓ Compare actuals vs budget and allow for corrective actions on time



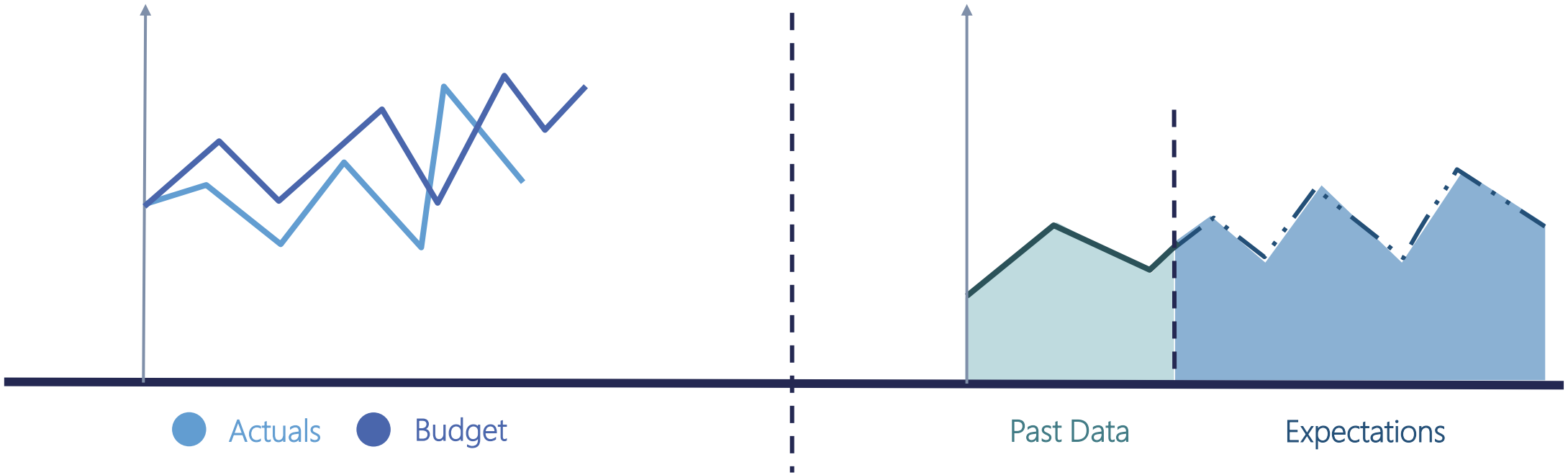
Analysis vs Analytics

Analysis:

The investigation of
"Why something happened in the past?"

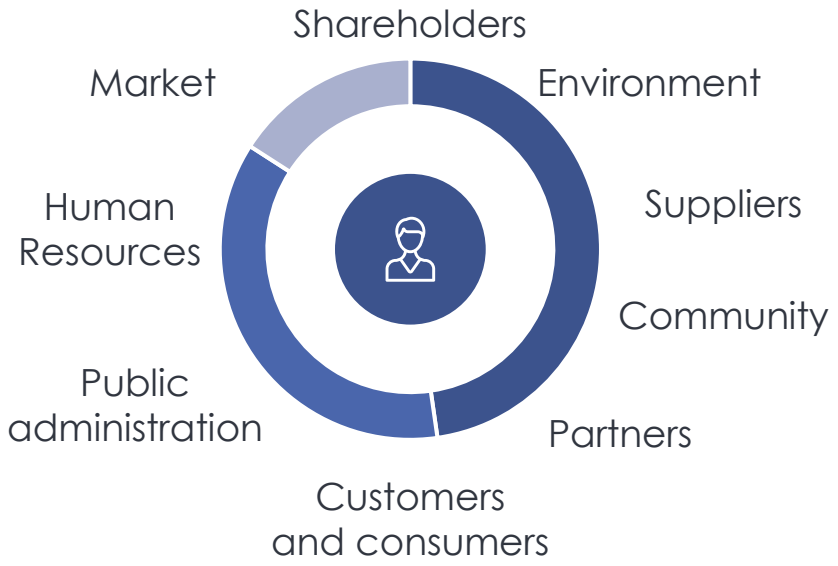
Analytics:

When we prepare the Long Range Plan and the Annual Business Plan, we need to predict what will happen in the future. Consider from an end-to-end process perspective to determine " What will happen?"



Stakeholders Mapping Exercise

In general, these are the main stakeholder groups for most companies.



Our goal is to study the expectations of stakeholder groups

Remember!

- ✓ Neglecting the expectations of even one stakeholder group can have a massive impact on profitability.
- ✓ The easiest and most effective way to understand the expectations of different stakeholder groups is by asking questions.
  - Ask "who", "what", "when", "where", "why" and "how" questions.
- ✓ The knowledge you will get from these interviews is the backbone on which you will proceed and start building the firm's business intelligence.

Business Intelligence

The idea of BI is to:

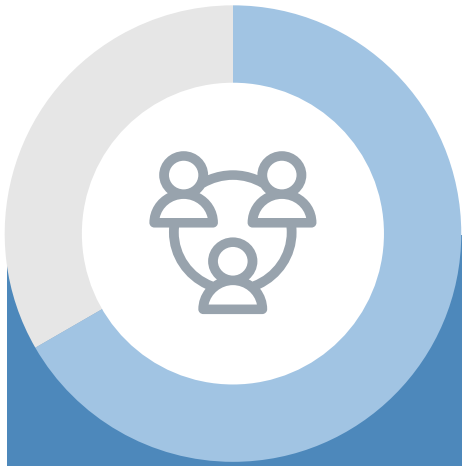
✓ Gain an accurate and deep understanding of a company's business

✓ Predict and prescribe the firm's performance.

QUALITATIVE ANALYSIS

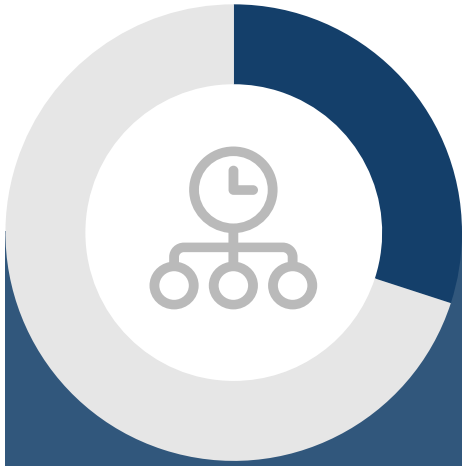
- ✓ Considers a firm's risks and opportunities
- ✓ Represents a diagnostic and descriptive analysis

QUANTITATIVE ANALYSIS



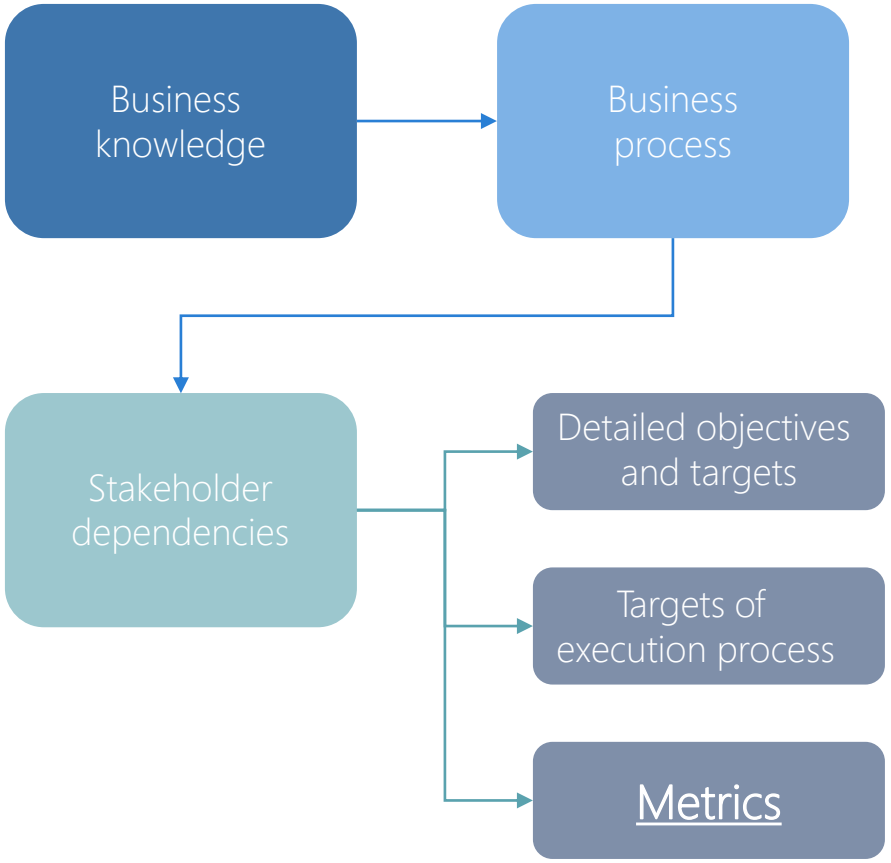
- ✓ Estimates the additional investments required and the impact of these investments on future sales (quantitative representation

