

Welcome to STB's

Data Analytics Capability Development Toolkit

Version: November 2021



Introduction

Data Analytics Capability Development Toolkit

Kickstart your data capability development journey with this self-help toolkit, designed and developed by STB as part of the Learn-Test-Build framework to accelerate the tourism industry's business recovery and growth through data analytics adoption. It contains resources for data maturity assessment and a how-to guide on becoming a data-driven organisation.

This toolkit is a guide to learn more about relevant data analytics applications in the tourism sector. It is structured around 3 key areas:

Ready, set, go!

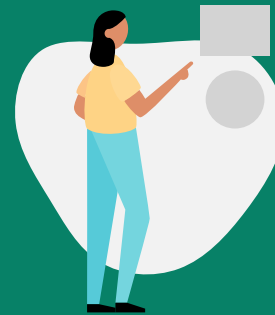
Click on one of the following sections to explore further:

DATA ANALYTICS IN TOURISM



Global data-related industry trends

HOW TO GET STARTED



TXI source to approach your transformation journey and development of data

APPLICATIONS - CASE STUDIES



Case studies that were developed with selected industry partners in Singapore

Ready, set, go!

WHAT IS DATA ANALYTICS IN TOURISM?

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Why should tourism pay more attention to data analytics?

As the world evolves with great advances in technology and ever-changing consumer trends, more industries including the tourism sector are tapping on data analytics to enhance their competitive edge and improve their business performance through actionable insights.

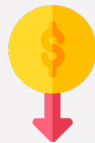
With the right tools, governance framework and strategy, data can enable organisations to understand their customers in depth, what works best and which marketing methods they are most receptive to. With these meaningful insights, businesses can make informed decisions with confidence, and monitor the impact of their decisions. In order to leverage the full potential of data, increasing the overall maturity of the tourism industry is vital and a key objective of adopting data in your organisation.

Data transformation within an organisation can be accomplished on the foundation of the following 3 pillars:



Driving Growth

Capturing a greater market share to increase revenues and explore new business channels are business goals. Data is a valuable tool that can support a business' journey through the challenges of the current time such as global pandemic and in the future.



Reducing Costs

Using data around incurred costs by an organisation and extracting those insights, what drives them, what patterns exist with any fluctuations and ultimately, whether there are areas in which costs can be improved.



Enhancing Experience

The usage of data can help businesses understand their business performances thoroughly such as collection of customers data on social media and online reviews combined with customer demographics and behavioural data, can help to re-define a more personalised and longer lasting customer experience.



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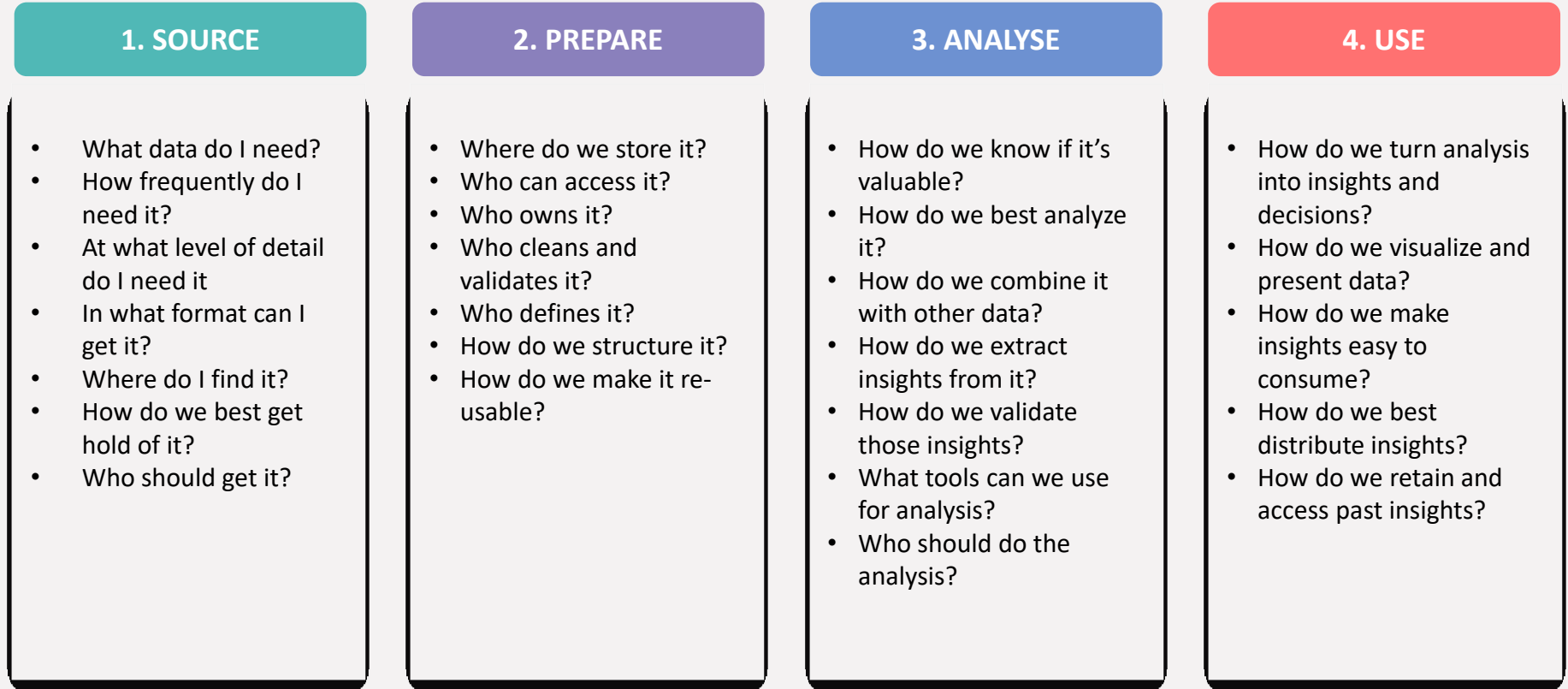
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Growing data analytics in tourism

The tourism industry is dynamic and fast-paced, constantly evolving to adapt to evolving customers' needs. With many trends shaping the digital space, being able to leverage on data analytics to gain a competitive advantage has become one of the top priorities for the industry.

To become a data-centered business, organisations should apply data analytics through a four-stage process:



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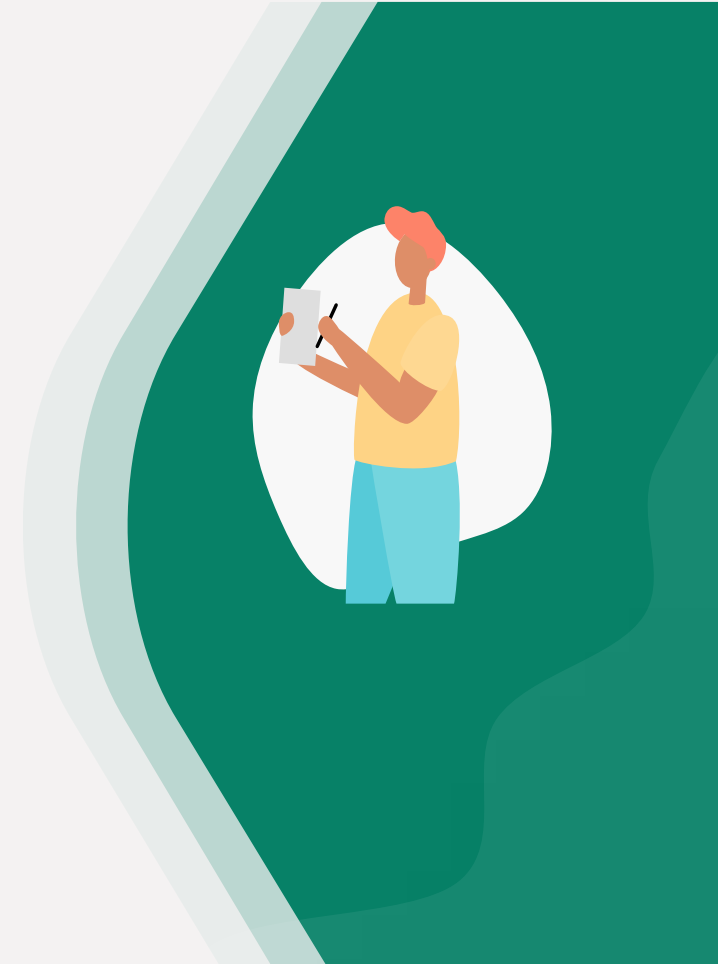


Global trends in data analytics

Increasing maturity in data analytics enables businesses to leverage on trends that have been taking place within the tourism industry. These trends are driven by evolving consumer behaviour and global events such as the Covid-19 pandemic.

Read about the top data-trends in the tourism sector:

- 1 Increasing usage of digital channels**
With the increasing usage of digital channels, more businesses are leveraging on search engine optimisation and web analytics tools to track the effectiveness of their marketing campaigns and to create more targeted marketing initiatives.
 [Read how a cruise company leveraged on digital channels to increase marketing effectiveness.](#)
- 2 Better understanding of customer sentiments**
Machine learning and AI-powered social listening tools are being increasingly adopted to screen through social media platforms for any signals related to customers' experiences and aggregate them into insightful data formats for businesses.
 [Read how a zoo analysed visitor feedback on social media to improve communication with millennials.](#)
- 3 Shaping demand for personalised experiences**
Increasing ability to collect data at the individual customer level (i.e. demographic, preferences, movements, etc.) is allowing businesses to anticipate and shape visitor preferences especially through the use of customer profiling tools, which can help tailor communications and offers.
 [Read how a theme park used behavioral data to anticipate visitor preferences and tailor marketing offers.](#)



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Global trends in data analytics

1. Increasing usage of digital channels [Case study]

X

INDUSTRY
Cruise

COMPANY



BUSINESS AREA
Sales & Marketing

COUNTRY
United States

PROBLEM STATEMENT

How might we use customer segmentation data and historical marketing campaign data to improve marketing effectiveness?

BACKGROUND

Celebrity Cruises runs numerous pricing programmes and promotions across its 600 to 700 open sailings a year and 30,000 travel partner channels. The amount of marketing campaigns and channels to monitor is significant and thus a strong need to analyse the data efficiently.

OBJECTIVES

- Track the success of each advertisement type across each customer segment in a timely manner
- Enhance effectiveness of marketing performance

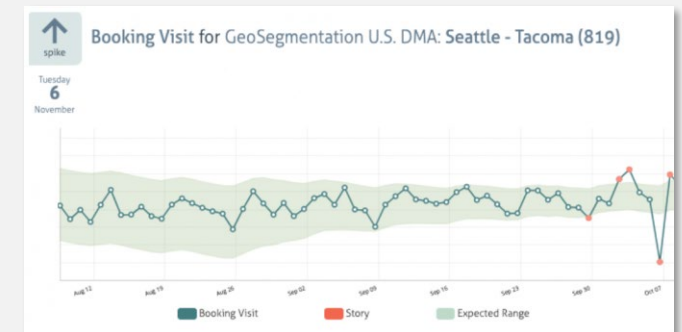
ACHIEVEMENTS

- Enabled the business to have better understanding of the “Why” behind under/overperforming marketing campaigns
- Made informed marketing decisions based on customer segmentation preferences (i.e. Florida responded best to radio ads, resulting in a 4% increase in bookings)

SOLUTION AND KEY FEATURES

Celebrity Cruises’ solution uses artificial intelligence to process billions of CRM and transactional datapoints to generate actionable insights on marketing performance, allowing for:

- User segmentation based on age, gender and buying habits for targeting marketing
- Detection of outliers in campaign performance for better marketing performance management
- Highlights over- and under-performing marketing campaigns
- Highlights outliers in sales and product checkouts
- Trend analysis to adjust marketing campaigns to perform within expectation



Conversion analytics

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Global trends in data analytics

2. Better understanding of customer sentiments [Case study]



INDUSTRY
Attractions

COMPANY


BUSINESS AREA
Sales & Marketing

COUNTRY
United States

PROBLEM STATEMENT
How might we analyse transaction and customer data to increase promotion redemption rates?

BACKGROUND
Point Defiance Zoo and Aquarium generates data records on visitor exhibits, special event preferences and participation in conservation initiatives on a daily basis. The zoo needed a lens to focus on actionable insights that emerge from this pool of information.

OBJECTIVES

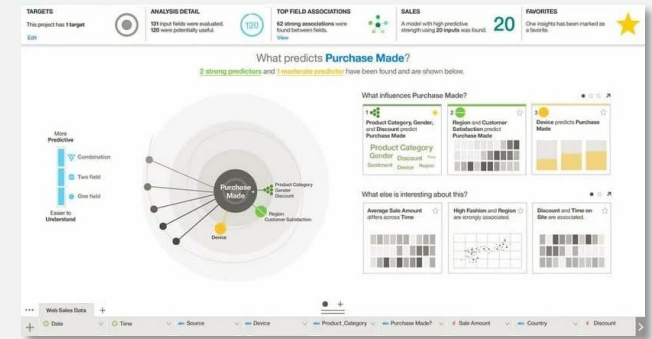
- Drive ticket sales
- Enhance visitor experiences
- Increase visitor participation in raising awareness of wildlife conservation

ACHIEVEMENTS

- Identified patterns of when and what customers are purchasing online, improving sales by more than 700% in two years
- Identified optimal time to push time-sensitive offers and promotions, increasing buy-in by 3%
- Obtain data within minutes instead of waiting several days to create a mailing list

SOLUTION AND KEY FEATURES
Point Defiance Zoo’s solution leverages on data generated from mobile devices and social channels to improve communications with millennial visitors by:

- Analyzing ticket purchase patterns and timing to push promotions and offers effectively
- Creating social and business connections on social media to spread awareness of wildlife conservation by empowering visitors into “influencers”
- Near-field communication capabilities on smartphones for zoo managers to assess exhibition success



Customer behaviour Analytics Dashboard

Ready, set, go!

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Global trends in data analytics

3. Shaping demand through personalised experiences [Case study]

X

INDUSTRY
Attractions

COMPANY
Disneyland
RESORT

BUSINESS AREA
Experience &
Operations

COUNTRY
United States

PROBLEM STATEMENT

How might we leverage on location and behavioural data to enhance visitor experience and tailor marketing offers?

BACKGROUND

Disneyland was facing challenges with negative customer experience due to long queue times and lack of tailored offerings. Disney wanted to address these with creating a more immersive experience.

OBJECTIVES

- Minimize queue times and overcrowding
- Enhance the visitor experience by personalization and prediction
- Increase engagement across channels (i.e. offline to online)

ACHIEVEMENTS

- Managed queue times in real-time by prompting visitors to shorter queues in-app
- Personalised interactions at certain Attractions based on visitor profile when sensors detect wearable tech
- Post-visit targeted marketing by recommending packages guests likely to prefer based on historical behaviour and purchases

SOLUTION AND KEY FEATURES

Disney's solution uses radio-frequency identification (RFID) wearable tech and a customer app to track visitor movements and behavior around the Attractions as capture key interests. This data captured enabled Disney to better understand customer needs and analyze visitorship flow.

Smartphone app key features:

- Live waiting time at each ride
- Itinerary planning to profile customer's interests
- F&B reservations and purchases
- Merchandise transactions
- Express tickets transactions



Real-time wait times allows visitors to plan their itinerary



Captures data through payments and Attractions check-in

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Data analytics maturity stages

Data analytics can provide value for tourism companies at every data maturity level, from those who have started exploring data, to those embarking on predictive analytics. There are tools available at every stage which can be utilized based on the analytics capabilities and the business needs of an organisation – different techniques can be applied to gather actionable outcomes.

Select a stage or click “Next” to find out more about each stage.

Stage 1: Descriptive

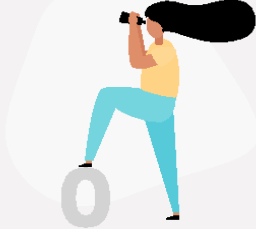
What happened?



[Learn More](#)

Stage 2: Predictive


What will happen?



[Learn More](#)

Stage 3: Prescriptive

What should we do about it?



[Learn More](#)

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Data analytics maturity Stage 1 – Descriptive

Descriptive stage



What is the key question for data to answer?

“What happened?”

Data analytics projects at this stage are more exploratory in nature and complements traditional business analysis and business intelligence functions

What kind of analytics is done?

- Large amounts of historical data is being interpreted to better understand changes that have occurred in a business.
- These historical data is also being used to draw comparisons. i.e. Most commonly use in financial reporting for year-over-year pricing changes.

What are the common techniques?

- Date aggregation
- Data mining

Application examples:

- Financial reporting
- Cost benchmarking
- Revenue segmentation (historic data)



[Read on how Barcelona leveraged technology to manage tourism flows.](#)

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Data analytics maturity Stage 1 – Descriptive

Stage 1 – Descriptive phase



INDUSTRY

Attractions

COMPANY



BUSINESS AREA

Experience & Operations

COUNTRY

Spain

PROBLEM STATEMENT

How might Barcelona manage and understand their tourists?

BACKGROUND

Barcelona was concerned that the growing visitor numbers could create urban challenges for the city, such as congestion. The city council in Barcelona was keen on understanding city-level (Barcelona) and Attractions-level (world-famous church Sagrada Família) tourist flows and behavior.

OBJECTIVES

- Minimize the negative impact of tourism on city and citizens
- Distribute tourism benefits beyond key touristic Attractions
- Manage flow of visitors

KEY BENEFITS

- The collected data gave insights into visitor profiles and their behaviour in the Sagrada Família area
- The insights generated were used to propose recommendations on crowd management measures and planning considerations to the city planners

SOLUTION AND KEY FEATURES

The Sagrada Familia Church leveraged on Internet of Things (IoT) and Big Data technologies to obtain data points in mobility, profile and behavior and analysed mobility patterns around the church.

15 million data points from mobile phone data and visitor surveys was used to identify:

- Areas of high tourist interest
- General visitor profile
- Concentration of visitors per area
- Most popular routes between neighborhood in Barcelona

IoT elements were deployed in the area surrounding Sagrada Família to analyze visitor profiles, behaviors and mobility patterns:

- Wi-Fi sensors to analyse visitor flow and how they move around the area
- 3D sensors to count people entering and exiting metro stations

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Data analytics maturity Stage 2 – Predictive

Predictive stage



Application examples:

- Manpower forecasts
- Spend analytics
- Demand forecasts
- Footfall prediction
- Price optimisation

What is the key question for data to answer?

“What will happen?”

At this stage, the focus is to do predictive analysis. This typically involves using more datapoints and datasets, leveraging on external data sources (i.e. weather, Google Analytics data).

What kind of analytics is done?

- Historical data is being used to identify the likelihood of future outcomes. The goal is to go beyond knowing what has happened to providing the best assessment of what will happen in the future.
- Decisions are automated using algorithms and technology.

What are the common techniques?

- Data modelling
- Machine learning
- Artificial Intelligence
- Deep learning algorithms
- Data mining



[Read on how Reed Exhibitors used predictive analysis to reduce attrition rates.](#)

Ready, set, go!

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Data analytics maturity Stage 2 – Predictive

Stage 2 – Predictive stage



INDUSTRY
MICE

COMPANY
 Reed Exhibitions®

BUSINESS AREA
Exhibitor retention

COUNTRY
United States

PROBLEM STATEMENT
How might Reed Exhibitions prevent attrition in their trade shows?

BACKGROUND
Reed Exhibitions organizes more than 500 exhibitions with around 7 million participants each year. With the goal of ensuring that every event is successful, they wanted to come up with a new way to increase the customer experience and retention rates by leveraging on their the data they collected from its trade shows.

OBJECTIVES

- Connect buyers and sellers during trade shows more effectively
- Retain exhibitors year-on-year

KEY BENEFITS

- Increased exhibitor retention through analysis
- Better insights into exhibitor satisfaction
- Reduced time to obtain insights from 3 months to 2 weeks

SOLUTION AND KEY FEATURES
Reed Exhibitions created a data analytics platform to process, analyse and find associations in high volumes of pre-event, during and post-event data within seconds. The analytics tool formed more complete and deeper customer segmentation profiles, customer engagement analysis at various touch points, and registration analysis. Reed Exhibitions build a model to identify factors of attrition and evaluate likelihood of exhibitor participation. The model showed that the contributing factors include:

- Whether they were new exhibitors
- Location of booth
- Number of face-to-face contacts the exhibitors contact at shows
- How exhibitors interacted with Reed’s products

They identified that 1 in 3 exhibitors that attended one of the 15 trade shows that were modelled were unlikely to participate again. Based on this, tailored marketing programmes could be designed for those exhibitors to encourage them to participate again.