ENTERPRISE PERFORMANCE MANAGEMENT



- ✓ highlights the underlying effectiveness and efficiency of your operations
- ✓ helps build business plan, strategy
- ✓ highlights risks and opportunities

End-to-end Process Mapping



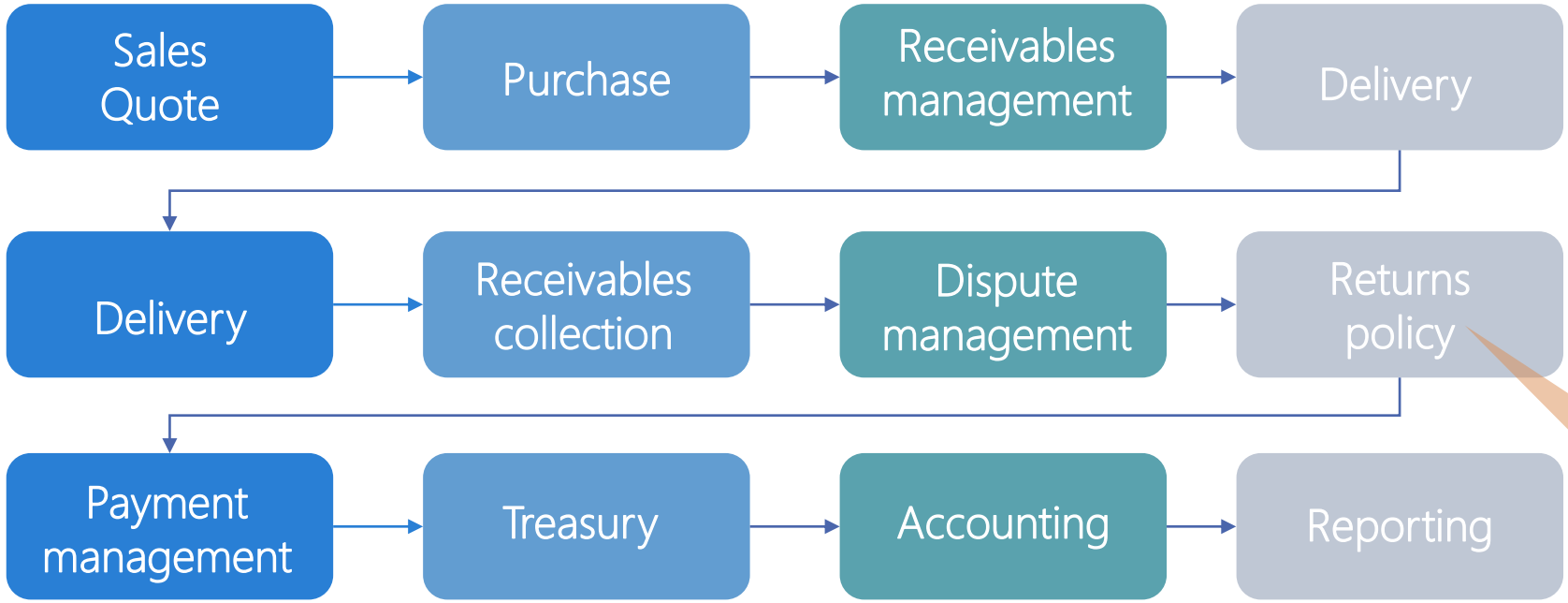
Metrics

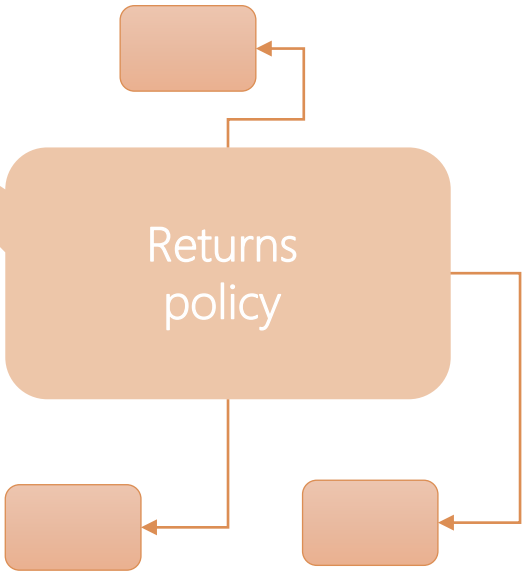
- ✓ help us track our performance under different aspects
- ✓ would enable us to evaluate whether the execution of a particular process or sub-process needs to be improved

It is important to introduce **metrics** that are **standard** for the industry

Benchmarking – the comparison of one company's performance against other firms operating in the same field

End-to-end Process Mapping





✓ Certain activities that are part of the same process sit with different departments

✓ Very often a single process consists of several sub-processes

Start → End-to-end perspective → Finish

✓ We do not consider functional roles, but we consider processes from beginning to end

Global process owners - Introduction

Process leaders

- ✓ Are responsible for an end-to-end process
- ✓ Act independently from any department
- ✓ Are placed to align the objectives of the different functional leads

✓ A Global Process lead is responsible for an end-to-end process spanning across different parts of the organisation.

Companies are organised around the following processes

Hire-to-Retire (H2R)

- ✓ This flow takes care of all the organizational aspects from the time a person is recruited in an organization until the employee retires

Order-to-Cash (O2C)

- ✓ A set of business processes that involve receiving and fulfilling customer orders

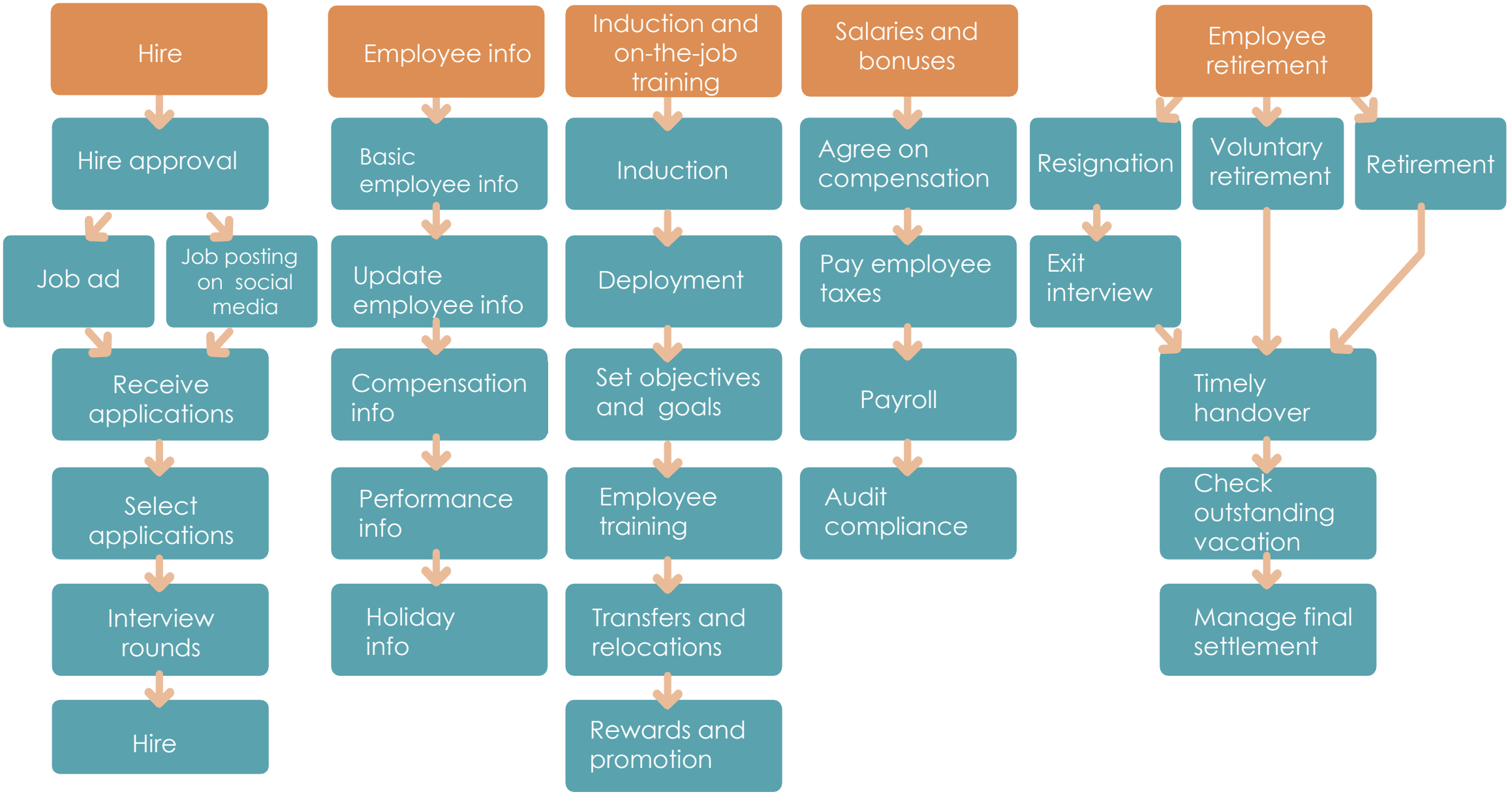
Record-to-Report (R2R)