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Data analytics maturity Stage 3 – Prescriptive

Prescriptive stage



What is the key question for data to answer?

“What should we do about it?”

This stage could involve drawing upon more datapoints and numerous external datasets.

What kind of analytics is done?

- Prescriptive analytics works with predictive analytics, which uses data to determine near term outcomes. When used effectively, prescriptive analytics can help organisations make decisions based on facts and probability-weighted projections, rather than jump to under-informed conclusions based on instinct.

What are the common techniques?

- Business rules
- Machine learning and computational modelling

Application examples:

- Personalised marketing
- Movement tracker
- Recommendation tool
- Manpower schedule



[Read on how Grandi Navi Veloci used analytics to create personalised marketing campaigns.](#)

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Data analytics maturity Stage 3 – Prescriptive

Stage 3 – Prescriptive stage



<p>INDUSTRY Cruise</p> <p>COMPANY </p> <p>BUSINESS AREA Marketing</p> <p>COUNTRY Italy</p>	<p>PROBLEM STATEMENT How might GNV identify new avenue of sales based on its customer profiles?</p> <p>BACKGROUND Grandi Navi Veloci (GNV), primarily a shipping company, is also one of the leading Italian passenger transport in the Mediterranean Sea. Expanding its business lines, GNV was keen on strengthening their relationship with customers by leveraging the data they have collected from 2.8 million customers over three years.</p> <p>OBJECTIVES</p> <ul style="list-style-type: none"> • Redefine customer relationships • Customise offers to increase profitability <p>KEY BENEFITS</p> <ul style="list-style-type: none"> • Tailor sales packages based on significant events or dates of the customer based off their profile • Accurate targeting of promotion yielding higher customer repeats • Redefined customer engagement strategy to develop new sales channels for repeated customers 	<p>SOLUTION AND KEY FEATURES GNV shifted their strategy towards investigating customer purchase behaviours. Leveraging on both direct (phone, websites, social networks) and indirect (travel agencies) data sets, GNV uses analytics to segment its customer base, find areas for process optimisation and create automated marketing processes that create relevant coupons and campaigns that are tailored to the customer.</p> <p>By identifying patterns in their dataset, GNV is able to position opportunities for cross-selling and up-selling to expand its relationship with their customers.</p>
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Adoption of data analytics in Singapore

Singapore’s tourism industry is diverse, housing a mix of internationally known and niche brands, with many other small and medium enterprises. While the data analytics adoption and capabilities amongst Singapore tourism companies vary from organisation to organisation, the industry acknowledges the importance of digital transformation and adoption of data.

STB is proactive in rallying the tourism industry to adopt data analytics, through the provision of various tools to the industry, such as the Singapore Tourism Analytics Network (Stan). Data visualisation tools are available to all tourism companies, allowing companies to easily slice and dice visitor arrival data to suit their needs.



[Read more on Singapore Tourism Analytics Network \(Stan\)](#)

Select an industry below or click “Next” to find out more about the impact of data analytics to each industry.

Hotels

Learn More

Attractions

Learn More

MICE

Learn More

Travel Agents

Learn More

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Adoption of data analytics in Singapore

Singapore's tourism industry is diverse, housing a mix of internationally known and niche brands, with many other small and medium enterprises. While the data analytics adoption and capabilities amongst Singapore tourism companies vary from organisation to organisation, the industry is embracing the benefits and adoption of data.

STB is proactive in building the tourism industry's data ecosystem through the provision of various tools to industry such as the Singapore Tourism Analytics Network (Stan) to enable companies to easily slice and dice various data.

Select an industry

Singapore Tourism Analytics Network (Stan)

Stan is a data analytics platform to view visualisations and perform analysis on tourism-related data, aggregated from STB and the industry, to derive actionable insights about Singapore's visitors. Stan allows users to gain access to the latest tourism data in visualisations. The platform has an automated built-in visual analytics tool, which aggregates tourism data and transform them into graphs and figures. Users can dynamically filter or drill down the data by various parameters, such as visitor traits, geography and time frame, to derive insights.



Data Marketplace

A data repository for industry to share and consume Singapore tourism-related data



Sandbox

A co-creation space, equipped with predictive tools, for industry collaboration on data analytics projects.

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Hotels

Attractions

MICE

Travel Agents

Data adoption in Hotels

A survey on 40 hotels assessing the current stage of data adoption in the Singapore hotel industry was conducted jointly by STB and Singapore Hotels Association. Based on the survey, a majority of hotels recognize the importance of data analytics and the benefits it brings. At least **60% have dedicated data analytics resources** and over **80% have plans to increase data analytics capabilities** in the future.

Based on the survey responses, we have defined 3 hotel profiles, each with a different set of challenges and needs.



For more information about the different hotel profiles, click here.

The survey results also shows **nearly one in two hotels in Singapore use intermediate data analytics tools** such as Tableau and Power BI. This is mainly seen in larger hotel chains as they are typically more well-resourced and able to drive data analytics adoption.

Additionally, independent hotels or hotels part of local chains were more likely to display a lower level of maturity using basic data analytics.



Read more about the case study we developed for the industry here.

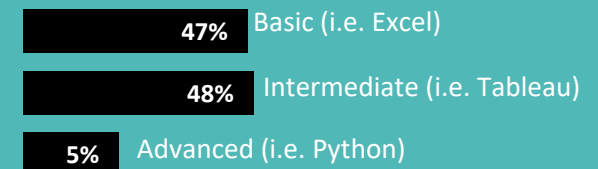


Hotel Industry Survey (2020 – 2021)

How do you plan to increase data analytics capabilities?



What is the level of data analytics tools used by SG Hotels?



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	Hotels	Attractions	MICE	Travel Agents
Hotel profile	 <p>The Small Non-Data Savvy Hotel</p>	 <p>The Large Non-Data Savvy Hotel</p>	 <p>The Large Data Savvy Hotel</p>	
Data Analytics tools	Majority use basic level tools (i.e. Excel)	Majority use basic level tools (i.e. Excel)	Majority use intermediate to advanced tools (i.e. Tableau, Python)	
Data Analytics resources	Do not have dedicated resources	50% have dedicated resources - those that do, have a very small team (less than 3)	Majority have dedicated resources with resources outside and in Singapore	
Loyalty Program	Most do not have a loyalty program – for those that do, they do not apply data analytics to the data collected	Approximately 50% have loyalty programs and do apply some kind of data analytics to the data collected	The majority have loyalty programs, and most run sophisticated data analytics to understand customers' spending behavior and experience at the hotel	
Sample size	11	12	17	
Room capacity as % of total SHA members	3.35%	10.9%	24.1%	

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Data adoption in attractions [1/2]

The adoption of data analytics amongst attractions in Singapore is varied. While the industry is generally aware of the benefits of data, attractions operators have incorporated basic data analytics.

As many operators are small and medium enterprises, they have been **less equipped and not as well-resourced to adopt data analytics tools**. Some larger attractions have incorporated data analytics in their business operations, but are still keen to enhance the amount of data that they collect.

In a survey that was carried out in March 2021, based on the survey results from 10 attractions, **50% of respondents run a loyalty or membership programme** to encourage customers' return to visit the attractions spot. However, they do not know how to utilise the data collected from the loyalty or membership programme to draw actionable insights. Majority of respondents would like to analyse their data to enhance the customer experience for visitors.



[Read more about the case study we developed for the industry here.](#)



Attractions Industry Survey

What are the main data sources used?

(from most used method to least)

1. Customer surveys
2. Capturing footfall of Attractions
3. Point of sale
4. Web analytics (i.e. Google analytics)

What data would you like to capture?

- Visitor demographics and interests
- Spend per visit and propensity to pay
- Dwell time per visitor and peak times
- Guest movement patterns within the Attractions
- Guest decision making data (i.e. how did they find us)

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Data adoption in attractions [2/2]

Majority of the attractions in Singapore understand the benefits of applying data analytics in their businesses. This was reflected in our 1-1 interactions with 75% of the attractions that we reached out to which had expressed interest in being part of the Industry case study POC.

Reasons to embark on industry case study

1 Ability to measure business performance in comparison to the wider sector.

“Keen to join this POC as the comparison to other attractions it provides will be interesting to see.” – Manager of a Sentosa attraction

“This is very helpful as it also shows us our data gaps and what data points we should be collecting in the future.” – Manager of an attraction located in the West

2 Ability to tap on new business models that could accelerate business recovery.

“Very interesting and helpful as data plays a big role in the future for us as well.” – General Manager of a Sentosa attraction

3 Ability to demonstrate clear business value through the use of data.

“The dashboard will be helpful, we would like to be a part of it.” – Manager of a Sentosa attraction

Key concerns

1 Lack of data to support industry case study.

“There is the concern of not being able to provide some data as it requires lots of effort to extract the data manually and we don’t have the manpower.” – Managing Director of a centrally located attraction

“Our POS system’s filters are grouped by time, price and quantity, but not by transactions. That’s why we can’t provide granular data on a per transaction basis.” – General Manager of a Sentosa attraction

2 Lack of resources to support data extraction.

“We have Power BI, but I have difficulty using it.” – General Manager of a Sentosa attraction

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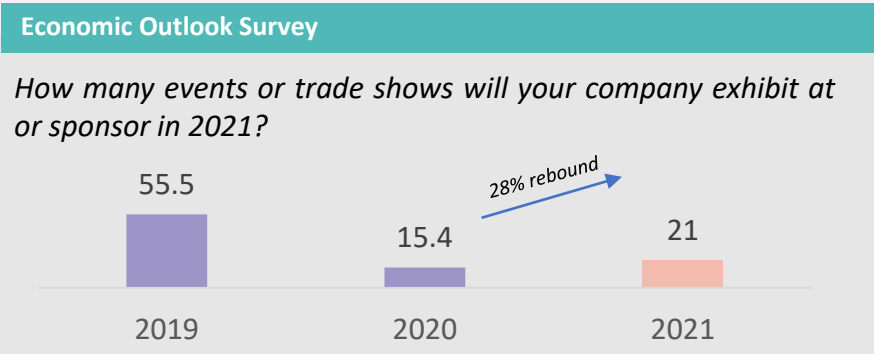
Travel Agents

Data adoption in MICE

According to a survey of nearly 400 exhibit and event managers done by the American Best Practices Media Organisation, the average corporate budgets for event exhibition and sponsorship in 2020 has fallen drastically, signalling that weakness in the market from the pandemic will continue this year.

However, a recovery is projected as companies look to exhibit and sponsor at far more events in 2021. Event and venue operators who are able to capitalise on this recovery by capturing the renewed event interest of corporates would be well positioned to grow and capture market share. As such, focus on effective lead generation and conversion is of paramount importance.

Moreover, hybrid events has been key in allowing events organisers to continue with business operations and to host larger events in terms of number of participants. As such, those who are able to identify new targets effectively and run hybrid events are the winners in the longer run.



From EXHIBITOR's 2021 Economic Outlook Survey

In Singapore, the MICE industry was heavily impacted by the pandemic made it impossible to organise and host large events. As a result, forward-thinking event and venue stakeholders have embraced the hybrid event model to adapt to the new normal.

This shift increased the complexity of event orchestration and data management as event engagement moves to a multi-platform paradigm. While new datasets are generated, only 10% are fully equipped to manage and capitalise on this change.

STB Industry Survey

- 91%** of event organisers are looking to subscribe to a hybrid event model
- 85%** of attendees are willing to pay for digital/hybrid events
- 10%** of event organisers are fully equipped to run hybrid events
- 9%** of attendees are willing to pay more than half of a live event admission

Source: STB Event Industry Resilience Roadmap

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[Read more about the case study we developed for the industry here.](#)

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Data adoption in Travel Agents

STB conducted a business understanding with the travel agents to assess the current stage of data adoption in the industry. Based on the business understanding, the travel agents agreed that data analytics is beneficial in the long term but the adoption of data is still at very early stage.

While travel agents have typically been viewed as “brick-and-mortar” and more traditional, the industry has started tapping on technology to improve their business propositions. Covid-19 has changed the way travel agents operate and how they deal with mainly domestic visitors who are looking to more customised tours. Most of the travel agents hope they can leverage on data to have a better understanding of the customers needs and the business performance.

We undertook a survey with the inbound travel agents to understand what were the metrics they find it useful, majority rated an average of 4 (useful) for the metrics. However, majority of the travel agents do not know how to utilize their data to draw actionable actions. Majority of the respondents would like to use their data to enhance their packages and services to the customers.



[Read more about the case study we developed for the industry here.](#)



Travel Agencies Industry Survey

What are the metrics of interest but not yet utilized data to draw actionable insights?

1. Correlations between TA revenue with macro-economics factors
2. TA financial performance and Y-O-Y growth for revenue, cost, profit margin and productivity
3. Revenue breakdown by service package
4. TA visitors profiling: Age group, group size and place of residence
5. TA visitors breakdown by service package, trip purpose and duration of stay

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Obstacles to the adoption of data analytics

The tourism industry is capable of generating vast quantities of data, but there is a real challenge when it comes to leveraging on this data to generate business insights. Below are the top 5 obstacles that the tourism industry in Singapore is facing:

01

Low data maturity level and weak data governance

The level of understanding displayed by the organisation on data governance plan and strategic plan of data, technology used and number of dedicated data analytics resources is low in comparison to other industry sectors.

02

Gaps in data collection

The gaps in data collection that could not be linked across the entire customer journey cause many organisations to not be able to make full use of their data to generate meaningful insights.

03

Collected data exists in silos

Departments do not have an overview of data collected and to store it in a centralised place, hindering a holistic view of the data and meaningful insights.

04

Lack of data analytics tools

Majority of organisations lack the necessary tools to conduct deep and insightful data analytics, whether it is benchmarking, customer segmentation and profiling, or cost analytics.

05

Difficulty to attract specialized talent

Many organisations, especially SMEs do not have dedicated resources for data analytics at an organisational level.

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Myths about data analytics debunked

There are many misconceptions with regards to data analytics both in terms of cost, feasibility, time intensity and the impact on jobs and future business growth. Below are the top 5 myths, debunking some common misconceptions about data analytics:

01

Implementing data analytics is expensive

Data analytics solutions actually tailor their pricing to SMEs and offer a “Startup” or SME plan making getting started significantly cheaper as compared to large corporations.

02

Implementing data analytics is challenging

Data analytics solutions enable organisations to easily import existing data and generate immediate insights. Besides, trainings are available and easy for staff to pick up relevant skills to implement, and operate data analytics tools across the organisation.

03

Making use of data analytics is very time intensive

Data analytics solutions can initially be set up within minutes and enhanced over time to generate more insights for the business such as business intelligence tools, where one can start with 1-2 metrics or graphs on a dashboard first.

04

Data analytics will cause people to lose their jobs

Data is merely an enabler to ease employees of tedious manual tasks and in turn help people to make better decisions by having more time to process data results rather than the process to generate the results.

05

Data analytics is the holy grail and will drive the business

Collecting masses of data and analysing data without purpose will not serve its purpose. Data analytics is only powerful if it is used as an enabler, make critical business decisions, uncover new insights and acted upon and properly executed.

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Common Pitfalls - What NOT to do on your data analytics journey

When kick-starting your data analytics journey, there are several things that you should absolutely NOT do to ensure smooth sailing. Below are the top 5 common pitfalls, that will significantly harm you in your data analytics journey:

01

Implementing data analytics without a plan or purpose

Implementing data analytics without having a reason and purpose as well as having no plan can be fatal. Resources spent doing analyses that are not useful to the company can be costly in terms of manpower and hours.

02

Overcomplicating analyses unnecessarily

Building complicated data models that is not necessary results in a waste of resources. Also, it may hamper the adoption of data analytics across the organisation as stakeholders are require to use it to make business decisions.

03

Not tailoring visualizations of data for different stakeholders

Data needs to be understandable across the organisation and allow the actual utilization of data analytics to make important business decisions through ease of understanding and ease of usability of data.

04

Confusing correlation & causation with data insights

Confusing correlation with causation is a common pitfall. It basically means: Just because two things correlate in terms of data, does not necessarily mean that one causes the other.

05

Looking at data only, without considering other factors

Looking at data only without applying common sense and logic can be deceiving and AI still, and may never will, be able to replace human common sense.

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To kick off your data journey, start with assessing your organisation's current capabilities and define where you want to be in the future

One of the tools used to assess the current state is STB's Tourism Transformation Index (TXI). TXI is a self-assessment tool designed to guide Singapore tourism organisations regardless of size and industries, to future proof businesses by providing a holistic diagnosis of the current state of transformation, information about where the business stands among industry peers and recommendations to stay relevant and thrive.



After completing your assessment, please follow the next pages to access key considerations in your data transformative journey.



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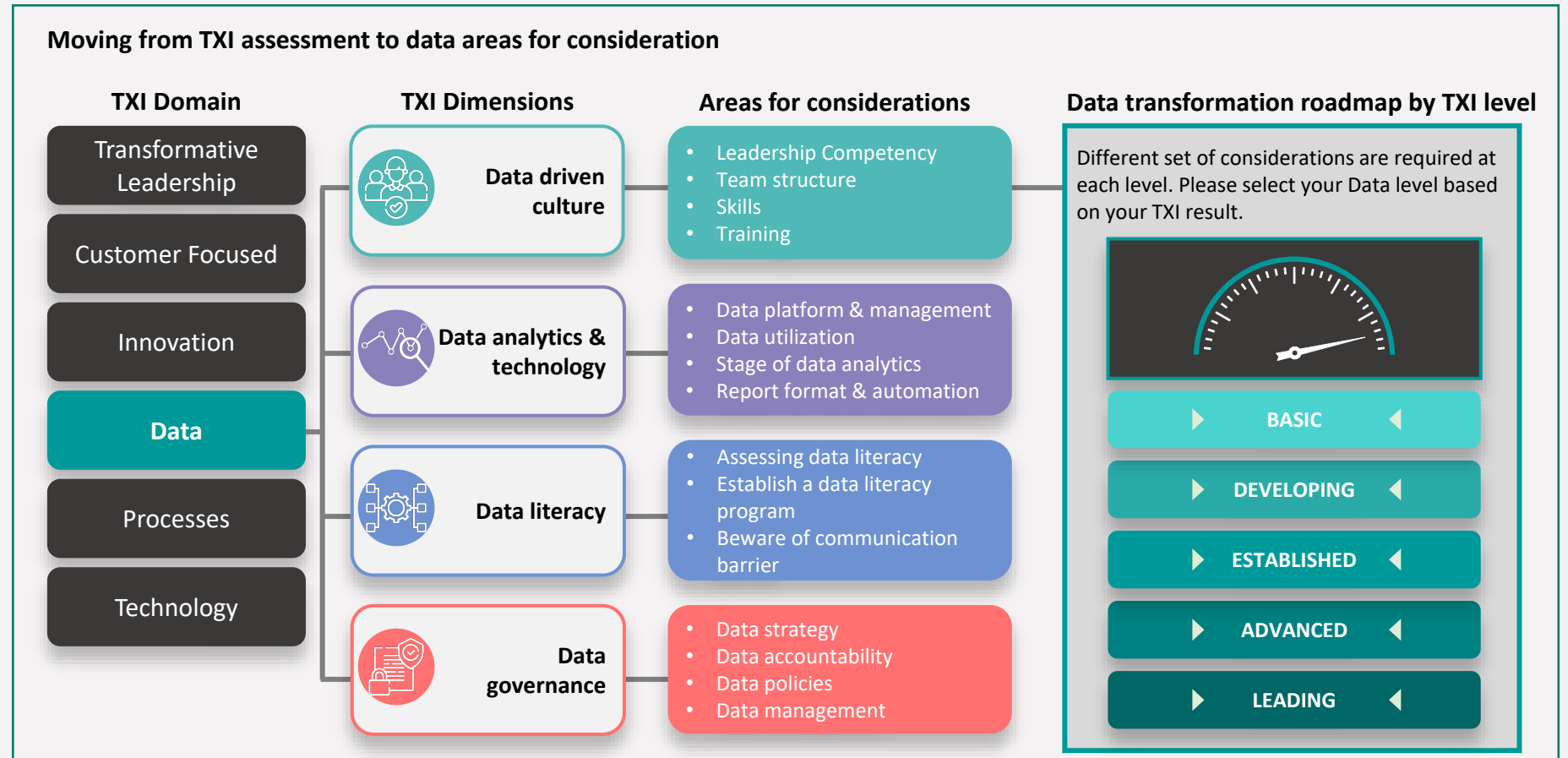
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Now that you know your TXI data level, you need to consider following areas to progress in your data journey

While TXI provides a holistic assessment of your organisation across 6 domains, this toolkit focuses primarily on the Data domain - an organisation needs to ensure that the appropriate data-driven culture developed, the necessary data analytics tools adopted, standardised data documentation established and necessary data governance policies has been placed in order to fully leverage on data and drive clear business value.