- ✓ Provide strategic, financial and operational information about how a business is performing

Source-to-Pay (S2P)

- ✓ Obtain and manage the raw materials needed for manufacturing a product or providing a service

Hire to Retire (H2R)



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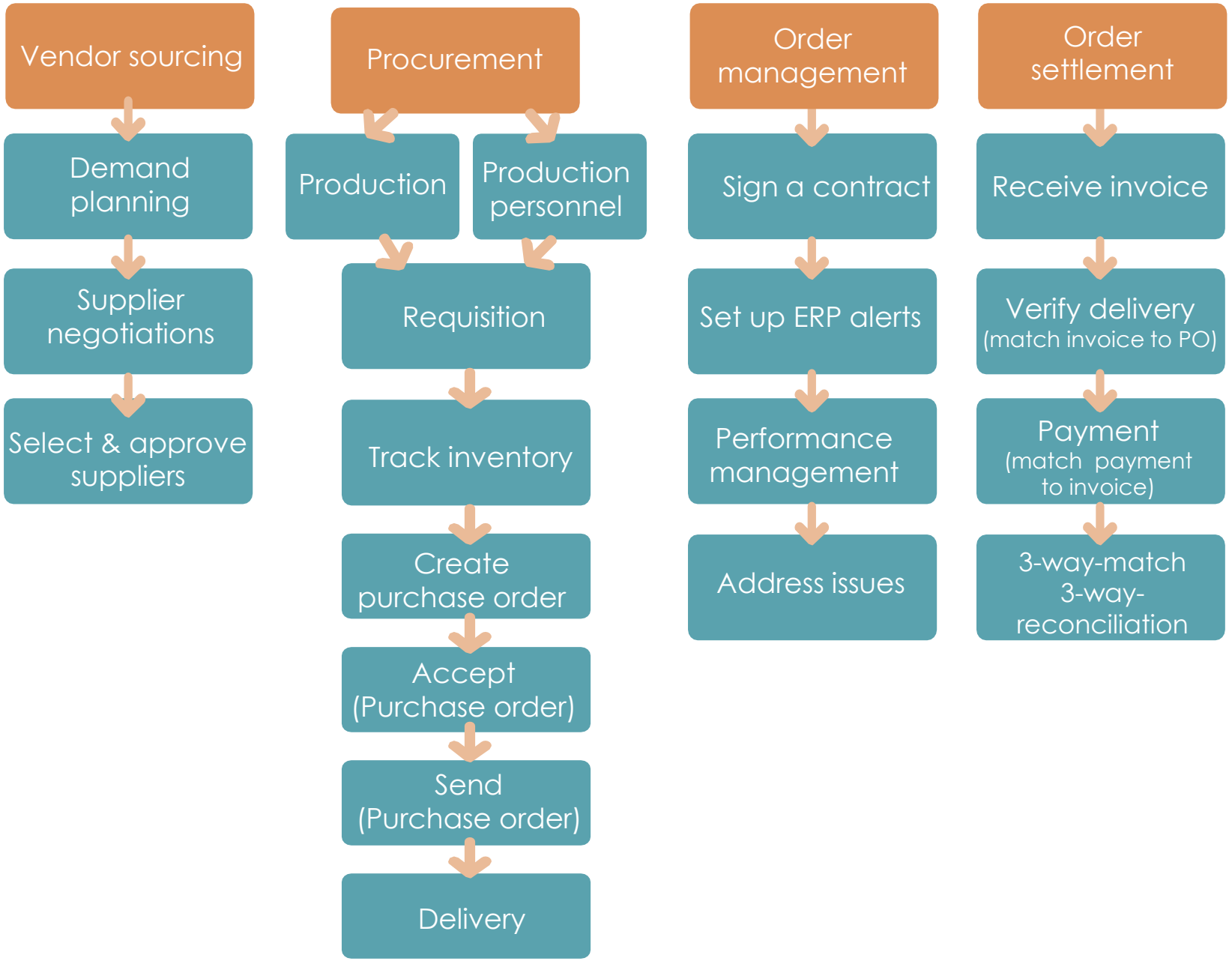
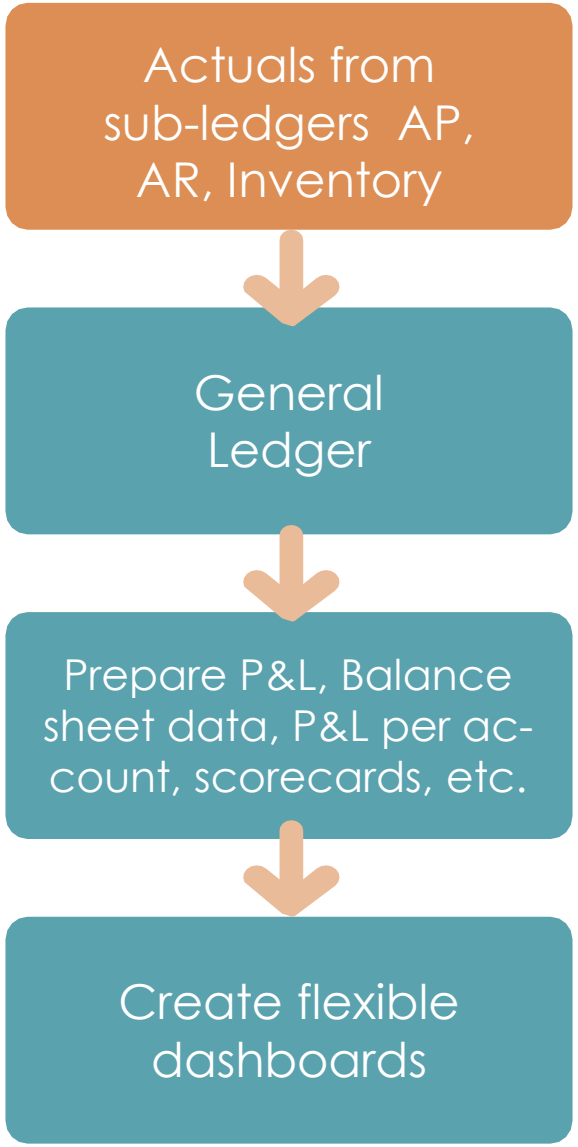
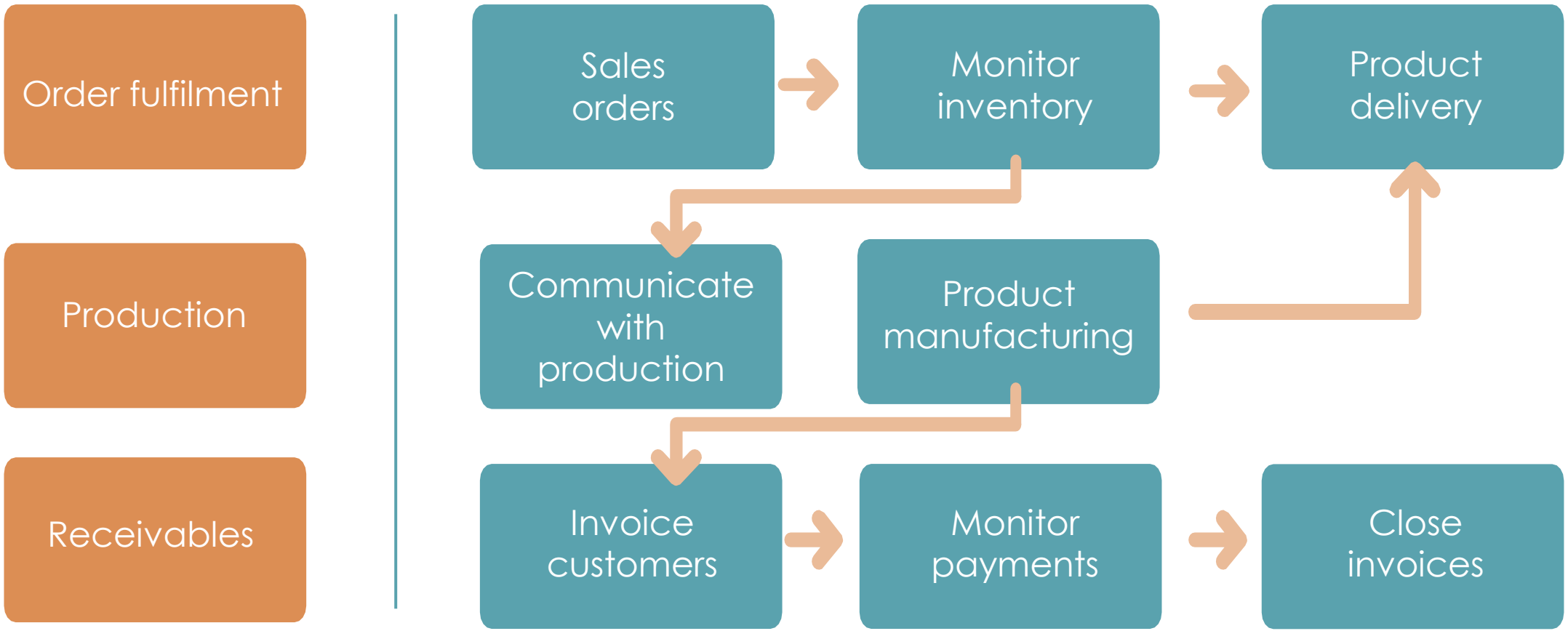
Source-to-Pay (S2P)



Record-to-Report (R2R)

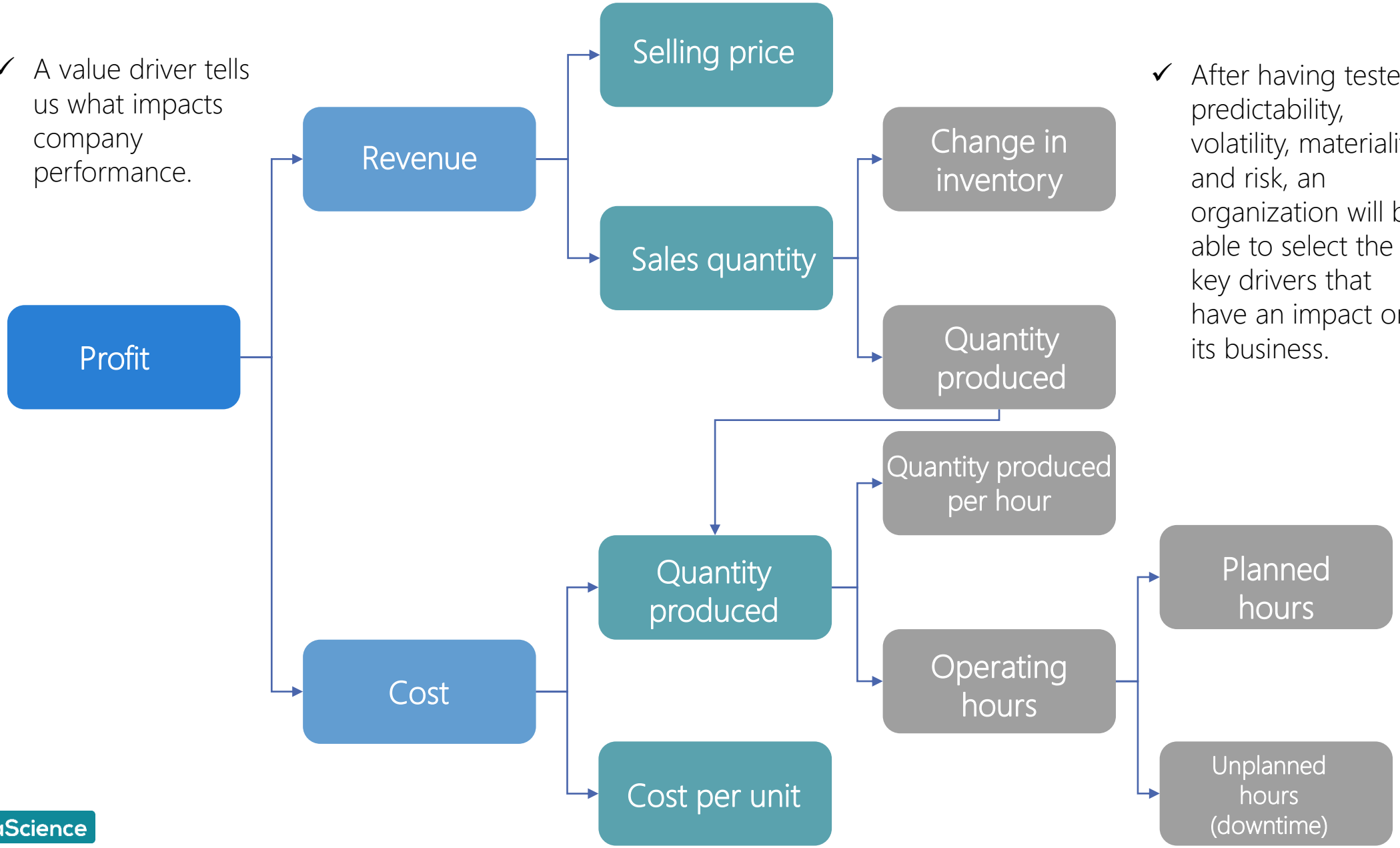


Order-to-Cash (O2C)



Value Driver Tree

- ✓ A value driver tells us what impacts company performance.



- ✓ After having tested predictability, volatility, materiality and risk, an organization will be able to select the key drivers that have an impact on its business.

What are metrics?

One of the key ingredients for Enterprise Performance Management is defining relevant metrics.

Well-designed metrics

- ✓ They are linked to a strategic objective
- ✓ They help a company translate execution into quantifiable terms
- ✓ They provide a quick insight into trends and are helpful for management to monitor performance and enact changes
- ✓ They help businesses measure the progress that has been made towards set goals.

✓ Metrics can be set to track companywide performance or can be designed to track the performance of a single department within the company.

Types of metrics

Metrics centered around Labor

- ✓ % of labor cost versus total cost, or % of Research & Development spend versus total revenue

Quality Metrics

- ✓ Based on a specific activity we want to track

Efficiency Metrics

- ✓ Show us how productive is our organisation

Cycle Time

- ✓ Indicates how much time does it take to run a process.

General Metrics

- ✓ Engagement score, attrition rate, and customer satisfaction score.

Metrics vs KPIs

KPIs

- ✓ primarily non-financial
- ✓ Analyse the past and the present and extract BI insights

KBIs

- ✓ primarily financial
- ✓ monitor, predict, understand and improve a company's financial performance

KRIs

- ✓ early sings of potential risks
- ✓ could be oriented towards internal and external risks

In addition

We can have certain **compliance metrics**, which are **set by external parties** (such as auditors) or government regulator agencies

REMEMBER!

Not all metrics are KPIs

All KPIs are metrics

$\neq$

Define Your Metrics

A metric needs to be:

Concise	Can the measure be easily and clearly explained?
Calculated	Can the measure be quantified?
Shareholders	Is the metric attainable?
Shareholders	Can the key performance indicator be aligned to an objective?
Employees	Can the results be controlled or significantly influenced?
Suppliers	Is the measure resistant to manipulation?
Customers	Can the KPI be cascaded throughout the organisation to drive behaviour?
Authorities	Is the KPI measured consistently throughout the organization?

Define Your Metrics

Lagging metrics → KRIs

Report what has happened

Leading → KPIs

Predict future events and tend to change ahead of that event

Dimensions are **categorical buckets** that can be used to **segment**, **filter**, or **group metrics**. Within each of these dimensions you have attributes that are **descriptive.**