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Before going in detail, an overview of all dimensions per level (1/2)



Data-driven culture



Data analytics & technology

BASIC

- Has little interest for data and analytics
- Used data to describe the outcomes of business decisions
- Data proficiency is viewed as a 'nice to have'

- No structured databases and querying tools - reports are static
- Does not use any enterprise wide technology platforms for data management
- Limited to capturing and presenting historical statistics and data

DEVELOPING

- Has interest for data and analytics
- Used data to understand the root cause of the outcomes of business decisions
- Sees value of data proficiency for some key departments but has not developed an organisational strategy

- Uses structured databases and querying tools - the workflow consists a mix of automated and manual processes
- Access to localised data management platforms which support limited functions
- Unable to analyse and deep dive into historical statistics and data to uncover insights

ESTABLISHED

- Committed to build a data-driven culture
- Used data to predict the likelihood of an outcome for key business decisions
- Sees the value of what data can bring about if it is being utilised wisely

- Decision makers have access to some automated reports and dashboards but continue to rely on manual processing
- Access to data management platform but only deployed to key business functions
- Predictive modelling through historical data is being developed but it is yet to be used in any business decisions

ADVANCED

- Views analytics capabilities as top priority and is in the midst of developing this across the organisation
- Predictive insights derived from data are used in some instances to determine the optimum course of action for business decisions
- A standalone data strategy is in place but is not updated regularly or integrated with the overall business strategy

- Internal decision makers tap on advanced analytics tools extensively
- Access to wide data management platform co-exists with an established governance structure, which is updated occasionally
- Capability to conduct some predictive modelling and machine learning in key business departments

LEADING

- Provides active support, resources and remove barriers to the consistent operationalisation of data analytics in decision making throughout the organisation
- Prescriptive insights derived from data to determine the best course of action for all business decisions
- The data strategy is fully integrated with the overall business strategy and is consistently reviewed and refined to account for changing demands and business environments

- Analytics tools are used and fully accessible across lines of business and are customised to the organisation's business needs
- Number of data management and technology platforms are used effectively and are acquired and retired to be relevant
- Capability to conduct forward-looking analysis, predictive and prescriptive analysis to drive business decisions

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Before going in detail, an overview of all dimensions per level (2/2)



Data literacy



Data governance

BASIC

- No clear articulation of a data proficiency framework
- Employees use operational data to do basic analysis to support day to day work, and present data as-is without analysis

- No formal data governance structure and policies for the storage, use and sharing of data
- No formal data quality evaluation framework nor do they see a need for such a framework

DEVELOPING

- Identified broad, high level data competencies applicable for certain business functions only
- Employees are able to perform descriptive analysis to highlight trends and business implications

- Data governance policies exist within some departments but not consistent across the entire organisation
- Sees a need for a formal data quality evaluation framework but does not have one yet
- Some business and data owners have been identified but do not have any formal roles in data governance

ESTABLISHED

- Defined data competencies needed, but has not mapped these to each role and level
- Employees are able to integrate qualitative and quantitative data to analyse data holistically and develop deeper assumptions to perform data storytelling

- Data governance policies exist and apply for all data sources, and is evaluating the deployment of a quality compliance method
- Sees a need for a formal data quality evaluation framework and is the midst of developing one
- Business and data owners have been identified and they have an informal role in data governance

ADVANCED

- Data proficiency framework has identified and defined data competencies for each role and level, along with the corresponding upskilling courses/ training that is needed for key employees
- Employees are equipped to use advanced data mining and modelling techniques to identify and predict patterns in data

- Data governance policies are up to industry standards and are enforced diligently
- Sees a need for a formal data quality evaluation framework and has developed and deployed one
- Business and data owners have a clear definition of their roles and responsibilities in data governance

LEADING

- Data proficiency framework comprises data competencies for each role and level and has distinguished generic competencies versus those that are specific to certain job roles
- Individual employee's upskilling courses have been customised and mapped out as well
- Employees can develop predictive insights from data from a number of techniques and are well equipped to use that data for decision making, data storytelling and planning

- Data governance policies are up to industry standards, control measures are in place and policy compliance is audited regularly
- Constantly refining its data quality evaluation framework to keep up with industry norms
- Business and data owners have a clear definition of their roles and responsibilities hence data access is granted in a managed fashion across the organisation

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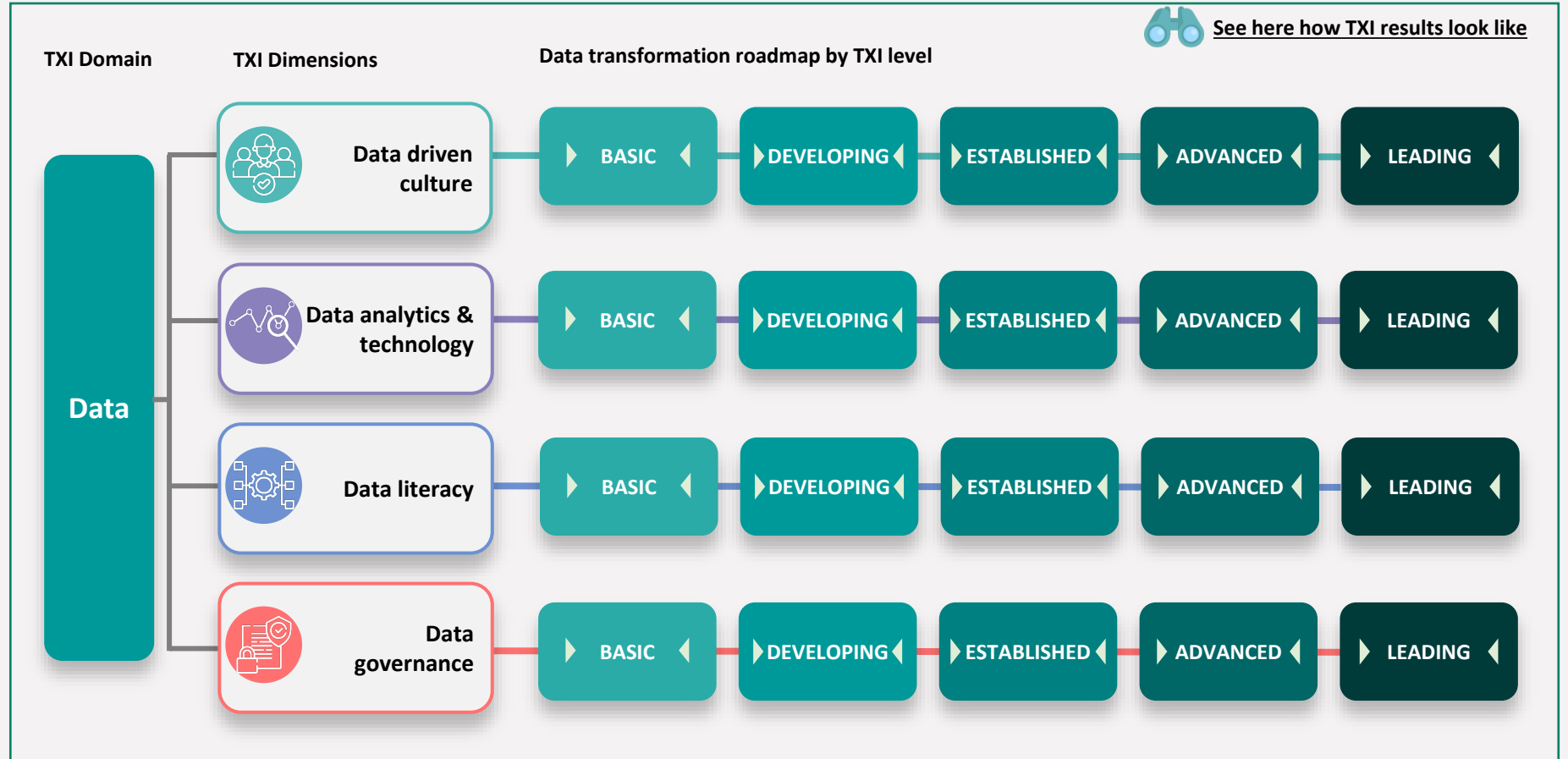
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Now, please select your level per area to get started

Select the level based on your TXI score for each area and learn about the key considerations and initiatives to embark on for the next 2 – 3 years as part of your data transformation journey. For example: If you have scored basic for “Data-driven culture”, please select basic, which will set you up for the next level “developing” in the future.

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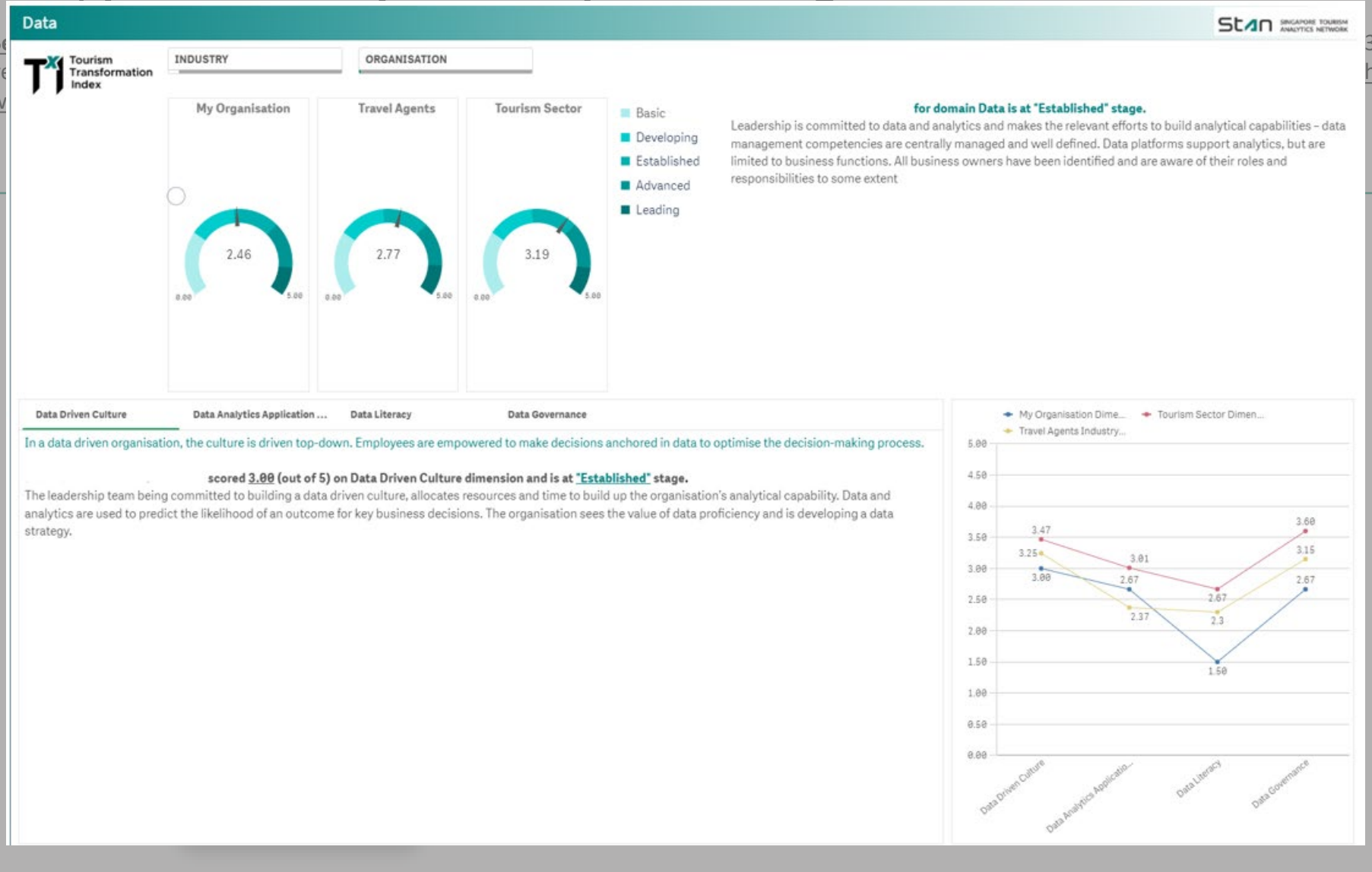
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TXI Level
BASIC



The leadership team has not embraced a data-driven culture yet and has little interest in areas of analytics - data is predominantly used to describe the outcomes of business decisions. Data proficiency is viewed as a 'nice to have' and is deemed to be too expensive and time consuming to deploy extensively.

Key considerations

Leadership competency

- Consider and actively position data analytics as a future core competency of the organisation (i.e. start with communicating importance within leadership)
- Create competency of senior management to explore the topic of data analytics and gain relevant basic knowledge (i.e. Use case studies how to embark on a data transformation journey, type of initiatives that can be launched)

Team structure

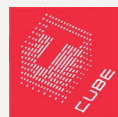
- Get informed on typical data analytics team structures and what they consist of, what roles serve what purpose and how it can be useful for the organisation (both in-house or outsourced)
- Get informed on what a data champion is (someone with both business and data knowledge who can lead data initiatives and advocates for adoption of data analytics usage in the organisation) and how it can be useful to the organisation to have these identified across the organisation

Skills

- Conduct a basic brief skills audit to gauge initial skill levels in terms of data analytics across the organisation (i.e. online survey identifying people with transferrable skills i.e. highly analytical staff, staff with advanced MS Excel skills etc.)

Training

- Research potential trainings on data analytics skills for basic data processing using Business Intelligence (BI) tools such as Qlik Sense and Power BI (either provision of internal training to a wider group of staff or potential to send staff individually to external training options i.e. via STB Data College, SkillsFuture etc.)
- Initial info sessions (i.e. virtual workshop or virtual training) with staff on the basics of data analytics (i.e. what is data analytics, how is it useful, what tools are out there?) to expand thinking beyond the use of spreadsheets (consider self conducting or working with an external party i.e. universities or private providers)



Tcube is a hybrid innovation space that brings STB's digital initiatives, resources and thought leadership content onto a single platform to support tourism stakeholders in their digital transformation journey.

[Click here to find out more.](#)

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Below is a sample data-driven culture questionnaire which includes both quantitative and qualitative questions.

Dimensions	Questions
Leadership	Does your team regularly have a vibrant data culture conversation?
	Do you spend as much (quality time) on data culture as you do on strategy?
	Is there clarity around how data can contribute to a successful business?
	Are all communications channels utilized – especially those preferred by employees who inhabit the informal organization – to promote importance of data?
	Do you hire with/promote with “tomorrow’s” data culture in mind?
Team Structure	Do the team members have absolute clarity about their role in the team?
	Is the someone to lead/advice when members of the data team meet with any issues?
Skills	Which step of data analysis project do you enjoy the most?
	What is your greatest data skills strength?
	What is your greatest data skills weakness?
	What tools or software do you prefer to using in the various phases of data analysis?
	What scripting language have you used in your projects so far?
	What is your experience in creating dashboards? What are the tools you have used for the purpose?
Trainings	Did the training content meet your expectations?
	Did you learn anything new?
	Was the training relevant to your job needs?
	Was the course practical and/or easy to apply?

Reference:

1. [Skills Assessment ncl.pdf](#)
2. [Skills Audit Template - MGNSW](#)

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TXI Level
BASIC



This is an overall overview of all initiatives to be taken with relevant timelines to view all initiatives from a strategic angle, helping you to start planning and to execute on your data transformation journey. This timeline can serve as a guideline and can be customized further to your own organisations needs.

Initiatives – Data-driven culture	Year 1	Year 2	Year 3
<p>Leadership competency</p> <ul style="list-style-type: none"> • Consider and actively position data analytics as a future core competency of the organisation <p>Start with communicating importance within leadership</p> <ul style="list-style-type: none"> • Create competency of senior management to explore the topic of data analytics and gain relevant basic knowledge <p>Use case studies and type of initiatives that can be launched</p>			
<p>Team structure</p> <ul style="list-style-type: none"> • Get informed on typical data analytics team structures and what they consist of, what roles serve what purpose and how it can be useful for the organisation (in-house or outsourced) • Get informed on what a data champion is <p>Inform how data champions can be useful to the organisation</p>			
<p>Skills</p> <ul style="list-style-type: none"> • Conduct basic brief skills audit on the organisation <p>Gauge initial skill levels in terms of data analytics across the organisation (i.e. online survey)</p>			
<p>Training</p> <ul style="list-style-type: none"> • Research potential trainings on data analytics skills for basic data processing (internal/external) • Initial info sessions with staff on the basics of data analytics <p>Conduct via virtual workshops / virtual training (i.e. self conducted or via university or external provider)</p>			

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TXI Level
BASIC



The organisation's reports are static and need to be manually refreshed and maintained as there are no structured databases and querying tools. The organisation does not use any enterprise wide technology platforms for data management and is limited to capturing and presenting historical statistics and data in tabular form.



Key considerations

Data platform and management

- Start creating basic organizational awareness of various systems and repositories where data is stored across the organization
- Start designing a data architecture that includes how data is acquired, transported, stored, queried and secured.

Data utilisation

- Start planning a basic data audit to uncover how data is currently being used and to find out its current landscape including a plan to identify all unique sources of data and information regularly being acquired and different analysis being done across the organisation (i.e. via Excel models)

Stage of data analytics

- Mainly storing data and only doing basic analysis on an ad-hoc basis when required as well as for reporting purposes of key metrics i.e. financials
- Reports are still manually being updated (no automation),
- Explore potential ways to automate reports in the future (i.e. automated data reporting tools)

Report format and automation

- Start informing about the tools for data ingestion, integration, computation, quality profiling and backup, version control, issue tracking and data modelling (i.e. data visualisation and basic data processing Business Intelligence (BI) tools such as Qlik Sense and Power BI and how they could fit into the organisation in the future to replace some of the old processes and ways of doing things).

Ready, set, go!

WHAT IS DATA ANALYTICS IN TOURISM?

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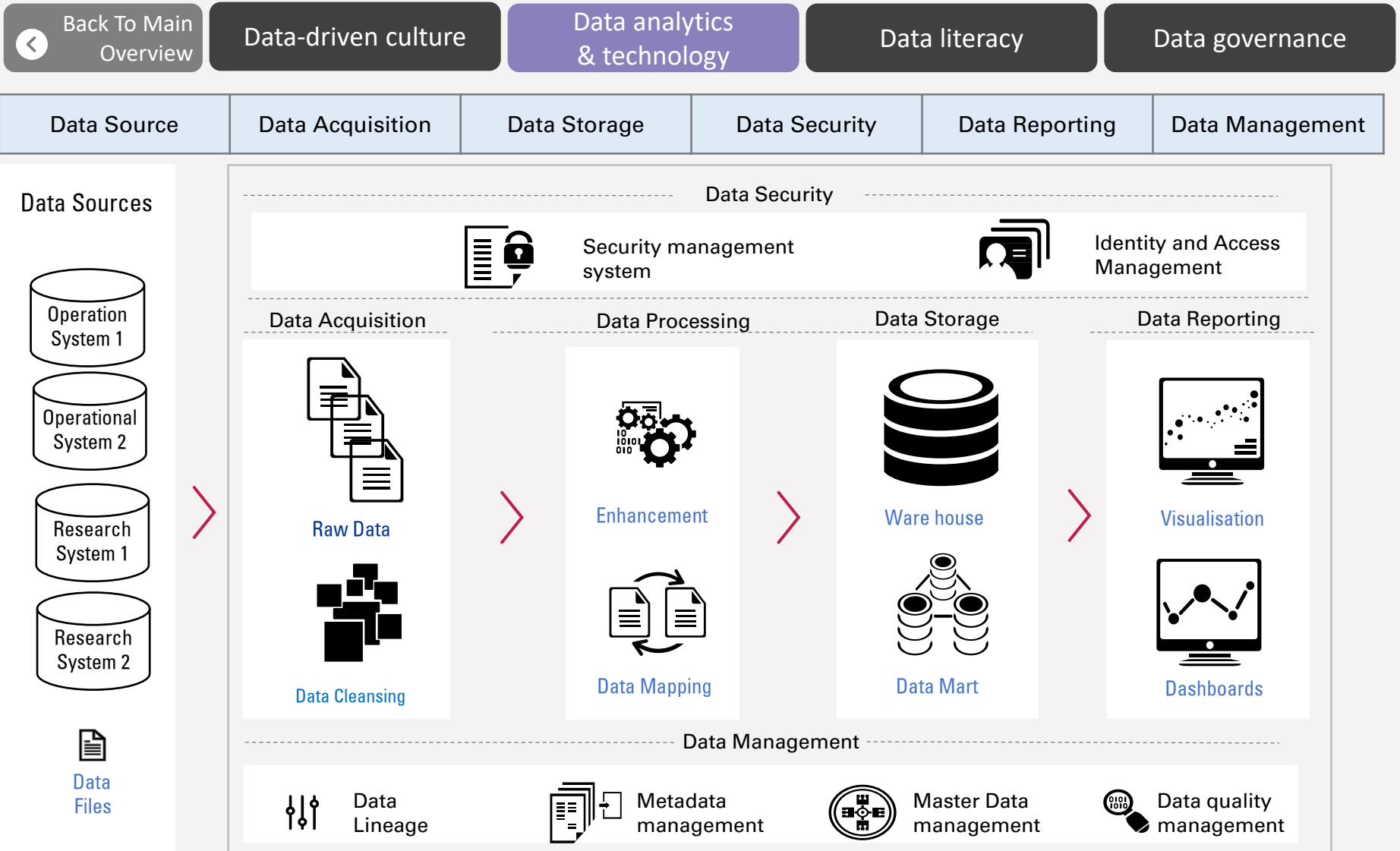
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Reference:

1. [What is data architecture? A framework for managing data - ARN \(arnnet.com.au\)](http://arnnet.com.au)
2. [Big Data Layers – Data Source, Ingestion, Manage and Analyze Layer – RCV Academy](#)

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TXI Level
BASIC



This is an overall overview of all initiatives to be taken with relevant timelines to view all initiatives from a strategic angle, helping you to start planning and to execute on your data transformation journey. This timeline can serve as a guideline and can be customized further to your own organisations needs.

Timeline			
Initiatives – Data analytics & technology	Year 1	Year 2	Year 3
<p>Data platform and management</p> <ul style="list-style-type: none"> • Start understanding basic organizational awareness of various systems and repositories where data is stored Start identifying different systems and repositories • Start designing a data architecture Include how data is acquired, transported, stored, queried, secured 			
<p>Data utilization</p> <ul style="list-style-type: none"> • Start planning a data audit to uncover how data is currently being used and to find out its current landscape Create a plan to identify all unique sources of data and information regularly being acquired and different analysis being done across the organisation (i.e. via Excel models) 			
<p>Stage of data analytics</p> <ul style="list-style-type: none"> • Explore potential ways to automate reports in the future Explore i.e. automated data reporting tools 			
<p>Report format and automation</p> <ul style="list-style-type: none"> • Start informing about tools for data ingestion, integration, computation etc., and how they could fit into the organisation for the future to replace some of the old processes and ways of doing things 			

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There is no clear articulation of a data proficiency framework, and employees use operational data to do basic analysis to support day to day work, and present data as-is without analysis.

Key considerations

Assessing data literacy

- Start by assessing basic data literacy with a few questions i.e. How many people in your business have done any data modelling before or simple analysis with i.e. Microsoft Excel (i.e. pivot tables, regression analysis etc.)

Establish a data literacy program

- Identify employees who can be fluent and native data speakers in the future
- Identify employees who can be future data translators serving as mediators to the business side other groups within the business

Beware of communication barrier

- Look for areas where communication barriers mean that data isn't being utilized at all
- Conduct data literacy assessments to identify gaps and use as a baseline
- Champion data literacy and evangelize the benefits of eliminating the data literacy gap in the future



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[Click here to find out more.](#)

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Sample questionnaire to assess your company's data literacy level:

Question	Options
1. How has been your experience with Analytics	<ul style="list-style-type: none"> <input type="radio"/> I feel it slows down the decision-making process <input type="radio"/> I think it is very important for growth, but I cannot utilize it as much as I want to <input type="radio"/> It is very important, and I do it myself / hold my team accountable for it
3. Which of the following statement best describes you?	<ul style="list-style-type: none"> <input type="radio"/> I understand the structured process for Analytics, but I can't do it myself <input type="radio"/> I understand the structured process for Analytics, and I can use it to drive insights <input type="radio"/> What is a structure process for Analytics?
4. Do you know when to use mean, median, or mode to understand what the data means?	<ul style="list-style-type: none"> <input type="radio"/> Never used it <input type="radio"/> I use it daily <input type="radio"/> I get confused with these <input type="radio"/> I don't know what do they mean
5. Do users of data in your organization share a common vocabulary and terminology to understand the meaning of data?	<ul style="list-style-type: none"> <input type="radio"/> Never <input type="radio"/> Sometimes <input type="radio"/> Always
6. Do leaders provide ongoing support and development to ensure the organization has the skills to consume and use data effectively?	<ul style="list-style-type: none"> <input type="radio"/> Never <input type="radio"/> Sometimes <input type="radio"/> Always
7. Do all employees understand how their work contributions align with key metrics and organizational goals?	<ul style="list-style-type: none"> <input type="radio"/> Never <input type="radio"/> Sometimes <input type="radio"/> Always
8. Do leaders reference key metrics and data analysis when they communicate goals and priorities?	<ul style="list-style-type: none"> <input type="radio"/> Never <input type="radio"/> Sometimes <input type="radio"/> Always

References:

1. [Data Literacy Assessment | Aryng](#)
2. [Data literacy | Numeracy | How data-literate are you? \(passionned.com\)](#)

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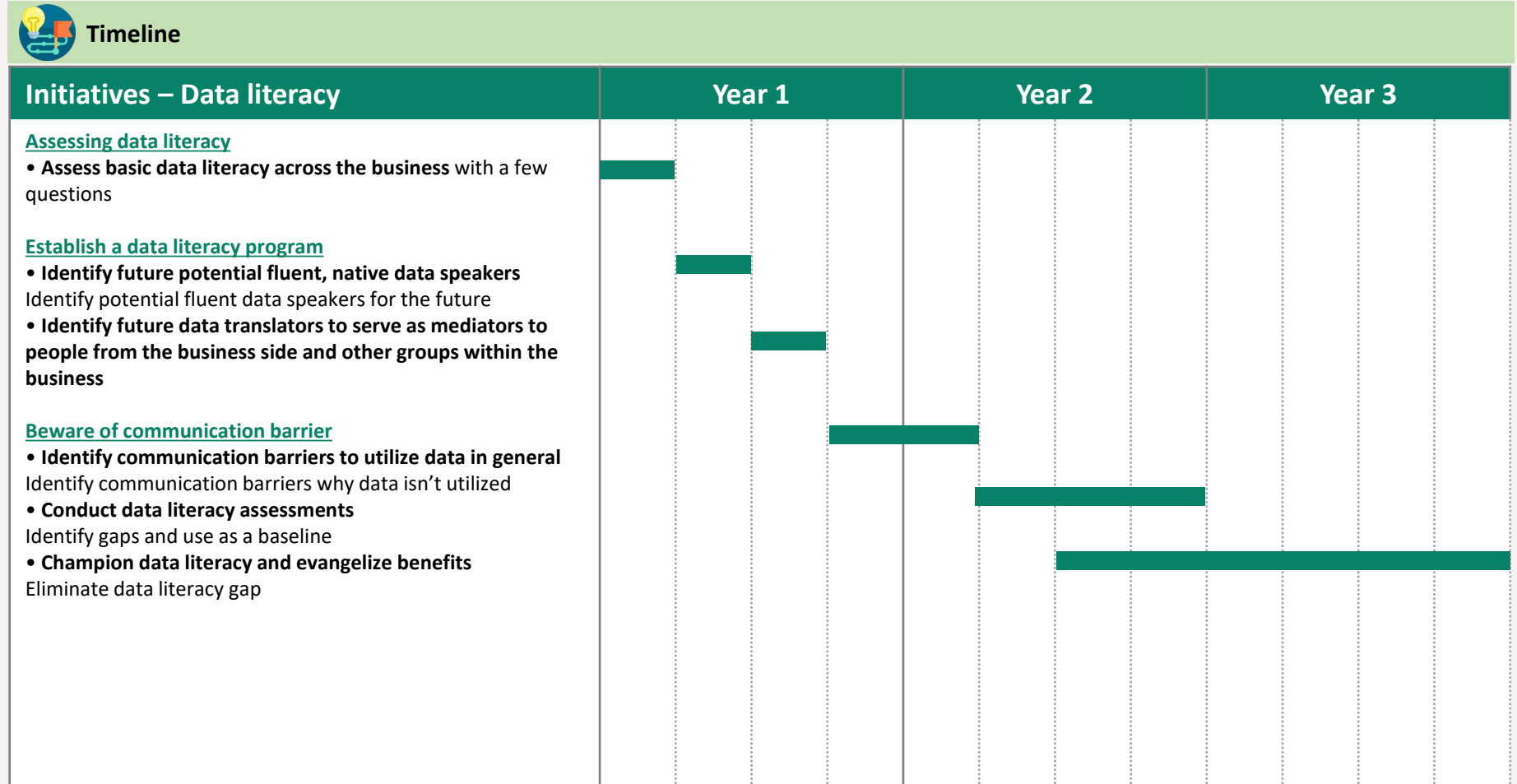
Quick Links and Tools



TXI Level
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The organisation has no formal data governance structure and policies for the storage, use and sharing of data. There is also no formal data quality evaluation framework nor do they see a need for such a framework.

Key considerations

Data strategy

- Explore future value of data and how it can be made part of the company strategy

Data accountability and ownership

- Start exploring data policy frameworks and how to implement these
- Explore requirements to set up a future data compliance team to monitor compliance with data governance requirements (i.e. data compliance officers who enforce non-compliance) either internally or outsourced

Data policies and governance

- Start exploring data governance framework structures and policies for data use, storage and sharing (i.e. decision rights and accountability rules and regulations)
- Start exploring future primary roles and responsibilities within data governance to be filled by current employees, such as data owners who have decision-making authority and have the rights to access and edit data and how it is used, and data stewards who manage data and focus on data quality.

Data management

- Explore making role-based data access rules that determine who can access what data for the future part of the governance framework

[Click here to read STB's Data Governance and Data Quality Playbook.](#)

[Back](#)

Click next to view sample data governance framework [Next](#)

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Sample Data Policy Framework

- 1 Data protection principles
- 2 General provisions
- 3 Lawful, fair and transparent processing
- 4 Lawful purposes
- 5 Data minimization
- 6 Accuracy
- 7 Archiving and removal
- 8 Security

Sample Data Governance Framework

- 1 Data governance vision and principles
- 2 Governance structure
- 3 Accountability mechanism
- 4 Data governance policy
- 5 Privacy and security policy
- 6 Legal instruments

Sample Data Compliance Framework

- 1 Establish a core team
- 2 Define the problems you're hoping to solve
- 3 Assess what tools and skills you will need
- 4 Inventory your data
- 5 Identify capabilities and gaps

References:

1. [Sample Data Protection Policy Template \(iapp.org\)](http://iapp.org)
2. [Sample Data Management Policy Structure \(culturehive.co.uk\)](http://culturehive.co.uk)
3. [BCFNDGI Data Governance Framework \(squarespace.com\)](http://squarespace.com)
4. [Data governance framework — guide and examples | Talend](#)
5. [What is data governance? A best practices framework for managing data assets | CIO](#)
6. [\(1\) New Message! \(informatica.com\)](http://informatica.com)
7. [Designing data governance that delivers value | McKinsey](#)
8. [5 steps to creating a strong compliance and data governance practice \(rstor.io\)](http://rstor.io)
9. [How to build a crack compliance team | Thomson Reuters](#)
10. [5 keys to data protection compliance | TechBeacon](#)

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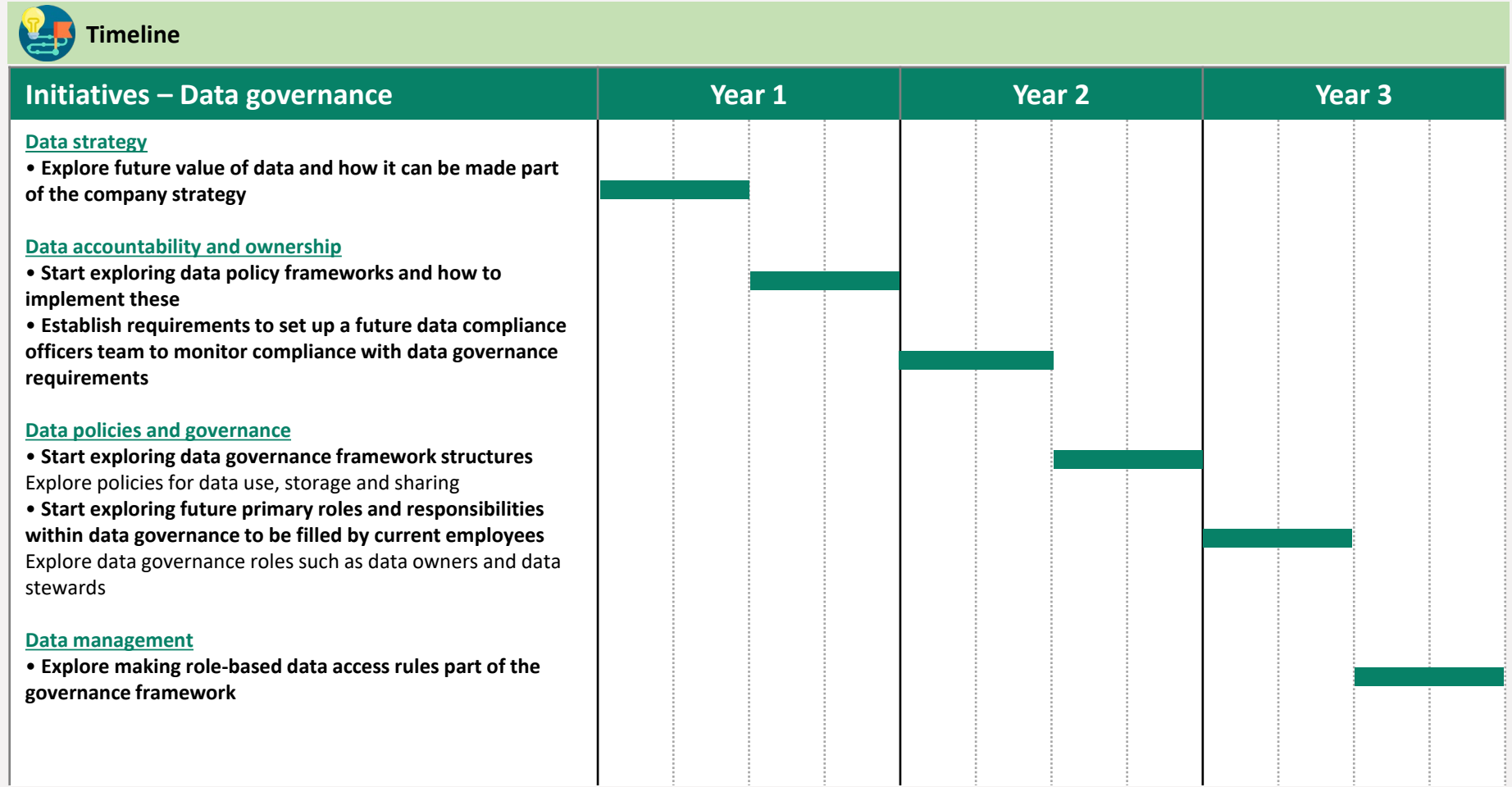
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TXI Level
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The leadership team builds interest for data and analytics through active application of basic analytics, where they are used to understand the root cause of the outcomes of business decisions. The organisation sees the value of data proficiency for some key departments but has not developed an organisational strategy for the collection and use of data.

Key considerations

Leadership competency

- Create a clear vision and strategy for data analytics / emphasizing data analytics that is partially embedded and aligned with both business and IT strategy
- Adapt and embrace transformational efforts on an organisational level, supported by the senior management level or data champions to be the voice of the data transformation initiatives in the entire organisation (i.e. announcing initiatives, vouching for initiatives, spearheading initiatives)

Team structure

- Identify and review the roles and responsibilities of what is needed to build a data analytics team. Identify 1-2 existing staff to be trained.
- Assign data champions (someone with both business and data knowledge who can lead data initiatives and advocates for adoption of data analytics usage in the organisation) in each business unit to drive and adopt use cases, liaise and partner with businesses to drive collaborations between business and technical employees. Organisations can sponsor data champions to participate in STB's Data Analytics SHift (DASH) Programme.

Skills

- Conduct a skills audit to identifying gaps targeted at all employees (i.e. organisation-wide online survey and more in-dept sessions with key data champions from identified business units)

Training

- Conduct trainings on data analytics skills for basic data processing using Business Intelligence (BI) tools such as Qlik Sense and Power BI (either provision of internal training to a wider group of staff or potential to send staff individually to external training options i.e. via STB Data College, SkillsFuture etc.)
- Conduct creative/design thinking workshops to introduce data analytics (i.e. how can we improves our business performance through data analytics)



Tcube is a hybrid innovation space that brings STB's digital initiatives, resources and thought leadership content onto a single platform to support tourism stakeholders in their digital transformation journey.

[Click here to find out more.](#)

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Below is a sample data-driven culture questionnaire which includes both quantitative and qualitative questions.

Dimensions	Questions
Leadership	Does your team regularly have a vibrant data culture conversation?
	Do you spend as much (quality time) on data culture as you do on strategy?
	Is there clarity around how data can contribute to a successful business?
	Are all communications channels utilized – especially those preferred by employees who inhabit the informal organization – to promote importance of data?
	Do you hire with/promote with “tomorrow’s” data culture in mind?
Team Structure	Do the team members have absolute clarity about their role in the team?
	Is there someone to lead/advise when members of the data team meet with any issues?
Skills	Which step of data analysis project do you enjoy the most?
	What is your greatest data skills strength?
	What is your greatest data skills weakness?
	What tools or software do you prefer to using in the various phases of data analysis?
	What scripting language have you used in your projects so far?
Trainings	What is your experience in creating dashboards? What are the tools you have used for the purpose?
	Did the training content meet your expectations?
	Did you learn anything new?
	Was the training relevant to your job needs?
	Was the course practical and/or easy to apply?

References:

1. [Skills Assessment ncl.pdf](#)
2. [Skills Audit Template - MGNSW](#)

Ready, set, go!

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Initiatives – Data-driven culture	Year 1	Year 2	Year 3
<p>Leadership competency</p> <ul style="list-style-type: none"> • Create a clear vision and strategy for data analytics To be embedded and aligned with business & IT strategy • Adapt and embrace transformational efforts on an organisational level Senior leadership to announce, vouch for and spearhead initiatives across the entire journey 	█		
<p>Team structure</p> <ul style="list-style-type: none"> • Establish a dedicated data and analytics team Review roles and responsibilities needed and identify 1-2 existing staff to be trained • Assign data champions in each business unit 	█	█	
<p>Skills</p> <ul style="list-style-type: none"> • Conduct skills audit on the organisation Organisation wide online survey, in-depth sessions with data champions 	█		
<p>Training</p> <ul style="list-style-type: none"> • Conduct training programmes on data analytics Data analytics skills for basic data processing using Business Intelligence (BI) tools • Mindset Change for the Organisation Creative / design thinking workshops on data analytics 	█	█	█

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The organisation uses structured databases and querying tools to extract relevant data insights, wherein the work flow consists of a mix of automated and manual processes which however exist in silos. The organisation has access to localised data management platforms which support limited functions such as reporting, but it is unable to analyse and deep dive into historical statistics and data to uncover insights from past business outcomes.