Username → Attribute
Website's URL → Descriptive

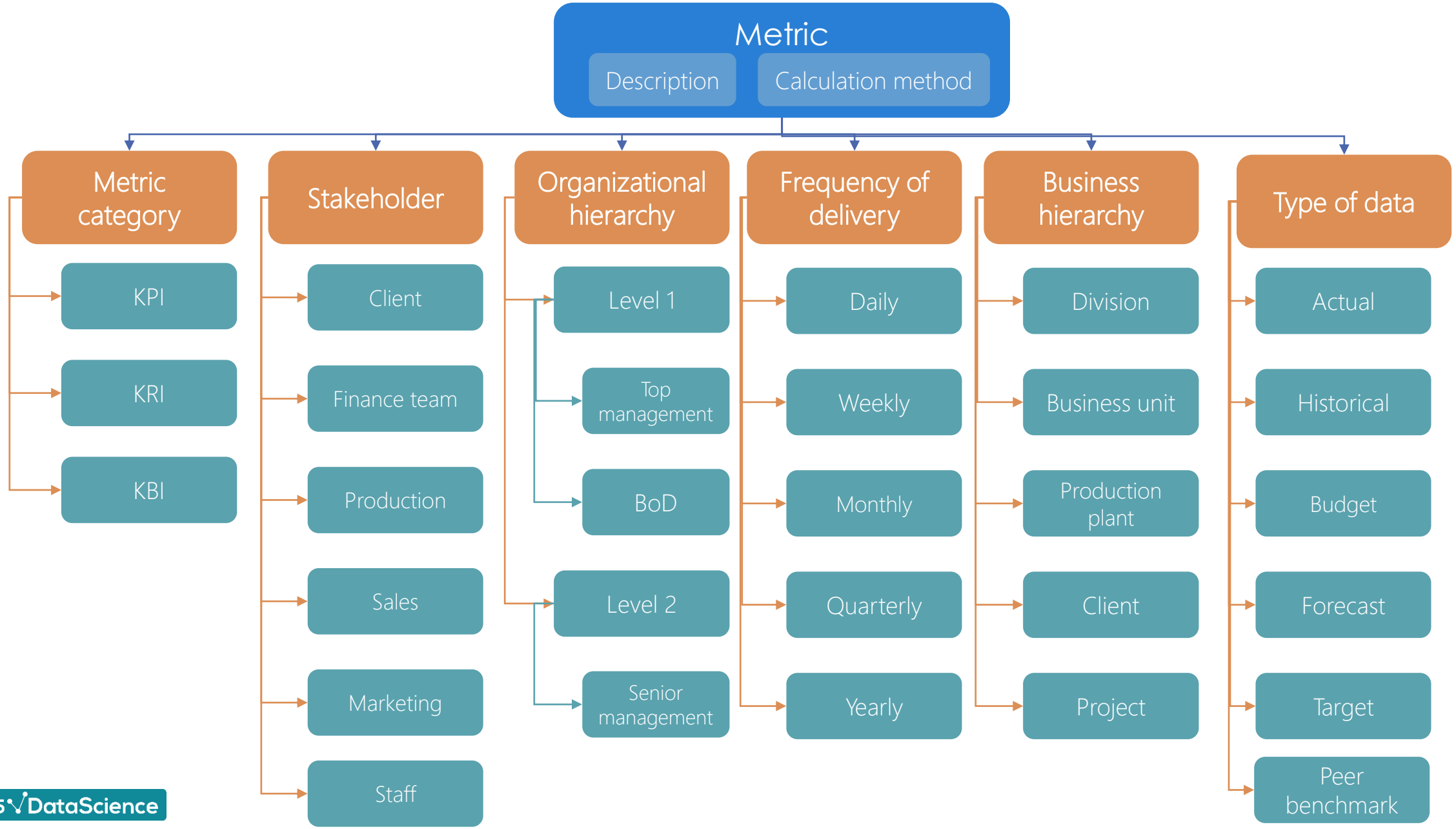
Set Targets Per Metric

Yearly Targets

Target Per Month

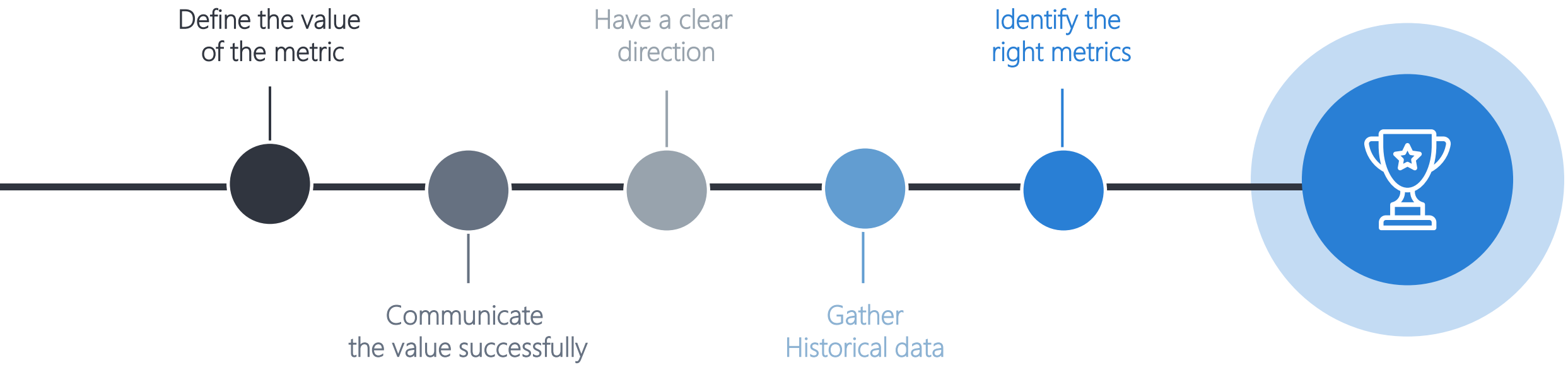
Target vs Forecast

Define Your Metrics



Define Your Metrics

Lessons learned:



Benchmarking

It consists in comparing the company's performance to peer organisations.

Benchmarking consists of 4 steps:

- ✓ study your own company
- ✓ have a good idea about industry leaders and competitors
- ✓ identify the best peer companies and focus on learning from them
- ✓ work in a direction that would allow us to become better than the selected benchmark

Types of benchmarking

Internal benchmarking
- ✓ focuses on processes and functions and there is no problem in terms of data confidentiality

Functional benchmarking
- ✓ consists in comparing how efficient the industry leader is in a certain aspect of the organisation

Performance benchmarking
- ✓ enables an organisation to assess its competitive positioning by analysing the products and services it offers

Master Data Governance

1

Master Data Governance is key to define:

- ✓ The level of information to be analysed
- ✓ The metrics to be used
- ✓ How information reporting will be carried out

2

Data governance increases the:

- ✓ Integrity
- ✓ auditability
- ✓ accountability
- ✓ transparency of a company's data

And it turns such data into a reliable source for analytics.

3

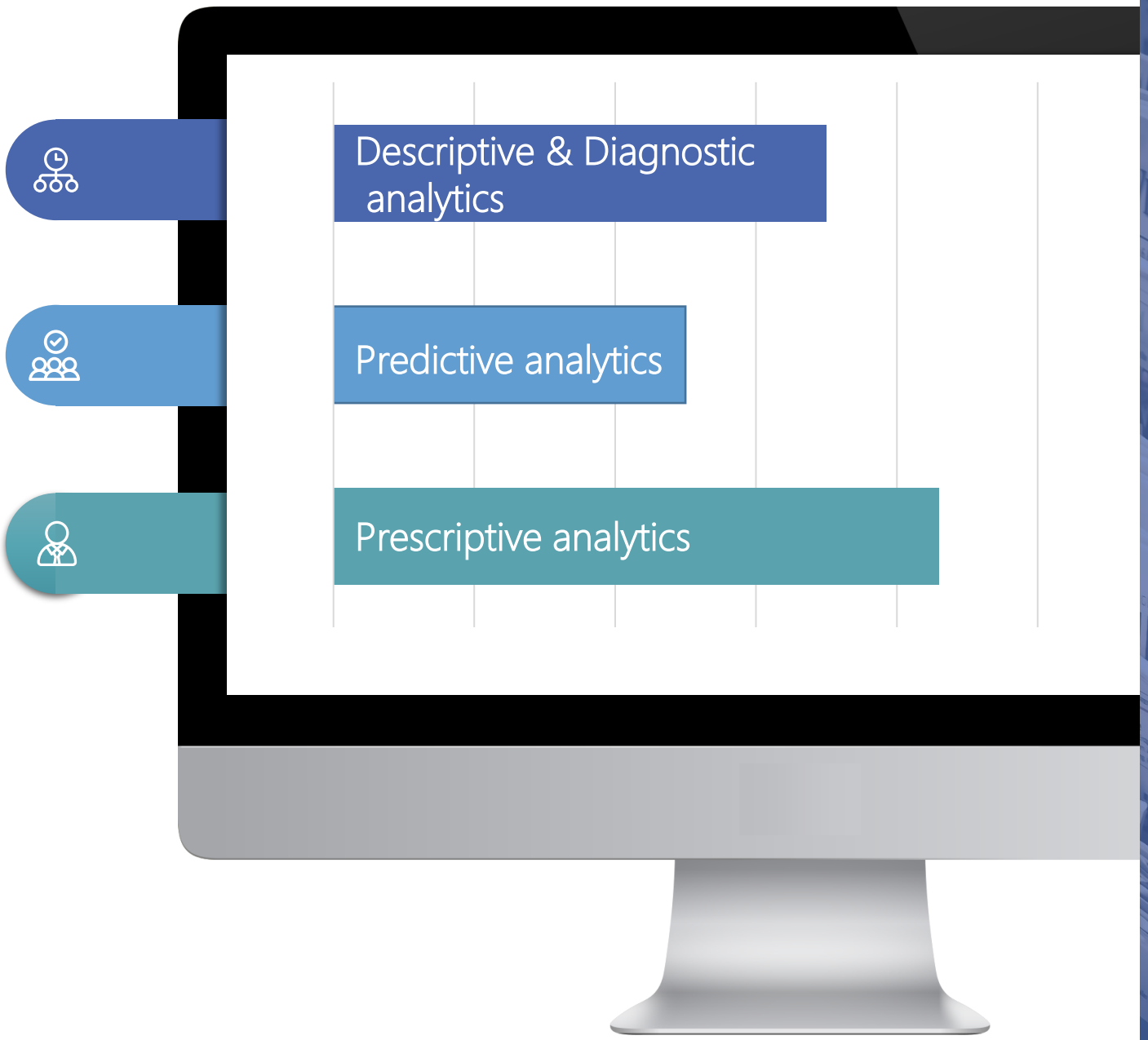
Enterprise-wide data governance function is responsible for establishing and maintaining of data collection criteria

Pre-established criteria help maintain consistent master data across the entire organization

4

Master data governance is a critical ingredient for successful analytics projects