Key considerations

Data platform and management

- Organization understands some of the key interfaces between different systems and repositories although data still seats in silos
- A data architecture is designed and deployed, with database systems and other types of repositories for an organization's data

Data utilisation

- Conduct a data audit to uncover how data is currently being used and to find out its current landscape. Below are the proposed steps to doing so:
 1. Identify all unique sources of data and information regularly being acquired
 2. Understand what analysis has been done for reporting and analytical purposes

Stage of data analytics

- Mainly using data for descriptive analysis to analyse historical data for performance and reporting of key metrics
- Some of the reports are starting to be automated while mainly bulk of it is still manually being updated
- Work with businesses units periodically to identify some value-added use cases which can be addressed using data analytics. Use outcomes of the exercises to showcase values and gain buy-in across the organisation

Report format and automation

- Plan out waves of data tool implementation, with focus on tools for data ingestion, integration, computation, quality profiling and backup, version control, issue tracking and data modelling (i.e. data visualisation and basic data processing Business Intelligence (BI) tools such as Qlik Sense and Power BI)

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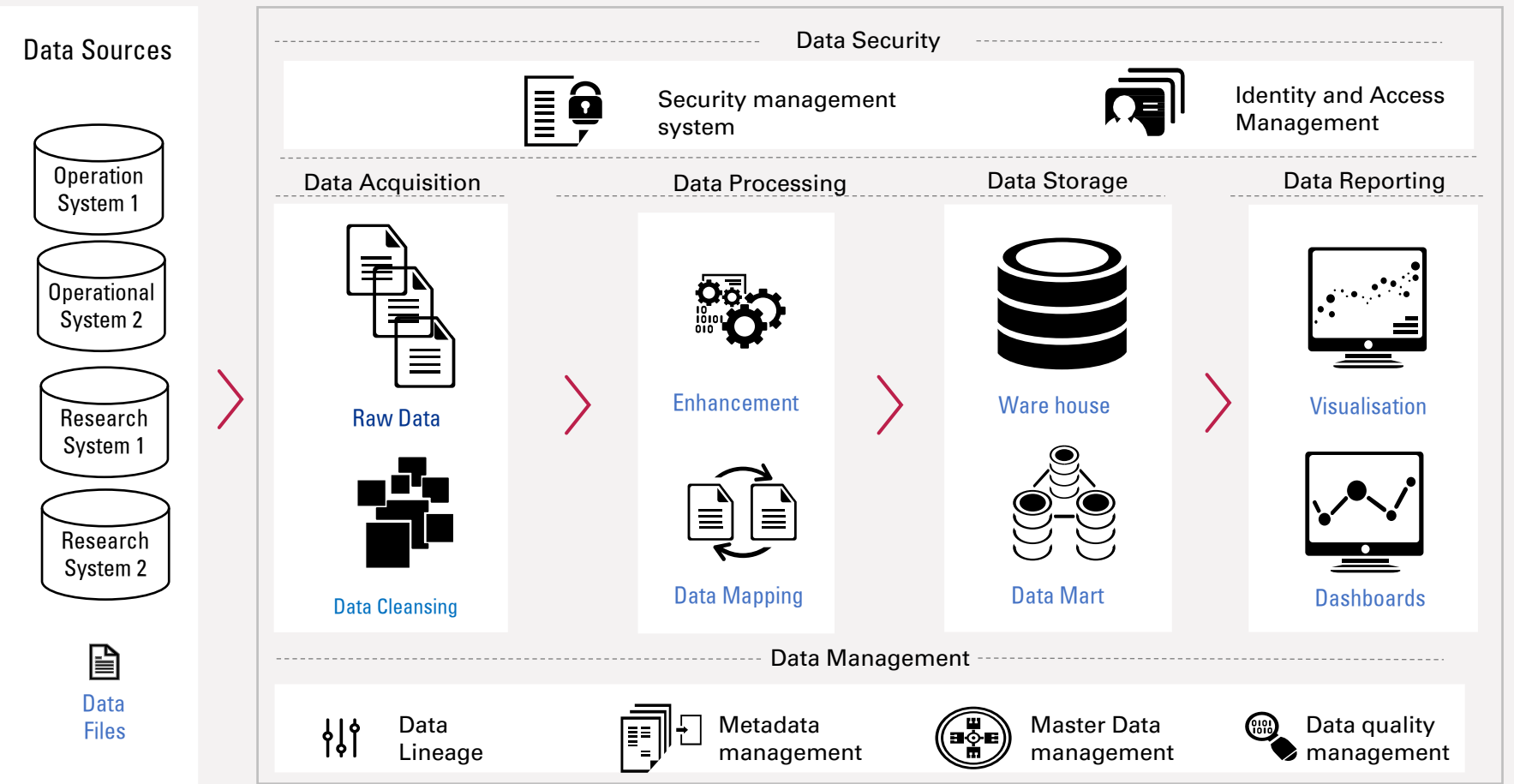
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Data Source	Data Acquisition	Data Storage	Data Security	Data Reporting	Data Management
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References:

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Timeline			
Initiatives – Data analytics & technology	Year 1	Year 2	Year 3
<p>Data platform and management</p> <ul style="list-style-type: none"> • Organization understands some of the key interfaces between different systems and repositories although data still seats in silos • A data architecture is designed and deployed 			
<p>Data utilisation</p> <ul style="list-style-type: none"> • Conduct data audit <p>Identify all unique sources of data, understand what analysis has been done, improve understanding of variety, velocity and volume of data to be ingested into data warehouse</p>			
<p>Stage of data analytics</p> <ul style="list-style-type: none"> • Start experimenting with automating some reports • Work with businesses units periodically to identify some value-added use cases which can be addressed <p>Use outcomes of the exercises to showcase values and gain buy-in across the organization.</p>			
<p>Report format and automation</p> <ul style="list-style-type: none"> • Plan out waves of data tool implementation / Business Intelligence (BI) tools <p>Focus on data visualisation and basic data processing</p>			

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The organisation has identified broad, high level data competencies applicable for certain business functions only, and employees are able to perform descriptive analysis to highlight trends and business implications.

Key considerations

Assessing data literacy

- Data and analytics leaders are responsible for creating the narrative for data literacy, highlighting the business value to be gained. Start by assessing data literacy with a few questions i.e. How many people in your business do you think can interpret straightforward statistical operations such as correlations.

Establish a data literacy program

- Identify the fluent and native data speakers. Look at business analyst, data stewards and architects who are able to speak data naturally and effortlessly.
- Identify employees who can be skilled data translators serving as mediators to the business side and other groups within the business

Beware of communication barrier

- Look for areas where communication barriers mean that data isn't being utilized to its full business potential.
- Conduct data literacy assessments to identify gaps and use as a baseline
- Ensure that the teams are speaking data in all meetings when discussing business outcomes and in other business situations. Data and analytics leaders and data teams must lead by example.
- Champion data literacy and evangelize the benefits of eliminating the data literacy gap.



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Sample questionnaire to assess your company's data literacy level:

Question	Options
1. How has been your experience with Analytics	<ul style="list-style-type: none"> <input type="radio"/> I feel it slows down the decision-making process <input type="radio"/> I think it is very important for growth, but I cannot utilize it as much as I want to <input type="radio"/> It is very important, and I do it myself / hold my team accountable for it
3. Which of the following statement best describes you?	<ul style="list-style-type: none"> <input type="radio"/> I understand the structured process for Analytics, but I can't do it myself <input type="radio"/> I understand the structured process for Analytics, and I can use it to drive insights <input type="radio"/> What is a structure process for Analytics?
4. Do you know when to use mean, median, or mode to understand what the data means?	<ul style="list-style-type: none"> <input type="radio"/> Never used it <input type="radio"/> I use it daily <input type="radio"/> I get confused with these <input type="radio"/> I don't know what do they mean
5. Do users of data in your organization share a common vocabulary and terminology to understand the meaning of data?	<ul style="list-style-type: none"> <input type="radio"/> Never <input type="radio"/> Sometimes <input type="radio"/> Always
6. Do leaders provide ongoing support and development to ensure the organization has the skills to consume and use data effectively?	<ul style="list-style-type: none"> <input type="radio"/> Never <input type="radio"/> Sometimes <input type="radio"/> Always
7. Do all employees understand how their work contributions align with key metrics and organizational goals?	<ul style="list-style-type: none"> <input type="radio"/> Never <input type="radio"/> Sometimes <input type="radio"/> Always
8. Do leaders reference key metrics and data analysis when they communicate goals and priorities?	<ul style="list-style-type: none"> <input type="radio"/> Never <input type="radio"/> Sometimes <input type="radio"/> Always

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Timeline

Initiatives – Data literacy	Year 1	Year 2	Year 3
<p><u>Assessing data literacy</u></p> <ul style="list-style-type: none"> • Assess data literacy across the business with a few questions 	[Timeline bar spanning Year 1]		
<p><u>Establish a data literacy program</u></p> <ul style="list-style-type: none"> • Identify fluent, native data speakers Look at business analysts, data stewards and architects • Identify skilled data translators to serve as mediators to the business side and other groups within the business 	[Timeline bars spanning Year 1]		
<p><u>Beware of communication barrier</u></p> <ul style="list-style-type: none"> • Identify communication barriers Identify barriers to utilize data to its full business potential • Conduct data literacy assessments Identify gaps and use as a baseline • Champion data literacy and evangelize benefits Eliminate data literacy gap 	[Timeline bars spanning Year 1 and Year 2]		
	[Timeline bar spanning Year 2 and Year 3]		

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Data governance policies for the storage, use and sharing of data exist within some departments but these are not consistent across the entire organisation - data is kept by departments in their respective siloes. Some business and data owners have been identified but they do not have any formal roles in data governance. The organisation does see a need for a formal data quality evaluation framework but does not have one yet.



Key considerations

Data strategy

- Explore making data an integral part of how the organisation delivers the most important services, and emphasise its future value

Data accountability and ownership

- Train employees on the requirements of the data policy, suggestions for implementation and the penalties of non-compliance
- Establish a data compliance team to monitor compliance with data governance requirements (i.e. data compliance officers who enforce non-compliance), 1-2 staff either internally or outsourced

Data policies and governance

- Create data governance framework structure and policies for data use, storage and sharing (i.e. decision rights and accountability rules and regulations), tailored to the needs to the organisation, where principles and goals of best practice data management are embedded and advocated in all appropriate policy documents
- Define primary roles and responsibilities within data governance, such as data owners who have decision-making authority and have the rights to access and edit data and how it is used, and data stewards who manage data and focus on data quality

To operationalise the data governance framework, below are the minimum steps needed to be taken:

1. Define the data governance policies
2. Communicate the policy
3. Train staff on requirements, establish control processes with acceptable thresholds
4. Enforce policies
5. Maintain policies and communicate changes
6. Establish dedicated roles within the organisation and for every project

Data management

- Explore the ability of role-based data access rules that determine who can access what data for the future



[Click here to read STB's Data Governance and Data Quality Playbook.](#)

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Click next to view sample data governance framework

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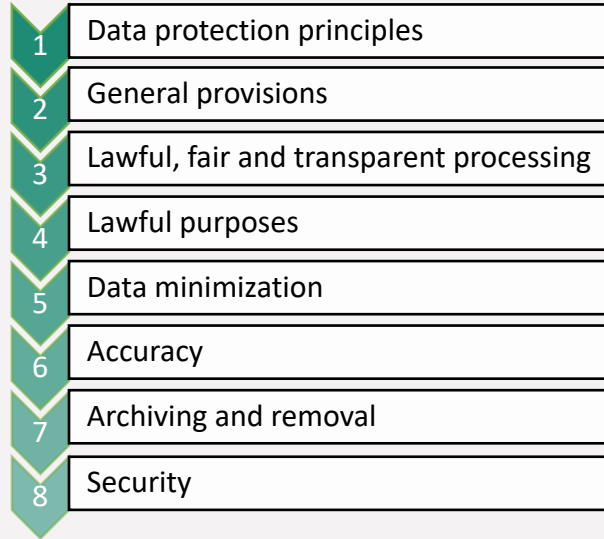
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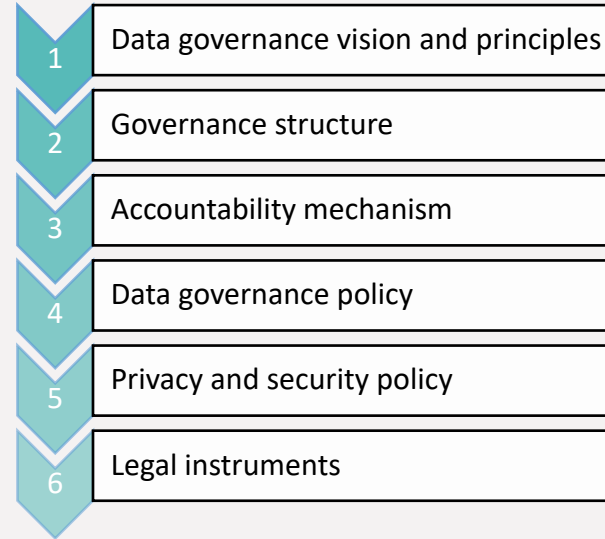
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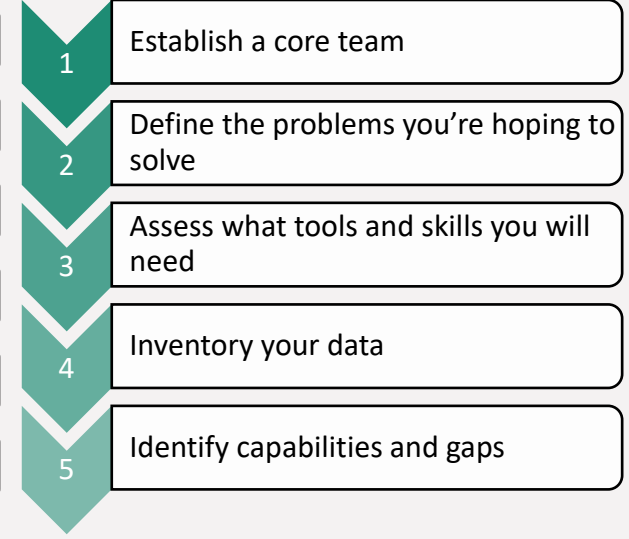
Sample Data Policy Framework



Sample Data Governance Framework



Sample Data Compliance Framework



References:

1. [Sample Data Protection Policy Template \(iapp.org\)](http://iapp.org)
2. [Sample Data Management Policy Structure \(culturehive.co.uk\)](http://culturehive.co.uk)
3. [BCFNDGI Data Governance Framework \(squarespace.com\)](http://squarespace.com)
4. [Data governance framework — guide and examples | Talend](#)
5. [What is data governance? A best practices framework for managing data assets | CIO](#)
6. [\(1\) New Message! \(informatica.com\)](http://informatica.com)
7. [Designing data governance that delivers value | McKinsey](#)
8. [5 steps to creating a strong compliance and data governance practice \(rstor.io\)](http://rstor.io)
9. [How to build a crack compliance team | Thomson Reuters](#)
10. [5 keys to data protection compliance | TechBeacon](#)

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Timeline			
Initiatives – Data governance	Year 1	Year 2	Year 3
<p>Data strategy</p> <ul style="list-style-type: none"> • Explore making data an integral part of how the organisation delivers the most important services, emphasise its future value 			
<p>Data accountability and ownership</p> <ul style="list-style-type: none"> • Train employees on data policies and penalties of non-compliance • Establish data compliance officers team and monitor compliance <p>Monitor and enforce non-compliance, 1-2 staff</p>			
<p>Data policies and governance</p> <ul style="list-style-type: none"> • Create data governance framework structure and policies <p>Tailor to needs of organisation, advocate best practice principles in all appropriate policy documents</p> <ul style="list-style-type: none"> • Define primary roles and responsibilities within data governance <p>Define data owners access and edit rights and how data is used and have dedicated roles within the organisation and for each project</p>			
<p>Data management</p> <ul style="list-style-type: none"> • Explore role-based data access rules for the future 			

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The leadership team being committed to building a data-driven culture, allocates resources and time to build up the organisation's analytical capability. Data and analytics are used to predict the likelihood of an outcome for key business decisions. The organisation sees the value of what data can bring about if it is being utilised wisely.



Key considerations

Leadership competency

- Possess understanding of the importance of data analytics to the organisation (buy-in), embarked on data analytics projects and supports the team through additional investments and push for resources
- Drive key leadership decision making through active use of data analytics (i.e. relevant data analysis, metrics, dashboards)

Team structure

- Form a strong in-house data analytics (i.e. data analysts, data scientists and data engineers) and data governance team (i.e. data controllers) to support future endeavours such as initiatives to drive new data analytics use cases or implementation of a Data Lake/Warehouse
- Create a community of champions in each business unit to pick up data analytics skills, share success stories, participate in mini challenges to engage the organisation on a working level, as well as to drive and adopt use cases.
- Create incentives for the champions and the communities to encourage engagement (i.e. recognition, small prizes etc.)

Skills

Conduct a skills audit to identifying gaps targeted at all employees (i.e. organisation-wide online survey and more in-dept sessions with key data champions from identified business units)

Training

- Encourage key champions and data analytics team to block dedicated time to attend advanced data analytics training courses
- Identify long term training needs (i.e. intermediate training needs of department staffs)



Tcube is a hybrid innovation space that brings STB's digital initiatives, resources and thought leadership content onto a single platform to support tourism stakeholders in their digital transformation journey.

[Click here to find out more.](#)

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Timeline				
Initiatives – Data-driven culture	Year 1	Year 2	Year 3	
<p>Leadership competency</p> <ul style="list-style-type: none"> • Possess understanding of importance of data analytics <p>Embark on data analytics projects and support teams with additional investments and push for resources</p> <ul style="list-style-type: none"> • Drive key leadership decision making through active use of data analytics, metrics, dashboards <p>Team structure</p> <ul style="list-style-type: none"> • Form in-house data analytics and data governance team <p>Include data-analysts, -scientists, -engineers and -controllers</p> <ul style="list-style-type: none"> • Create community of data analytics champions in each business unit <p>Enable community to share data analytics skills, share success stories, participate in mini challenges.</p> <ul style="list-style-type: none"> • Educate staff across the organisation about data analytics <p>Offer foundational courses and annual workshops</p> <p>Skills</p> <ul style="list-style-type: none"> • Conduct skills audit on the organisation <p>Conduct org. wide online survey, in-depth sessions with data champions</p> <p>Training</p> <ul style="list-style-type: none"> • Encourage data analytics team to block dedicated time to attend advanced data analytics training courses • Educate across the organisation about data analytics <p>Educate through foundational courses, annual workshops</p>				

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Although analytics tools are available, they are not extensively used - decision makers have access to some automated reports and dashboards but continue to rely on manual processing for others. The organisation has a data management platform that supports analytics but is only deployed to key business functions. The capability in predictive modelling through historical data is being developed but it is yet to be used in any business decisions.



Key considerations

Data platform and management

- Data is generated, processed and stored in a database, file system, cloud object storage service or other data repository
- Data may be integrated in a data lake/warehouse for analysis purposes
- Make Business intelligence tools (i.e. Qlik Sense; Power BI and Tableau) easily accessible at enterprise level

Data utilisation

- Carry out workshops with business units periodically to identify high value use cases which can be addressed using data analytics. Use outcomes of the exercises to showcase values and gain buy-in across the organization.
- Conduct a data audit to understand how data is currently being used and to find out its current landscape. Below are the propose steps to doing so:
 1. Identify all unique sources of data and information regularly being acquired
 2. Understand what analysis has been done for reporting and analytical purposes
 3. Improve understanding of variety, velocity and volume of data to be ingested into data warehouse

Stage of data analytics

- Explore diagnostic analytics to get deep insights (i.e. understanding customer patterns on a weekday/weekend/time of day basis)
- Target to move towards predictive analytics in the future (i.e. utilizing data mining, predictive modelling, and machine learning that analyse current and historical facts to make predictions about future or otherwise unknown events)

Report format and automation

- Automate generation of reports on timely basis in platform instead of manual mapping of data elements and pulling together data from different systems
- Self-service reporting amongst business units (i.e. from data visualization and reporting tools such as Tableau, Power BI)



[Read on how to implement a Data Warehouse.](#)



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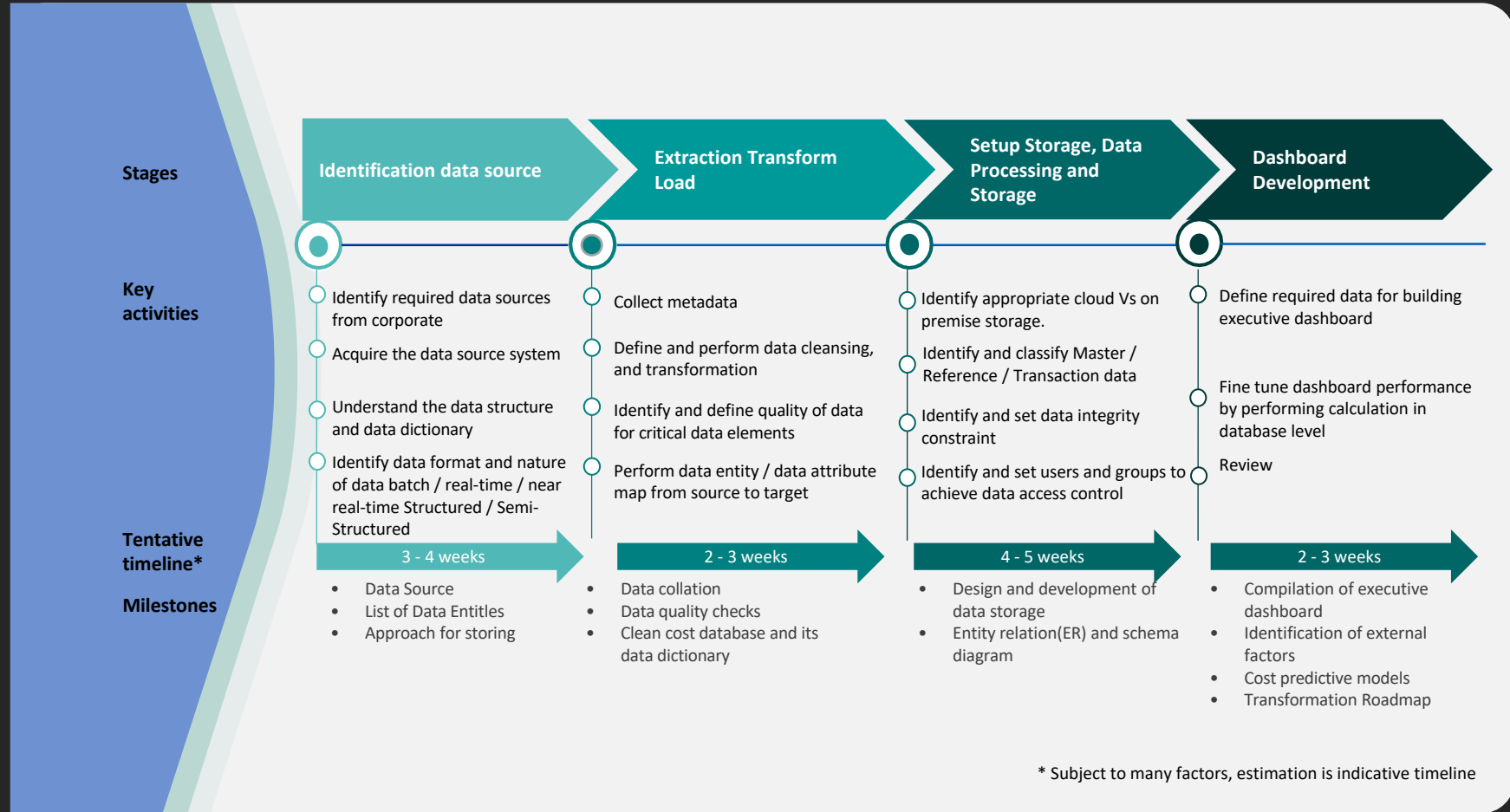
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Approach for Data Warehouse Implementation



* Subject to many factors, estimation is indicative timeline

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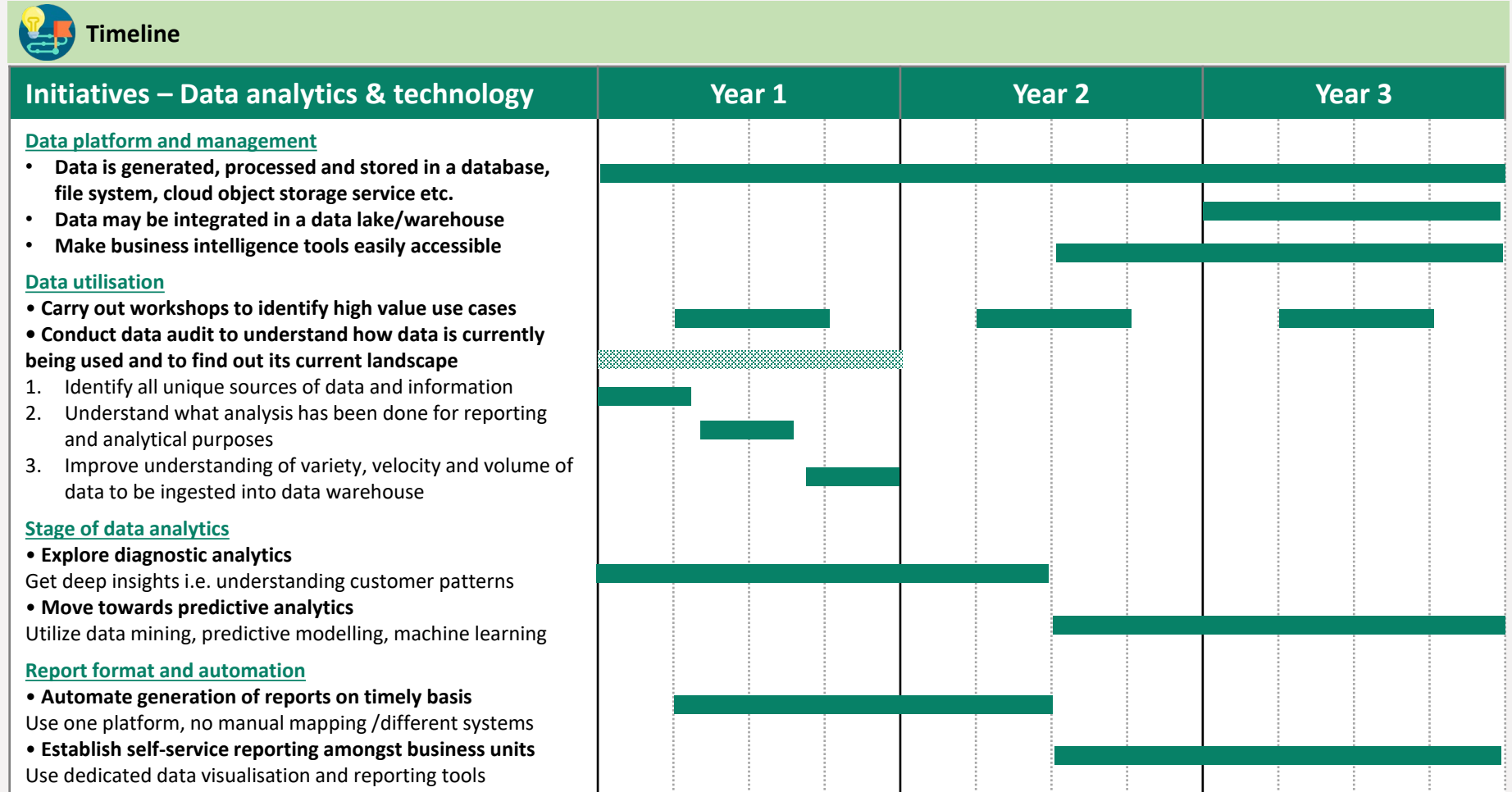
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The organisation has identified and defined data competencies that are needed, but has not mapped these to each role and level. For the most part, employees are able to integrate qualitative and quantitative data to analyse data holistically and develop deeper assumptions to perform data storytelling.



Key considerations

Assessing data literacy

- Data and analytics leaders are responsible for creating the narrative for data literacy, highlighting the business value to be gained. Start by assessing data literacy with a few questions i.e. How many people in your business do you think can interpret straightforward statistical operations such as correlations.
- Make sure people know how to use the tools. Excel is still very useful. While lots of software will provide reporting and analytics functions, for most users (unable to utilise full business intelligence) to feel like they are in control of their data, in particular, to compare data from distinct and disparate sources, Excel (including the still-ubiquitous csv file) remains the common currency.

Establish a data literacy program

- Identify the fluent and native data speakers. Look at business analysts, data stewards and architects who are able to speak data naturally and effortlessly.
- Identify more employees who can be data translators serving as mediators to the business side and to other groups within the business
- Set up a capability academy for data skills. A capability academy is a place where employees can go to advance specific job-related skills. Carefully select the data skills needed by your workforce to arrive at a skills framework.

Beware of communication barrier

- Look for areas where communication barriers mean that data isn't being utilized to its full business potential.
- Conduct data literacy assessments to identify gaps and use as a baseline
- Data and analytics leaders and data teams must lead by example. Ensure that the teams are speaking data in all meetings when discussing business outcomes and in other business situations.
- Champion data literacy and evangelize the benefits of eliminating the data literacy gap.



Data College provides a one-stop platform for Singapore's tourism industry stakeholders to upskill their employees through online courses, case studies and upcoming data-related initiatives.

[Click here to find out more.](#)

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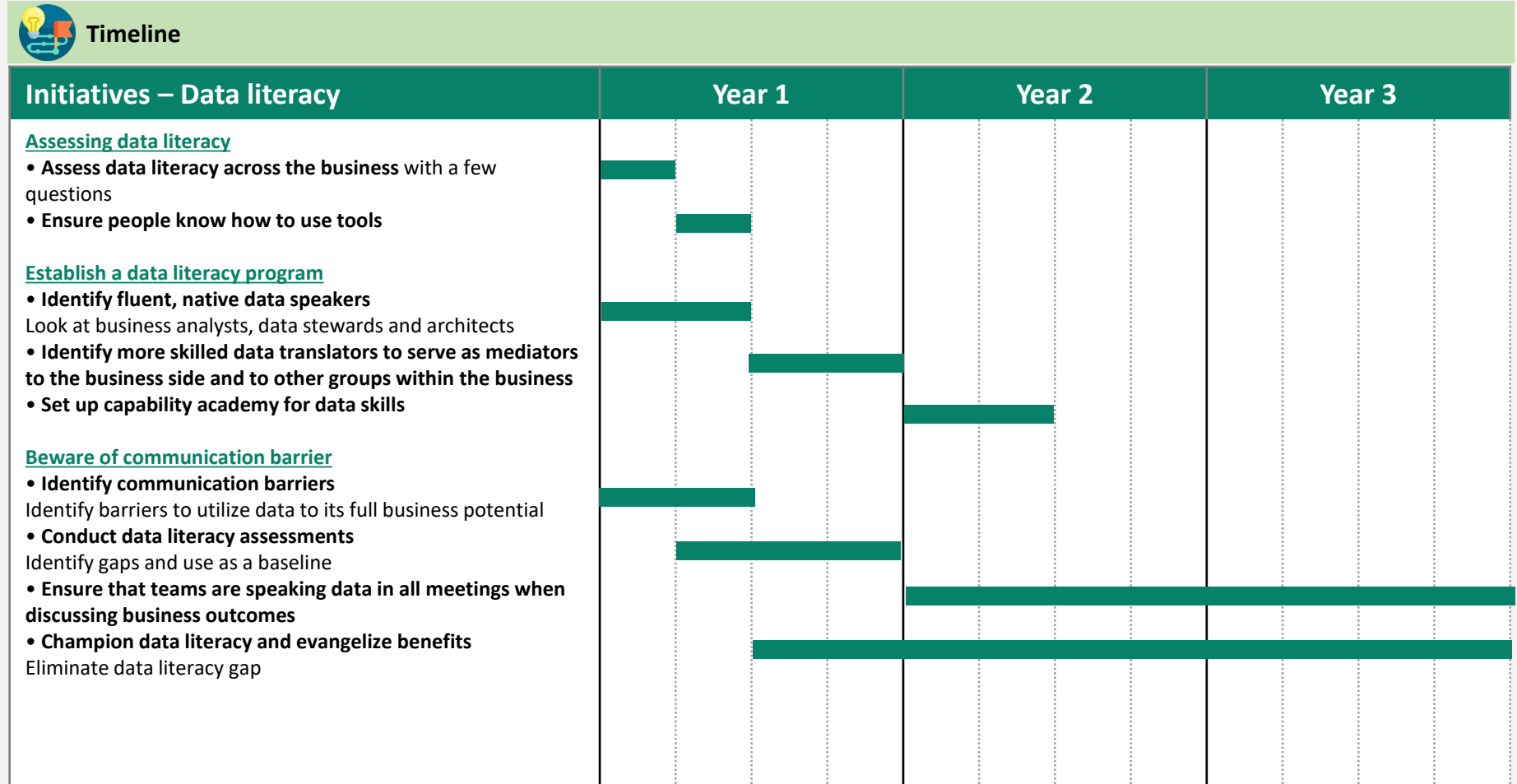
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Data governance policies exist and apply for all data sources, and the organisation is evaluating the deployment of a quality compliance method (i.e. ISO). The organisation sees a need for a formal data quality evaluation framework and is in the midst of developing one. In the meantime, business and data owners have been identified and they have an informal role in data governance. However, data is only shared with other departments on a need to basis.



Key considerations

Data strategy

- Make output of data an integral part of how the organisation delivers the most important services, and how their value is well understood by key business functions
- Affirm that data collection activities are in line with operational and strategic needs

Data accountability and ownership

- Have a data governance team or person for critical data assets (or all data assets) in the organisation
- Information asset ownership is embedded and distributed across the organisation

Data policies and governance

- Build actionable data policies across multiple functions:
 1. Set up goals of the data governance program and metrics for determining success
 2. Compile a list of data inventory of the data sources within the organisation
 3. Define permissions and who has access which data elements
 4. Classify the data into different levels such as “Secret”, “Confidential”, “Restricted”, “Public”, etc., along with the levels of security and protection required at the different levels. Employ and update data security tools on a regular basis.
 5. Define data quality measurement, aims and objectives, as well as a range of supporting activities and processes, i.e. develop SOPs, Manual, guideline for front office to capture data consistently and accurately
 6. Create master data/metadata dictionary along with data lake development and implementation
 7. Integrate training on data privacy for general training program and onboarding of new staff (including data regulations of different countries i.e. GDPR, PDPA)
- Establish and enforce SOPs in daily work to improve data quality

Data management

- Creating role-based access rules that determine who can access what data
- Establishing and maintaining the data security measures needed to comply with company policy around information security



[Click here to read STB's Data Governance and Data Quality Playbook.](#)

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Timeline

Initiatives – Data governance	Year 1	Year 2	Year 3
<p><u>Data strategy</u></p> <ul style="list-style-type: none"> • Make output of data integral part of how organisation delivers most important business services <p>Make value understood by key business functions</p>			
<p><u>Data accountability and ownership</u></p> <ul style="list-style-type: none"> • Have data governance team / person for critical data assets • Information ownership embedded / distributed across org. 			
<p><u>Data policies and governance</u></p> <ul style="list-style-type: none"> • Build actionable data policies across multiple functions <ol style="list-style-type: none"> Set up goals / success metrics of data gov. program Compile list of data inventory/data sources within the org. Define data permissions Classify the data into different security levels Employ and update data security tools on a regular basis Define data quality measurement, aims and objectives, as well as a range of supporting activities and processes Create master data/metadata dictionary along with data lake development and implementation Integrate training on data privacy for general training program and onboarding of new staff 			
<p><u>Data management</u></p> <ul style="list-style-type: none"> • Create role-based data access rules • Establish and maintain data security measures needed to comply with company policy around information security 			

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The leadership team views analytics capabilities as top priority and the organisation is in the midst of developing this across the organisation. Predictive insights derived from data are used in some instances to determine the optimum course of action for business decisions. A standalone data strategy is in place but is not updated regularly or integrated with the overall business strategy.



Key considerations

Leadership competency

- Have a clear vision and strategy for data analytics that is fully embedded and aligned with both business and IT strategy
- Sponsor all data analytics initiatives with strong support by senior leadership providing all the resources needed to undertake initiatives

Team structure

- Drive data analytics efforts across all business units through a centralised shared services hub and spoke model with a dedicated data analytics team, where business owners work with the data analytics team closely to ideate use cases and implement these in their business units
- Have formal data owners and stewards that exist in the organisation for data lifecycle management

Skills

- Introduce trainings on a continuous basis to perform analytics through the use of advanced analytics such as machine learning, AI, natural language processing, etc.

Training

- Have good understanding of data analytics across the organisation and all employees on how to bring data to life through use cases
- Schedule for data analytics team to have dedicated time to attend advanced data analytics training courses



Tcube is a hybrid innovation space that brings STB's digital initiatives, resources and thought leadership content onto a single platform to support tourism stakeholders in their digital transformation journey.

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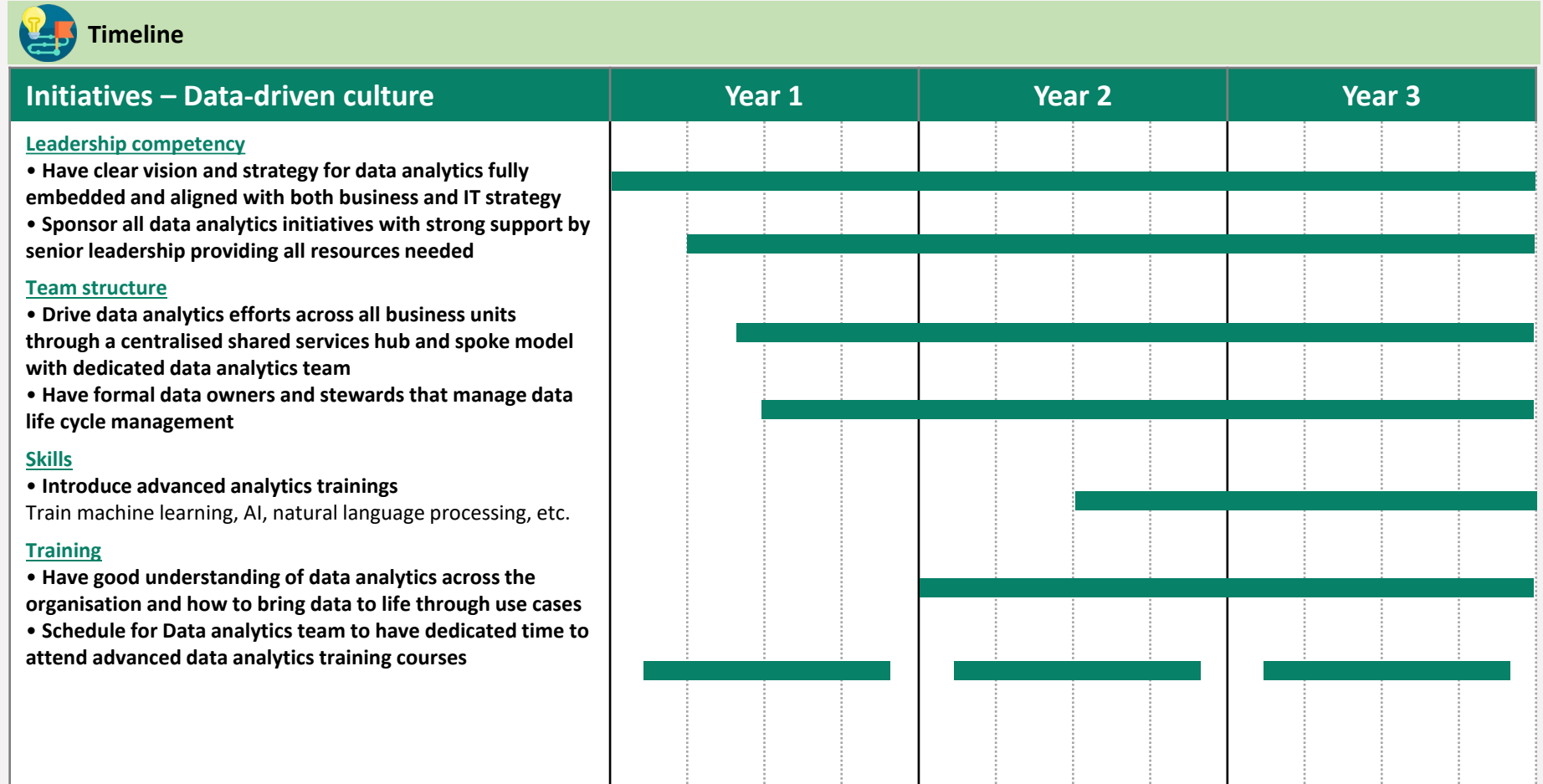
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Internal decision makers tap on advanced analytics tools extensively. In fact, an organisation wide data management platform co-exists with an established governance structure, which is updated occasionally. The organisation has the capability to conduct some predictive modelling and machine learning in key business departments.