- ✓ consistent
- ✓ easy to access
- ✓ good quality data



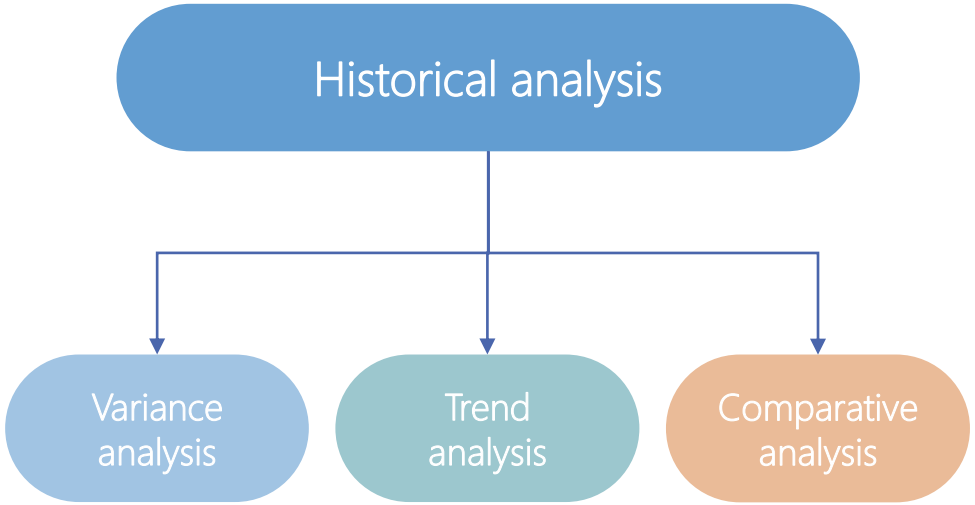
Categories of analytics techniques

Descriptive Analytics

Key characteristics

- ✓ Easy execution
- ✓ Main goal: Explain variances and look for trends
- ✓ Uncover the key drivers of business performance
- ✓ Steppingstone to more sophisticated analytical techniques

Descriptive analytics (examples)



Diagnostic Analytics

A good example of diagnostic analytics is:
SWOT ANALYSIS

STRENGTHS

Strengths are aspects that your organization excels at and is better than competitors.

THREATS

Threats include anything that can negatively affect your business from the outside, such as supply chain problems, shifts in market requirements, or a shortage of recruits.

WEAKNESSES

Weaknesses need to be addressed because these can be exploited by competitors

OPPORTUNITIES

Opportunities are openings or chances for positive developments that can become a source of strength.

Predictive Analytics

Answers the question:
What will happen next?

The goal is to make
projections about future events
by using:

→ Current data
→ Historical data

Then, we can perform scenario analysis

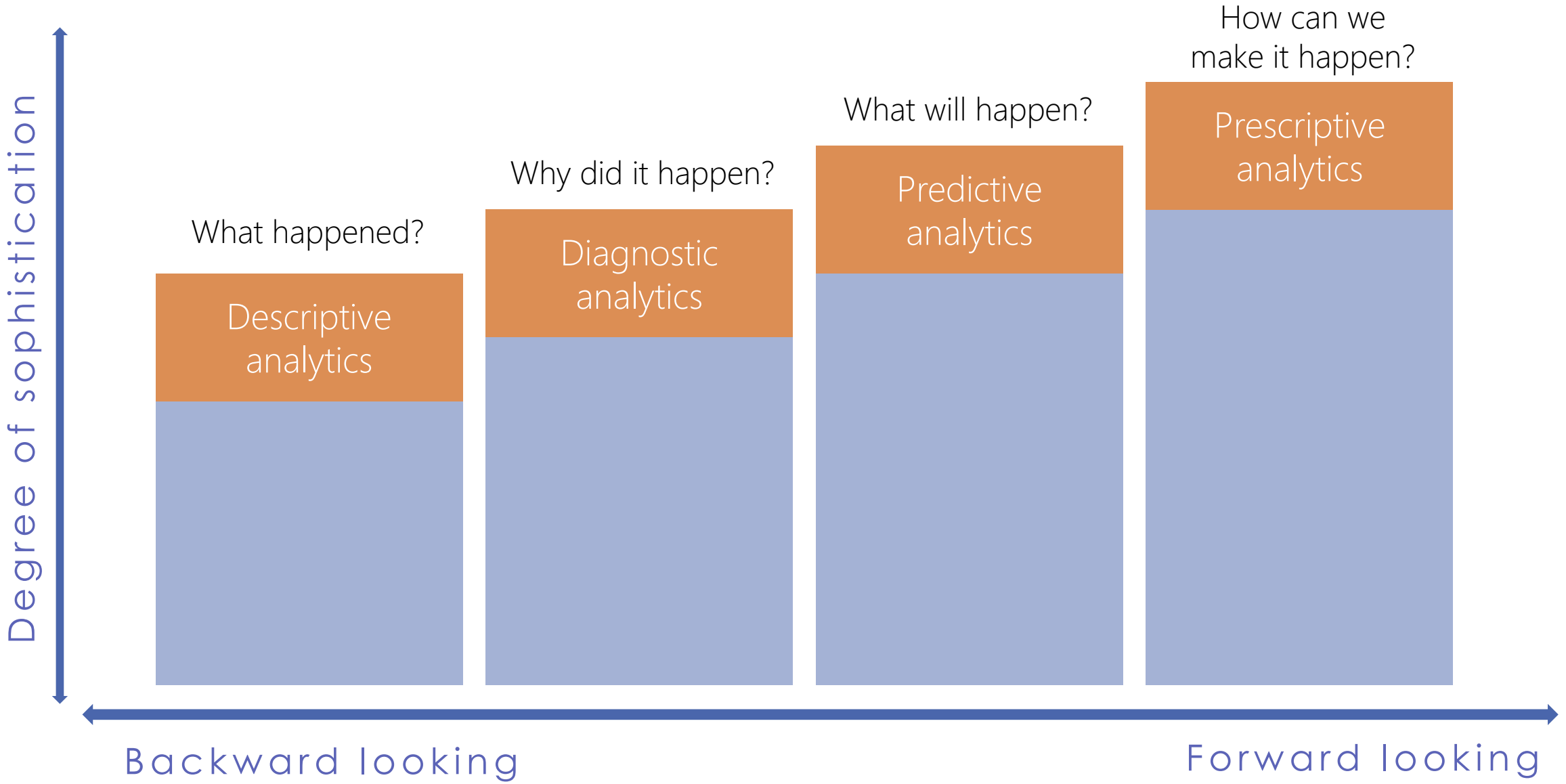
- ✓ best-case scenario
- ✓ realistic scenario
- ✓ worst-case scenario

Prescriptive Analytics

Finding the best action in a given situation

Prescriptive analytics allow companies to **track** human behaviour **and deliver relevant content**

Summary


Degree of sophistication
What happened?
Descriptive analytics
Why did it happen?
Diagnostic analytics
What will happen?
Predictive analytics
How can we make it happen?
Prescriptive analytics
Backward looking
Forward looking

Trend Analysis

The practice of uncovering patterns in your data

- ✓ Relies on effective historical analysis
- ✓ Focus on the factors that can impact the business

Types of trend analysis

- → Performance Management
- → Project Management
- → Trading

Performance Management

Risky business operations:

- ✓ Monitor
- ✓ Prevent
- ✓ Remedy

Project Management

Manage the delivery of projects on time and on budget

- ✓ Project cost (Quality control mechanism)
- ✓ Variance Analysis

Trading

To study the price and volume movement

- ✓ Stock
- ✓ Commodities
- ✓ Currencies

Comparative Analysis

1

Comparative Analysis

✓ The comparison of two or more variables

Price A
Price B

VS

2

Type of comparisons

Internal comparison

✓ Business units or departments

External comparison

✓ Other companies from the same industry

3

Uses of comparative analysis

Transformation projects

✓ Depoliticize difficult discussions

✓ Helps setting strategies and tactics back on track

Value-based Analysis

Value-based Analysis

- ✓ outlines the most valuable activities of a firm
- ✓ Studies the correlations between an activity's inputs and the factors impacting them

Two types of goals

Financial

- ✓ Revenue
- ✓ Margins
- ✓ ROIC

Non-financial

- ✓ Market share growth
- ✓ Pace of innovation
- ✓ Employee turnover

Identify KPIs

Steps

1. Successful value-based analysis focuses on an initial, mapping exercise aiming to define the expected outcomes and measures of success

2. Derive causality and sensitivity between measures

3. Leading metrics vs Lagging metrics

Metrics that predict an outcome | *Metrics that measure an outcome*

Outcome realizations

4. What-if analysis

Correlation Analysis

Correlation analysis:

- ✓ is a statistical technique aimed at establishing whether a pair of variables is related
- ✓ establishes a statistical relationship, but does not prove causation
- ✓ could help us a great deal, provided that we have the right amount of data and that business managers have defined well the variables to be studied

Correlational coefficient

- ✓ provides an indication of the strength of the relationship between two variables

Correlation analysis of multiple variables

- ✓ statistical relationship between multiple variables and a single variable

Time Series Analysis

Characteristics

- ✓ The model will provide a range of potential outcomes
- ✓ The outcomes will vary depending on various factors
- ✓ Time series analysis is an effective tool allowing us to quantify the impact of management decisions on future outcomes.