Key considerations

Data platform and management

- Data is generated, processed and stored in a database, file system, cloud object storage service or other data repository
- Data is fully integrated in a data lake/warehouse for analysis purposes
- Data management framework and policies are implemented to ensure data standardisation, security and quality across systems
- Business intelligence tools (i.e. Qlik Sense; Power BI and Tableau) are easily accessible enterprise level

Data utilisation

- Use of data analytics by every business unit in the organization including back office i.e. HR, Finance and Operations Teams. Out of all data collected and procured by the organisation, more than 80% is processed to gain further value and to back common and important decisions in the organisation

Stage of data analytics

- Move towards predictive and prescriptive analytics, specific use cases are fully developed within the business already (i.e. natural language processing, automatic price optimization, dynamic content recommendation etc.)

Report format and automation

- Link reports to data warehouse or data lake fully, reports should automatically refresh and deliver to specific places (i.e. visual dashboards in business intelligence tools i.e. Tableau, Power BI) at a specific regular interval (i.e. weekly, monthly) with prescriptive analysis elements being performed

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Timeline			
Initiatives – Data analytics & technology	Year 1	Year 2	Year 3
<p>Data platform and management</p> <ul style="list-style-type: none"> • Data is generated, processed and stored in a database, file system, cloud object storage service or other data repository • Data is fully integrated in a data lake/warehouse • Data management framework and policies implemented <p>Ensuring data standardisation, security, quality across systems</p> <ul style="list-style-type: none"> • Business intelligence tools (i.e. Qlik Sense; Power BI and Tableau) are easily accessible enterprise level 			
<p>Data utilisation</p> <ul style="list-style-type: none"> • Use of data analytics by every business unit in the organization including back office functions – 80% of data collected is processed to gain further value 			
<p>Stage of data analytics</p> <ul style="list-style-type: none"> • Move towards predictive and prescriptive analytics, specific use cases are fully developed within the business i.e. natural language processing, automatic price optimization, dynamic content recommendation etc. 			
<p>Report format and automation</p> <ul style="list-style-type: none"> • Link and auto refresh reports through data warehouse or data lake fully and deliver to specific places <p>Deliver to i.e. visual dashboards in business intelligence tools at a specific regular interval (i.e. weekly, monthly) with prescriptive analysis elements being performed</p>			

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The organisation's data proficiency framework has identified and defined data competencies for each role and level, along with the corresponding upskilling courses/ training that is needed for key employees. Employees are equipped to use advanced data mining and modelling techniques to identify and predict patterns in data.



Key considerations

Assessing data literacy

- Assess current state of data literacy with a few questions i.e. How many people in your business know how a machine learning algorithm works and what to take into consideration when interpreting its results?. Data and analytics leaders are responsible for creating the narrative for data literacy, highlighting the business value to be gained.

Establish a data literacy program

- Have fluent and native data speakers in place i.e. business analysts, data stewards and architects who are able to speak data naturally and effortlessly.
- Have skilled data translators serving as mediators to the business side and to other groups within the business in place
- Enhance capability academy for data skills. A capability academy is a place where employees can go to advance specific job-related skills. Carefully select the data skills needed by your workforce to arrive at a skills framework.

Beware of communication barrier

- Identify remaining areas where communication barriers mean that data isn't being utilized to its full business potential.
- Conduct data literacy assessments with focus on more advanced data analytics capabilities and techniques to identify gaps and use as a baseline
- Ensure that the teams are speaking data in all meetings when discussing business outcomes and in other business situations. Data is the new mode of communication.
- Champion data literacy and evangelize the benefits of eliminating the remainder of the data literacy gap.



Data College provides a one-stop platform for Singapore's tourism industry stakeholders to upskill their employees through online courses, case studies and upcoming data-related initiatives.

[Click here to find out more.](#)



Click next to view timeline



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This is an overall overview of all initiatives to be taken with relevant timelines to view all initiatives from a strategic angle, helping you to start planning and to execute on your data transformation journey. This timeline can serve as a guideline and can be customized further to your own organisations needs.

Timeline

Initiatives – Data literacy	Year 1	Year 2	Year 3
<p>Assessing data literacy</p> <ul style="list-style-type: none"> • Assess current state of data literacy across the business Assess with a few questions, identify remaining gaps 	[Progress bar: 0% to 10%]		
<p>Establish a data literacy program</p> <ul style="list-style-type: none"> • Have fluent, native data speakers in place Have business analysts, data stewards, architects up and running • Have skilled translators to serve as mediators to the business side and to other groups within the business in place • Enhance capability academy for data skills 	[Progress bar: 0% to 100%]		
<p>Beware of communication barrier</p> <ul style="list-style-type: none"> • Identify remaining communication barriers Identify barriers utilizing data to its full business potential • Conduct data literacy assessments with focus on more advanced data analytics capabilities and techniques Identify remainder of gaps especially in advanced analytics • Ensure that teams are speaking data in all meetings when discussing business outcomes – data is the new mode of communication • Champion data literacy and evangelize benefits Eliminate remainder of data literacy gap 	[Progress bar: 0% to 100%]		

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Data governance policies are up to industry standards and are enforced diligently. Remediation is carried out for any anomalies out within a stipulated time period. The organisation sees a need for a formal data quality evaluation framework and has developed and deployed one. And a strategy is being developed to integrate ownership and access of the data at an organisational level - Business and data owners have a clear definition of their roles and responsibilities in data governance.



Key considerations

Data strategy

- Output of data is an integral part of how the organisation delivers the most important services, value is understood very well across the whole organisation
- Have good alignment of data collection in line with operational and strategic needs

Data accountability and ownership

- Have a data governance team (i.e. data stewards, data controllers) for all data assets in the organisation entirely in place
- Have a clear data governance process in place

Data policies and governance

- Well established data governance processes and policies are in place and enforced with Standard Operating Procedures(SOPs) in daily work across the org., including:
 1. Goals of the data governance program and metrics for determining success
 2. List of data inventory of the data sources within the organisation
 3. Permissions of everyone in the organisation is in place i.e. who has access to which data elements across the organisation
 4. Data is classified into different levels such as “Secret”, “Confidential”, “Restricted”, “Public”, etc., along with the levels of security and protection required at the different levels. Employ and update data security tools on a regular basis.
 5. Data quality measurement, aims and objectives are defined, as well as a range of supporting activities and processes, i.e. develop an SOP, Manual, guideline for front office to capture data consistently and accurately
 6. Master data/metadata/data dictionary along with data lake development and implementation is in place
 7. Training on data privacy is integrated with general training program and onboarding for new staff (including data regulations of different countries i.e. GDPR, PDPA)
- Standard Operating Procedures (SOPs) are in place and enforced in daily work to improve data quality

Data management

- Create KPIS for data Governance and stewards to maintain high quality data
 - All the applications are integrated through a service layer to a master repository with embedded synchronizations



[Click here to read STB's Data Governance and Data Quality Playbook.](#)

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Timeline			
Initiatives – Data governance	Year 1	Year 2	Year 3
<p>Data strategy</p> <ul style="list-style-type: none"> • Output of data is an integral part of how organisation delivers most important business services 			
<p>Data accountability and ownership</p> <ul style="list-style-type: none"> • Data governance team / person for critical data assets entirely in place (i.e. data stewards, data controllers) • Have a clear data governance process in place 			
<p>Data policies and governance</p> <ul style="list-style-type: none"> • Well established data governance processes and policies are in place and enforced with SOPs in daily work, including: <ol style="list-style-type: none"> Goals / success metrics of data gov. program List of data inventory/data sources within the org. Data permissions of everyone in the org. in place Data is classified into different security levels Data quality measurement, aims and objectives Master data/metadata dictionary along with data lake development and implementation is in place Training on data privacy is integrated with general training program and onboarding of new staff 			
<p>Data management</p> <ul style="list-style-type: none"> • Create KPIs to maintain high quality data • All the applications are integrated through a service layer to a master repository with embedded synchronizations 			

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The leadership team sees the value of analytics, providing active support, resourcing and removing barriers to the consistent operationalisation of data analytics in decision making throughout the organisation. Where available, the organisation uses prescriptive insights derived from data to determine the best course of action for all business decisions. In fact, the data strategy is fully integrated with the overall business strategy and is consistently reviewed and refined to account for changing demands and business environments.

Key considerations

Leadership competency

- Provide continuous support, resourcing and removing barriers that hinder data analytics in decision making throughout the organisation
- Consistently review, refine and update strategy for data analytics that is fully integrated and aligned with both business and IT strategy to account for changing demands and business environments

Team structure

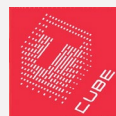
- Sustain data analytics efforts across all business units through a centralised shared services hub and spoke model with a dedicated data analytics team, where business owners work with the data analytics team closely to ideate use cases and implement these in their business units.
- Uphold having formal data owners and stewards that exist in the organisation for data lifecycle management

Skills

- Continuous training on advanced analytics such as machine learning, AI, natural language processing, deep learning etc.

Training

- Superior understanding of data analytics across the organisation and all employees on how to bring data to life through use cases
- Make it mandatory and schedule data analytics teams to have dedicated time to attend data analytics training courses frequently to stay up to date and upgrade their skills to stay on top of the latest techniques and technologies



Tcube is a hybrid innovation space that brings STB's digital initiatives, resources and thought leadership content onto a single platform to support tourism stakeholders in their digital transformation journey.

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A number of sophisticated analytics tools are used which are fully accessible across lines of business and are customised to the organisation's business needs. An appropriate number of data management and technology platforms are used effectively and are acquired and retired as is necessary in order to be relevant. Additionally, the organisation has the capability to conduct forward-looking analysis, predictive and prescriptive analysis to drive business decisions.



Key considerations

Data platform and management

- Data is collected, processed and stored in one centralized location
- Data is fully integrated in a data lake/warehouse for analysis purposes
- Data management framework and policies are fully in place to ensure data standardisation, security and quality across systems
- Sophisticated business intelligence and data science tools (i.e. Qlik Sense, Alteryx, TensorFlow, Hadoop) are easily accessible

Data utilisation

- Use of data analytics by every business unit in the organization including back office (i.e. HR, Finance and Operations Teams). Out of all data collected and procured by the organisation, 90-100% of data is processed to gain further value and for important decision making across the organisation

Stage of data analytics

- Sophisticated analytics capabilities are in place including forward-looking analysis, predictive modelling, prescriptive analytics and applied fully across the business (i.e. real-time demand anticipation, automated financial forecasting etc.)

Report format and automation

- Maintain reports linked to data warehouse or data lake fully, automatic refreshing of reports and delivery to specific places (i.e. visual dashboards in business intelligence tools such as Tableau, Power BI) at a specific regular interval (i.e. weekly, monthly) with prescriptive analysis as well as predictive analysis elements being performed.

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The organisation's data proficiency framework comprises data competencies for each role and level and has distinguished generic competencies versus those that are specific to certain job roles. Individual employee's upskilling courses have been customised and mapped out as well. Employees can develop predictive insights from data from a number of techniques and are well equipped to use that data for decision making, data storytelling and planning.



Key considerations

Assessing data literacy

- Assess state of data literacy periodically to maintain leading capabilities with a few questions i.e. How many people in your business know how a machine learning algorithm works, how to build a simple one i.e. via no-code tools for non-developers and what to take into consideration when interpreting its results?

Establish a data literacy program

- Maintain pipeline of fluent and native data speakers i.e. business analysts, data stewards and architects
- Maintain capability academy for data skills. A capability academy is a place where employees can go to advance specific job-related skills. Continue nurturing the data skills needed by the workforce on a customised level for the business based on a data proficiency framework that comprises data competencies for each role and level. For each role there are distinguished generic data competencies as well as job specific data competencies required for the role in place.

Beware of communication barrier

- Continuously identify areas and monitor where communication barriers mean that data is not being utilized to its full business potential.
- Continue to practice speaking data in all meetings when discussing business outcomes and in other business situations. Data is the main mode of communication across the entire business.



Data College provides a one-stop platform for Singapore's tourism industry stakeholders to upskill their employees through online courses, case studies and upcoming data-related initiatives.

[Click here to find out more.](#)

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Data governance policies are on par with industry standards, control measures are in place and policy compliance is audited regularly. The organisation is constantly refining its data quality evaluation framework to keep up with industry norms. Remediation is carried out immediately in case of any anomalies. Business and data owners have a clear definition of their roles and responsibilities in data governance. Hence, data access is granted in a managed fashion across the organisation.



Key considerations

Data strategy

- Output of data is the main mode of how the organisation delivers the most important services, value of data is indispensable part of the organisations strategy

Data accountability and ownership

- Maintain data governance team (i.e. data stewards, data controllers) for all data assets in the organisation
- Maintain data governance process that is industry standard level and an example to others

Data policies and governance

- Industry standard data governance processes and policies are in place and enforced with Standard Operating Procedures(SOPs) in daily work across the organisation and the organisation is constantly auditing, refining and keeping these up to date with industry norms including:
 1. Goals of the data governance program and metrics for determining success
 2. List of data inventory of the data sources within the organisation
 3. Permissions of everyone in the organisation is in place i.e. who has access to which data elements across the organisation
 4. Data is classified into different levels such as “Secret”, “Confidential”, “Restricted”, “Public”, etc., along with the levels of security and protection required at the different levels. Employ and update data security tools on a regular basis.
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- Continue consistent monitoring and reviews of KPIS for data Governance and stewards to maintain high quality data
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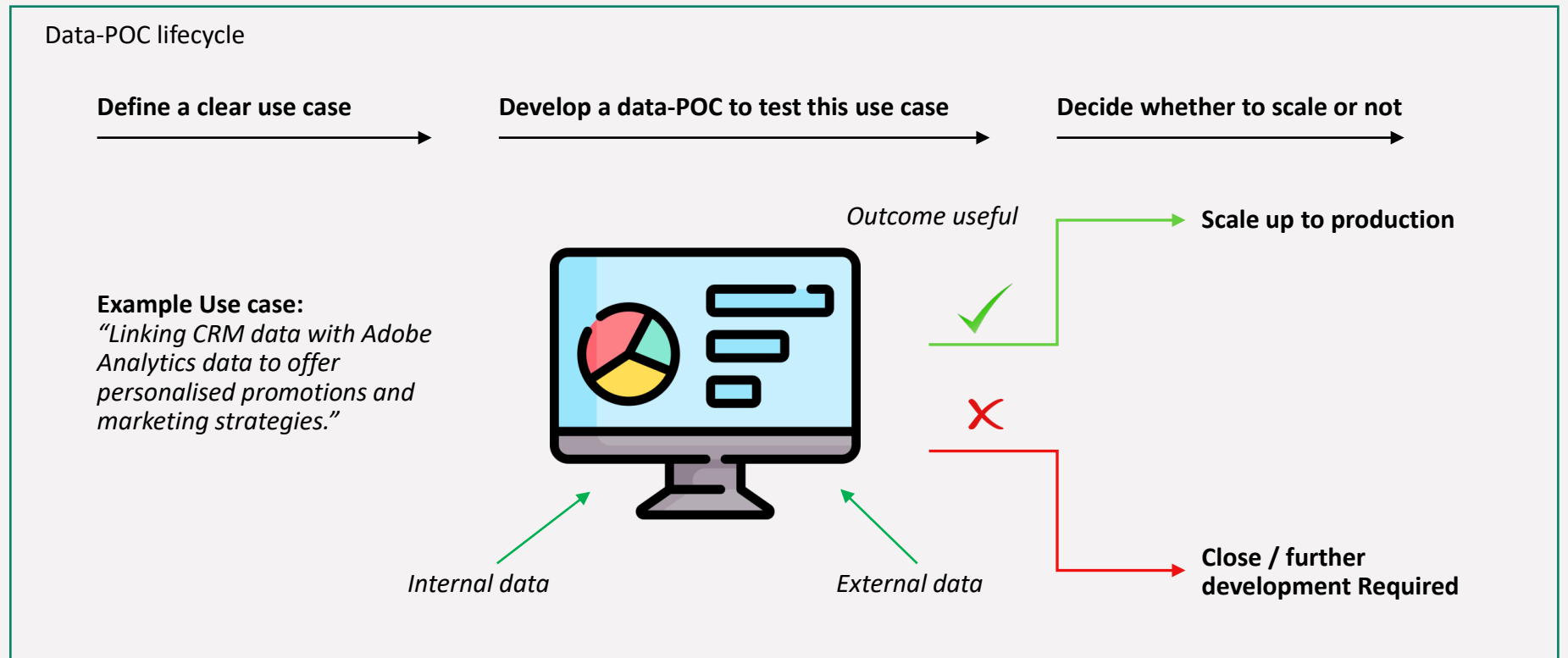
Quick Links and Tools



To accelerate the data analytics transformation journey and drive cultural change, organisations could start with developing a data-POCs which can demonstrate tangible benefits

What is a data-POC?

A data-POC (Proof Of Concept) is an experiment with the objective to assess the value, relevance and feasibility of a solution through the use of data before spending the effort in full development or purchasing a software.



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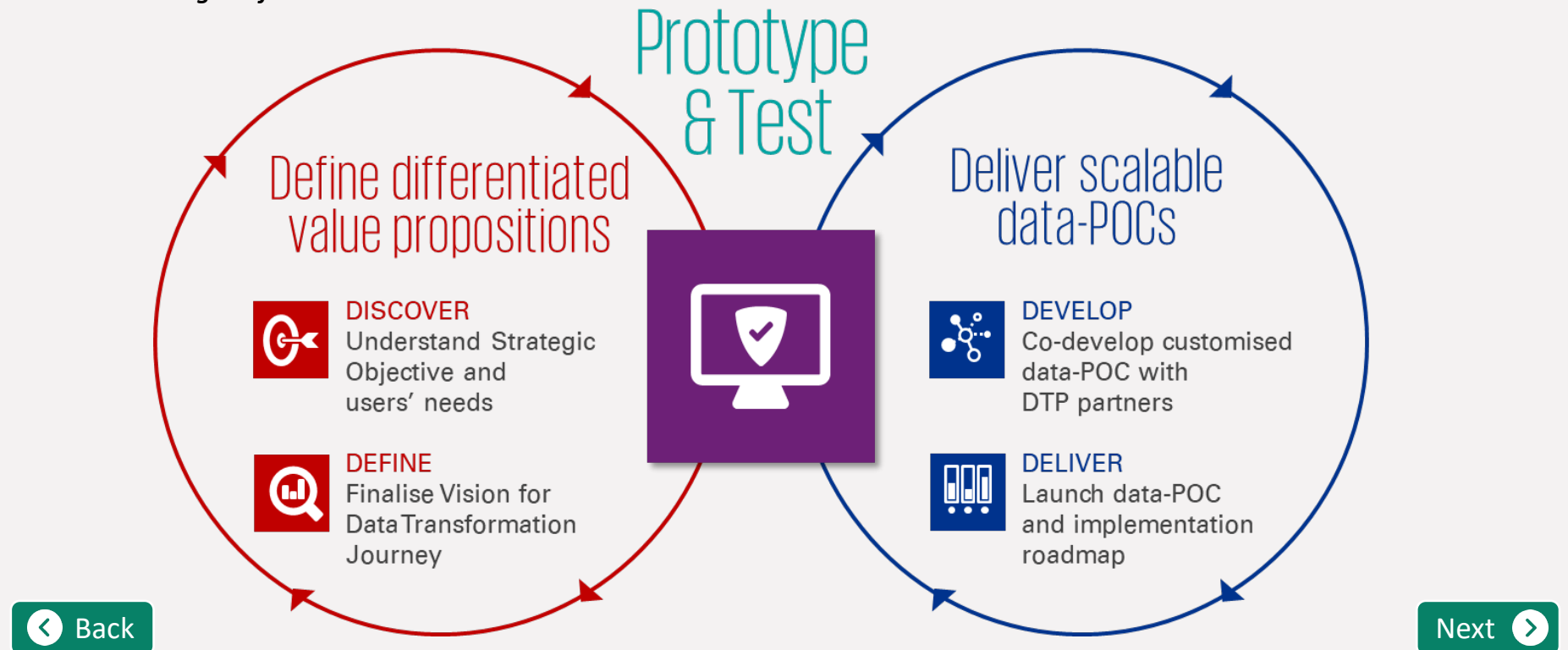


How to start? Applying a user-centered approach to develop data-POC

To run a POC in the tourism industry, it is important for an organisation to apply a user-centered approach to develop the relevant solutions.