Four modelling methods

Naïve

- ✓ A value is taken from the previous period as a reference

Deterministic

- ✓ It is a more complex form of time series analysis, which includes user-defined confidence intervals.

Probabilistic (Monte Carlo Simulation)

- ✓ simulates the realization of real-life events with uncertain outcomes based on a pre-defined distribution function

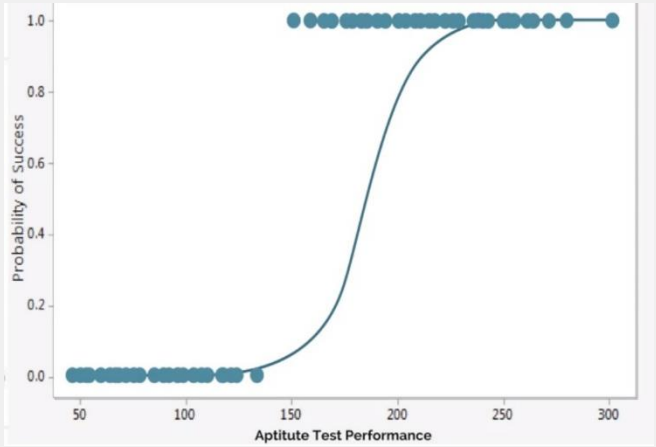
Hybrid

- ✓ combines probabilistic and deterministic; considers available data and then steps on it to simulate how uncertainties can affect the output

Regression Analysis

Linear regression

Logistic regression



Regression analysis:

- ✓ A model used for quantifying causal relationships among the different variables included in your analysis
- ✓ A dependent variable is driven by a set of independent variables
- ✓ It's difficult to understand well the relationships between separate data points in large datasets

Machine Learning Analysis

Machine Learning Algorithm

Trial-and-error process
Each consecutive trial is at least as good as the previous one

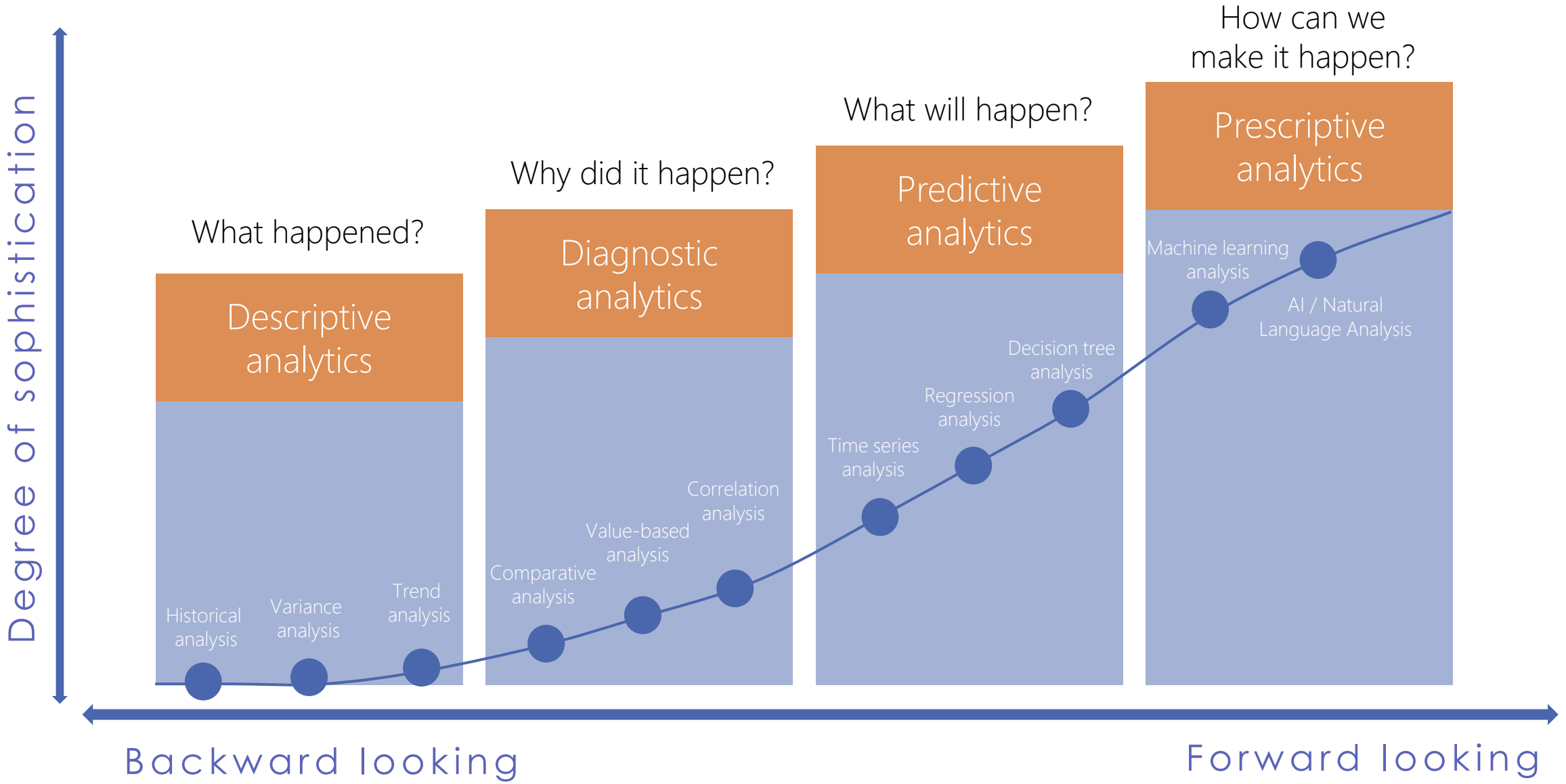
4 ingredients

- ✓ Data
- ✓ Model
- ✓ Objective function
- ✓ Optimization algorithm

Types of Machine Learning

1. Supervised learning
2. Unsupervised learning

Summary


Degree of sophistication
What happened?
Descriptive analytics
Historical analysis
Variance analysis
Trend analysis
Why did it happen?
Diagnostic analytics
Comparative analysis
Value-based analysis
Correlation analysis
What will happen?
Predictive analytics
Time series analysis
Regression analysis
Decision tree analysis
How can we make it happen?
Prescriptive analytics
Machine learning analysis
AI / Natural Language Analysis
Backward looking
Forward looking

Analytics Project Phases

1. Hypothesis development

A statement that helps communicate an understanding of the question or issue at a point in time

2. Situation analysis

Investigate organisational needs and determine influences

3. Current state analysis

How things function currently

4. Blueprint and design

The desired outcome we want to have and the steps to get there

5. Build and test

When we implement new solutions (we build) and we test these solutions

6. Deploy and operationalize

Further critical success factors will be discussed, which must be taken into consideration when working on analytical projects

Hypothesis development

Define the hypothesis

✓ A statement that helps communicate an understanding of the question or issue the organization faces

Not a question

Testable

Measurable

✓ A hypothesis is a proposed explanation of a problem derived from limited evidence as a starting point for further analytical investigation.

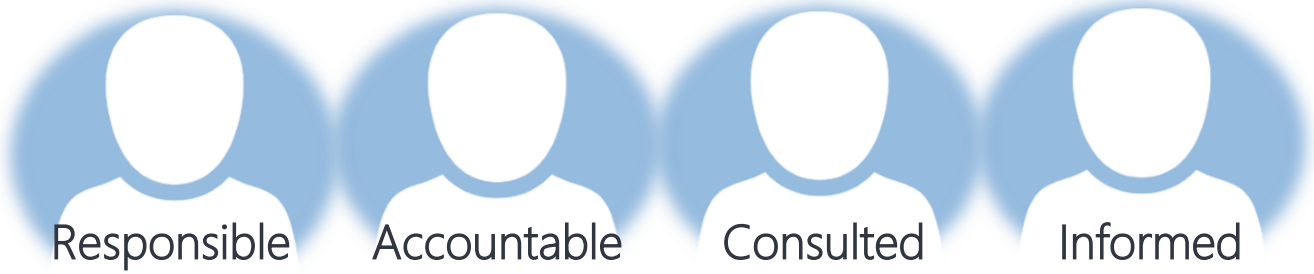
✓ For organisations, It allows the assessment of the effectiveness of operations before the analytics investigation begins. It forms the basis for allocating resources, time and money to the project.

Situational Analysis

- ✓ Analyze documentation
- ✓ Brainstorm about the affected parties
- ✓ Build a list of the affected parties

RACI matrix

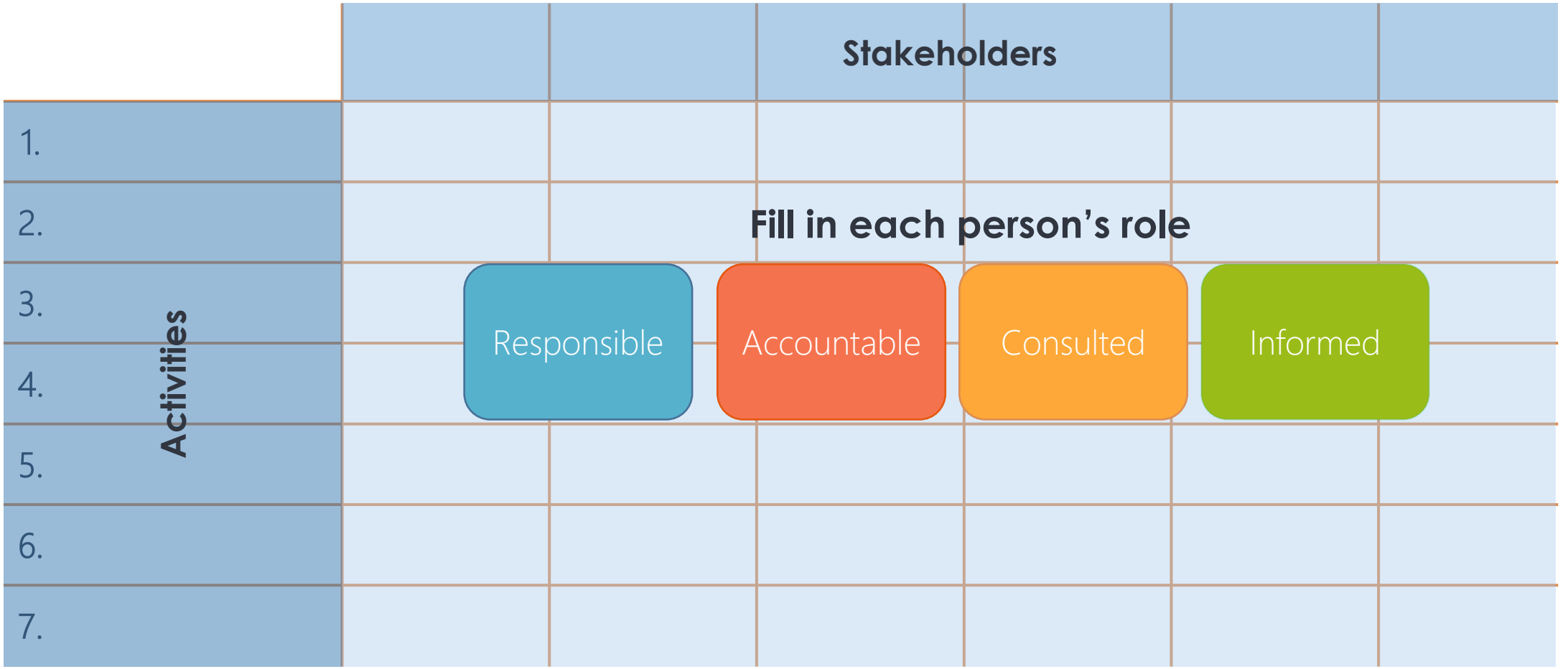
Reports status of each stakeholder



Responsible	Accountable	Consulted	Informed
A person performing a given task	A person who signs-off the deliverable of the project	A subject matter expert (SME) consulted for opinions and advice	A person kept up-to-date on progress

Situational Analysis

Building a RACI matrix



Situational Analysis

What makes for a successful project?

5 key factors of success

1. Executive sponsorship
2. Clear communication
3. Engaged stakeholders
4. Planning
5. Realistic expectations

Prioritisation Matrix

Engaged stakeholders

Planning

Realistic expectations

Pitfalls

Lack of user support

Incomplete requirements and specifications

Characteristics of properly defined requirements:

- ✓ Correct
- ✓ Clear
- ✓ Understandable
- ✓ Unambiguous
- ✓ Testable
- ✓ Feasible
- ✓ Independent
- ✓ Necessary
- ✓ Consistent
- ✓ Complete

Current State Analysis

Useful

Frames current problems and helps quantify outstanding issues

Not necessary

If problems have generally been acknowledged

The analytics professional has 2 key roles

- ✓ complete the analysis
- ✓ prepare content describing the current state

Four main components

1. Performance metrics
   - Set the baseline and benchmark for each function by process area identifying the key performance gaps and opportunities to improve
2. Capability maturity and best practice assessment
   - Assess current processes and systems in place against best practices and evaluate the planned initiatives.
3. Solution targeting and future state assessment
   - Define the design principles, service placement, organisational structure and reporting lines
4. Benefits case, roadmap and socialisation of the current state analysis
   - Step-by-step plan of execution

Blueprint And Design

Blueprint

Refers to a specific way to chart the desired future state of an organisation and the necessary steps to get there.

The purpose of the blueprint is to prioritise initiatives based on their value-add to an organization and short- to long-term strategic objectives.

Alignment in

- ✓ Level of detail
- ✓ Tracking and collecting data tool
- ✓ Data definitions

EIM

Enterprise Information Model

Balance between

- ✓ Granularity
- ✓ UX
- ✓ Functionality

Know your

- ✓ Audience
- ✓ Stakeholders

Comparable metrics

- ✓ Strong governance model for alignment in collecting data

Lessons learned

- ✓ Get specific: build and validate the business case as soon as possible
- ✓ Value, value, value: every problem statement needs to be tied to an implication and every recommendation to an impact
- ✓ Identify points of resistance early
- ✓ Listen to the full stack of opportunities
- ✓ Leverage previous project knowledge
- ✓ Don't start from scratch

Build And Test

Validate and sign-off the benefits and business case estimates of the project

Priorities:

- ✓ Impacted stakeholders are identified
- ✓ Scope of the project is approved
- ✓ Establish a clear and frequent communication with all stakeholders
- ✓ There are sufficient resources (Capabilities to support the newly implemented solution)

IT Specialist

R2R SMEs:

- Change manager
- Communication manager (prepare the communication about the change)
- Internal control (auditing the process)
- Financial controllers

Build And Test

Step-by-step

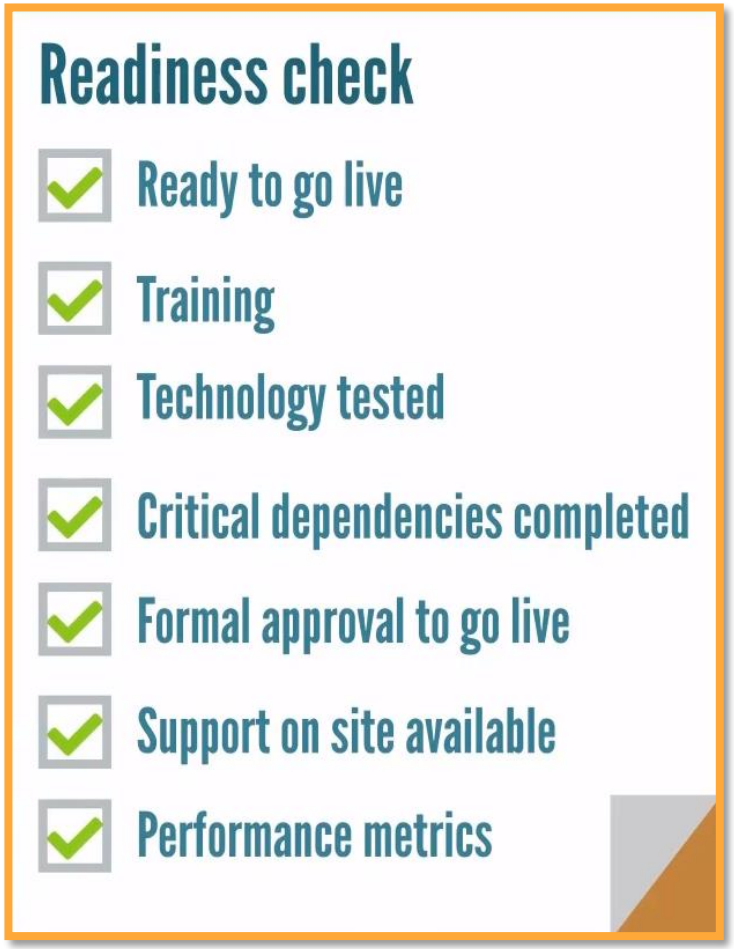
Step 1	Readiness Checkpoint
Step 2	Configure and Build the Technical Solution
Step 3	Configure and Load the Data Model
Step 4	Build and Test Business Application Logic
Step 5	Build and Unit Test Other Application Tasks
Step 6	Build and Test Reports (test how the new tool performs)
Step 7	Internal Quality Assurance and Quality Control Checkpoint
Step 8	Conduct Conference Room Pilot
Step 9	Update Analytic Solution Based on Feedback
Step 10	Conduct User Acceptance Testing and Remediation

Deploy And Operationalise

Critical success factors

- ✓ Training must be a top priority for users and management
- ✓ First impression is important
- ✓ Communication is essential
- ✓ Organise post deployment training

Key aspects of actual development



Summary

1. Define a hypothesis
2. Investigate organisational needs
3. How things work at the moment
4. Chart the future state of an organisation
5. Implement and test new solutions
6. Critical success factors