This section explores how we might derive and frame business questions through a user-centered design thinking approach, which allows us to consolidate problem statements, prioritise value propositions and define key proof of concept (POC) features that address the needs of end users who benefit from using the data analytics solution. At its core, Design Thinking is an iterative process that emphasises a solution-based problem-solving approach through achieving a deep understanding of the user, and challenging existing assumptions about how things are done. To define a relevant use case for POC development, an organisation must go through 4 stages, starting from the initial discovery stage. Each stage follows specific steps and leverage on different tools to achieve the desired business outcome.

Click on each stage to find out more details.



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During the discover stage, interviews with problem owners are conducted to understand the business needs, user pain points and behaviours. The outcome is to gather key insights from problem owners and have a better understanding of the overall business objectives.

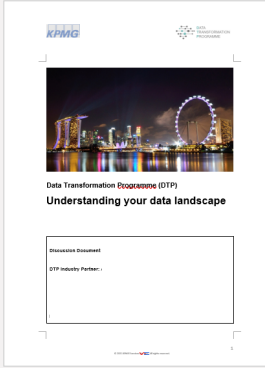
Activities

1. **Conduct business assessment**
 - Identify key stakeholders within relevant business units
 - Conduct business assessment discussions to identify key pain points, challenges and desires that can be addressed with data analytics
[See Business Assessment survey]
2. **Conduct data assessment**
 - Understand the data landscape, data types and systems in use
 - The type of data collected and its format, how they are used and stored
 - The types of analytics performed (i.e. Descriptive, Diagnostic, Prescriptive, Predictive, Prescriptive and their algorithms / methods)
 - The extent of sharing of data and analytics
 - Assess data readiness, current and desired data & analytics capabilities
 - Identify potential data gaps
[See Data Assessment survey]
3. **Synthesise business challenges**
 - Cluster key findings and generate insights based on business and data assessments
 - Synthesize insights to define key problem statements that could be addressed through the use of data analytics

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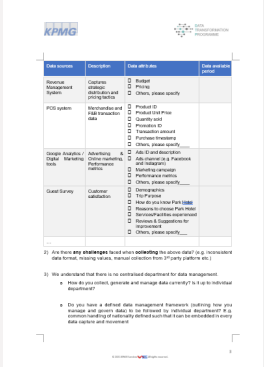
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Business Assessment



[CLICK TO DOWNLOAD](#)

Data Assessment



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The above assessment are illustrative examples. Assessments are subject to changes based on the organisation.

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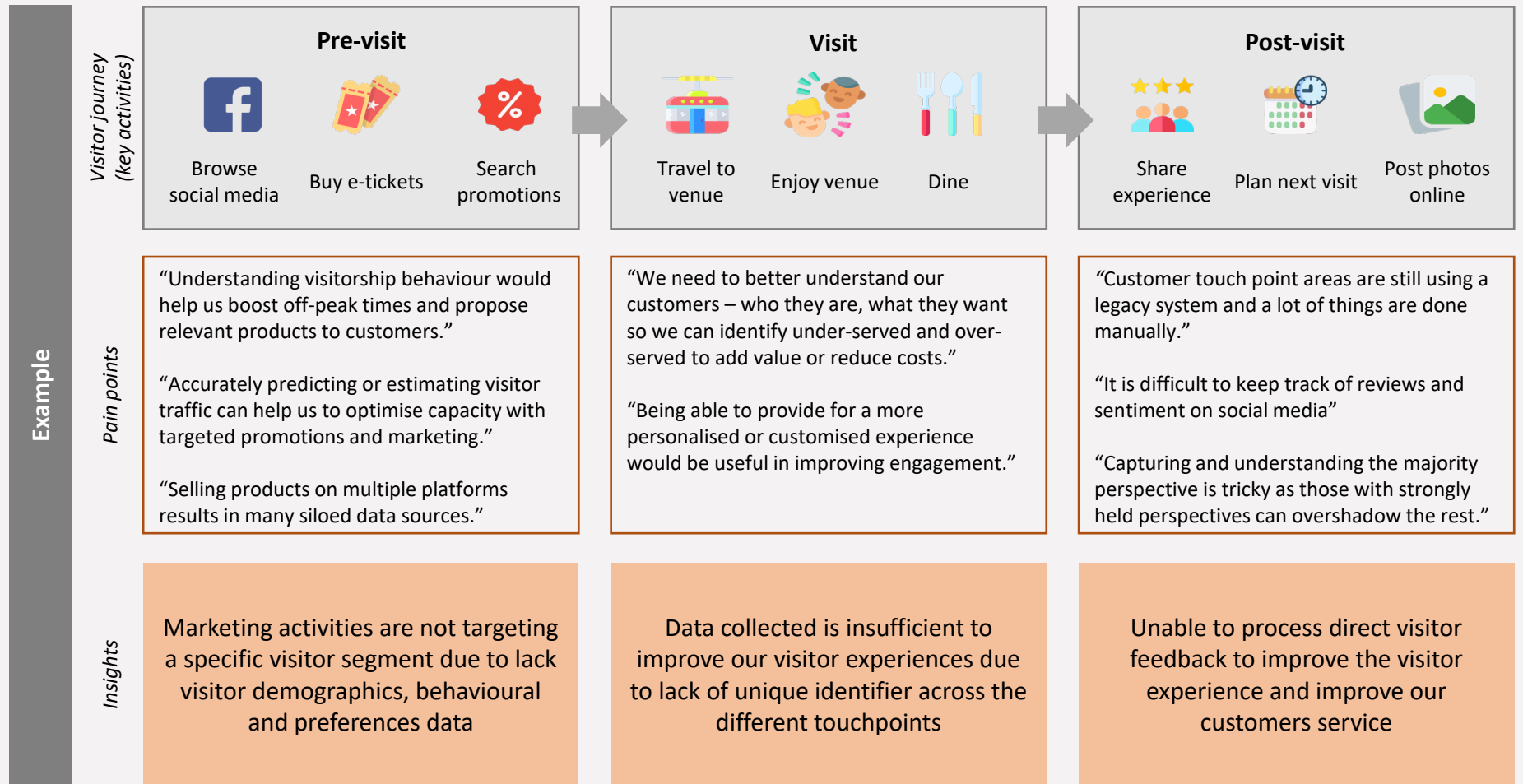
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Based on the business and data assessment Company ABC defined 3 key insights anchored around the 3 stages of the visitor journey. These insights to set the base for the ideation workshops in the Define stage.



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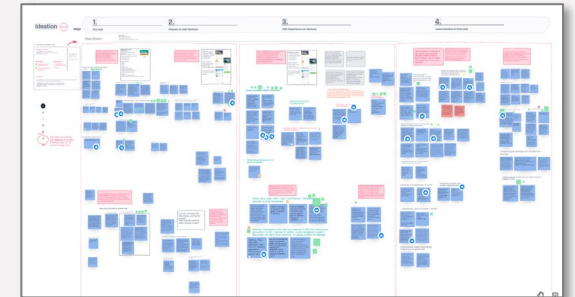
Deliver

During the define stage, workshops will be hosted as collaboration between different business units to generate ideas. During the ideation workshop, several activities occur to define potential use case concepts and solution features.

Activities

1. **Conduct ideation workshop to conceptualise potential use cases for POC**
 - Facilitate ideation workshop with relevant business units to generate high quantity of ideas to address pre-defined problem statement
 - Cluster solution themes based on common objectives to define potential use cases
 - Develop low-fidelity solution mock-ups to illustrate the solution concept to the stakeholders
2. **Prioritise one use case for POC development**
 - Prioritise potential use cases for development based on:
 - Viability (revenues, costs, customer Satisfaction etc.)
 - Feasibility (data availability, resources, tools)
 - Desirability (relevance for users)
 - [Click here to find out more](#)
3. **Define POC scope and features**
 - Define solution objectives
 - Define solution features
 - Define KPIs and success metrics
 - Agree on budget, steering committee, working level team
 - Chose one proposition to take forward to refine, ahead of full feature list and solution design

Ideation workshop – Virtual



Clustering solution themes



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Discover Define Develop Deliver

Three lenses of innovation for use case prioritisation: X

In general, data in itself does not provide an organisation with value just by existing. It must be processed before it can be useful. By identifying the business objectives, needs and challenges, the business owner can then decide how to use their data to develop a new solution – Throughout this process the business owner needs to prioritise any solution concepts through the so called three lenses of innovation (Feasibility, Desirability and Viability).

Feasible from a data perspective

When considering whether to develop a solution, an organisation should also think about the data that they already have, whether there are any gaps within the existing data that is preventing them from extracting meaningful insights.

The diagram consists of three overlapping circles. The top-left circle is purple and labeled 'Feasibility'. The top-right circle is teal and labeled 'Desirability'. The bottom circle is blue and labeled 'Viability'. The central area where all three circles overlap is colored yellow.

Desirable for users

Is this solution solving the right problem and does it meet the business objectives and the real user needs. Is it a must-have or nice-to-have solution?

Viable for the business

Viability asks, whether the new solution help the organisation to drive growth or reduce costs. But it also looks into the organisation's ability to scale-up the solution with a sustainable business model.

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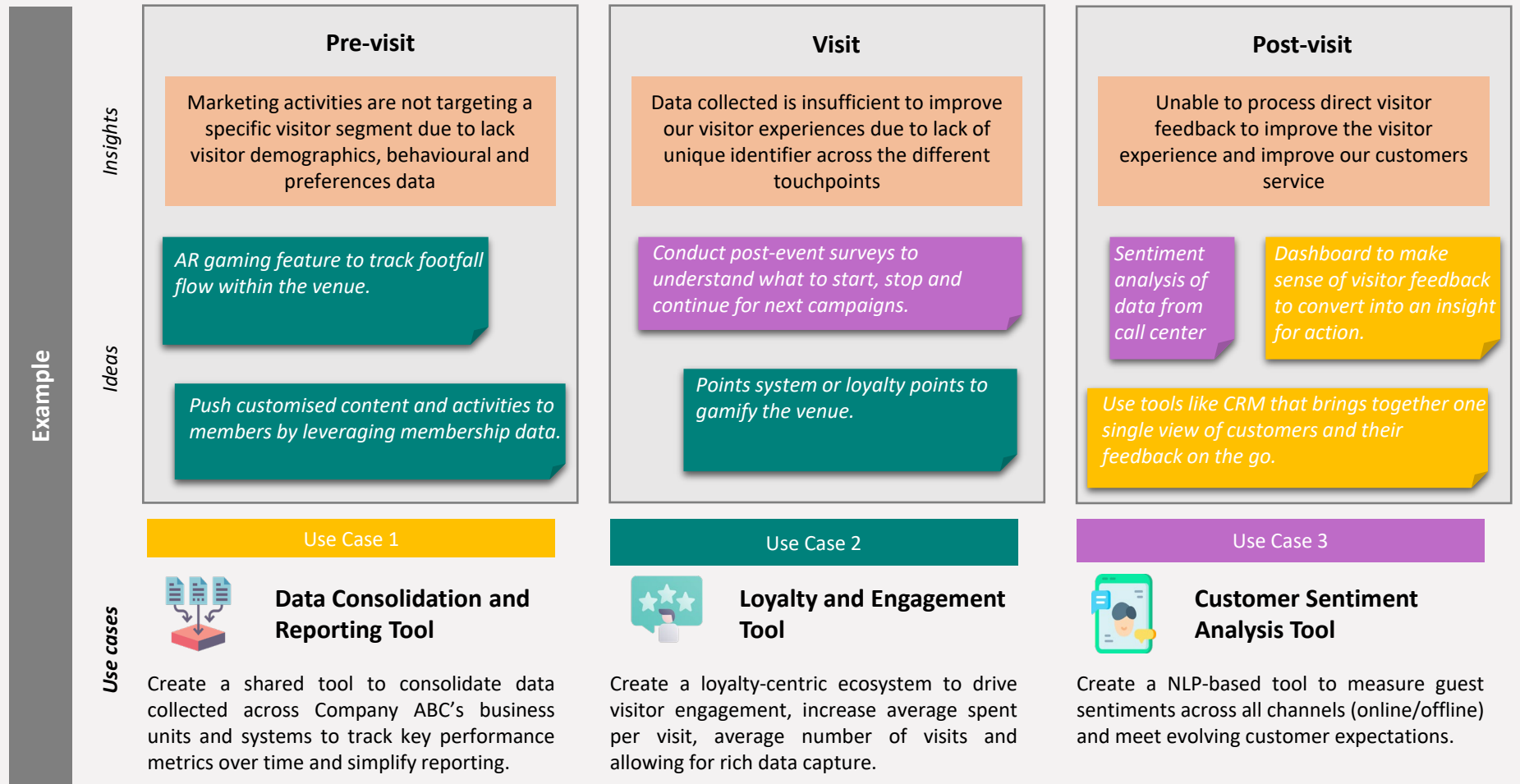
Discover

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Company ABC conducted an ideation workshop to generate a high quantity of ideas and solutions to address the key insights. These ideas are then clustered into solution themes (use cases) which are to be prioritised based on the feasibility, desirability and viability for the company.



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Develop

Deliver

During the develop stage, the selected Proof of Concept will go through design and develop. In the data analytics aspect, develop POCs through data collection, extraction, processing and integration, data modelling, visualisation to monitoring.

Activities

1. Identify required data for value proposition

- Assess the data availability and its qualification based on the criteria such as: Relevancy and sufficiency, granularity, data quality, collection frequency, data format and data cost (if requires 3rd party data with a cost)

2. Create a set of hypothesis on relevant indicators and factors related to the selected POC

- Define and prioritise indicators, analysis and data features to build
- Examples for indicators:
 - Business problem: How can I make my event more successful?
 - Indicators of a successful event: # of attendees, overall feedback from attendees, ROI etc.

3. Build analytical datasets for modelling and insight generation

- Extract data from multiple sources (internal and external) by using different techniques (i.e. MySQL, MongoDB, web scraping, etc.)
- Cleanse and transform data and to a relevant and homogenous format and consolidate data using scripting tools like python or R
- Enrich data and engineer features by using statistical methods and visualisation
- Build analytical datasets to enable modelling and insight generation

4. Decide on the right techniques to build the POC data model based on data maturity (i.e. Machine Learning, Statistical Analysis, Time Series Analysis, or simple calculations etc.)



[Click here to see a MICE firm uses internal and external data to identify its top exhibitors.](#)

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During the develop stage, the selected Proof of Concept will go through design and develop. In the data analytics aspect, develop POCs...

Example: Developing a data-POC based on clustering analysis

Company ABC, a MICE industry firm, had the objective to identify its top exhibitors based on internal and external datasets. To develop this POC, Company ABC performed clustering analysis based on the below steps.

Consolidated and cleansed data from various sources to understand its performance and behaviour

- Extracted the exhibitor account level data from Company ABC's systems (i.e. CRM, SAP, digital platform, etc.), processed and consolidated the data into a database for each corporate account, allowing Company ABC to understand:
 - Top accounts contributing highest # revenue
 - Top accounts with highest % growth of revenue
 - Most popular exhibitor based on the attendee's behaviour

Enriched the account level database with publicly available or external data sources

- Enriched the account level database with external information from multiple resources.

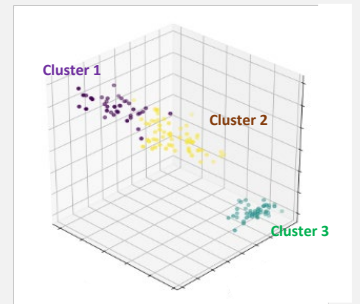
Industry growth and outlook

- Industry revenue and GDP growth
- Industry employment growth
- M&A deals growth by industry
- # of business registered by industry
- Government procurement statistics (i.e. # of tenders by industry and company, procurement value by industry and company, etc.)
- Event calendar from STB and EDB (i.e. # of international events by industry)

Defined top exhibitors and identified their key attributes with the sales team

- Performed clustering analysis on the defined metrics using unsupervised machine learning. For example, cluster 1- high value and frequency, cluster 2 – mid value and recency, cluster 3 – low value and high recency.
- Overlay other attributes of accounts to identify the features that a top exhibitor is likely to have.

Example:



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Discover

Define

Develop

Deliver

During the deliver stage, ensure the POC is equipped with the right resources and tools to demonstrate expected analytics outputs.

Activities

1. **Model output and visualisation**
 - Visualise model output into a suitable data visualisation tool
2. **Test POC with end users**
 - Conduct closed loop pilot with selected users to validate POC proposition
 - Conduct market survey
 - Conduct 1-on-1 user interviews
 - Synthesize market feedback to define new features and enhancements
3. **Measure business value and identify potential improvements**
 - Business value could be reflected in the following indicators:
 - Increase in number of visitors / subscribers, etc.
 - Increase in revenue (%)
 - Cost reduction (i.e. number of manhours / employees reduced, % cost reduced)
 - Compare the KPIs before and after to measure the success of the POC
 - Identify potential improvements for data and algorithm, as well as design data pipeline and architecture for future deployment (if any)
4. **Ensure proper handover and training**
 - After delivering the POC, ensure proper handover to end users through training
 - To facilitate the handover, ensure delivery of a technical manual which entails the POC features, data model, and a set of instructions for installation, use, maintenance, and steps for effective deployment of the product

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Case Studies


Read about the experiences of other players in the tourism industry as they embarked on their data transformation journey. Each case study will include a summary, the concept, a section on data and as well as change management initiatives that were adopted to make their data transformation journey a success.

Click on any of the case studies below to explore further.

USE CASE 1
Hotel Industry

USE CASE 4
Attractions Industry

USE CASE 9
Travel Agent Industry




Benchmarking business performance and visitor profiling with peers for cost optimization and growth opportunities

USE CASE 6
SINGAPORE FLYER

USE CASE 8
PARK HOTEL GROUP

USE CASE 12
AMARA HOTELS & RESORTS




A data consolidation and reporting tool to track business performance and simplify reporting process

USE CASE 5
constellar

USE CASE 7
Far East HOSPITALITY

USE CASE 11
MICE Industry




A one-stop tool to Empower sales team to identify potential customers

USE CASE 2
sentosa™

USE CASE 3
Gardens by the Bay

USE CASE 10
Mandai WILDLIFE GROUP



A data capture and engagement tool to better understand users' demographic, behavioural, motivational and on-site transactional and locational data

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PROBLEM STATEMENT

Who are Singapore hotels' guests, how much do they spend and where do they go?

OBJECTIVES

- Provide local hotels with insights around the profiles and behaviors of their own guests and their comparison group (i.e. hotel within the same area, same size or type)
- Have a better understanding of the customer profile and behavior to develop data-driven targeted marketing campaigns.

ACHIEVEMENTS

- Understood behavioral data through customer segmentation of guests in order to make more data-driven decisions (i.e. On average, guests from UK, Australia and Japan are older compared to the rest of the markets)
- Improved guest experiences through more relevant, attractive products and services (i.e. Flexible booking policies – this helps to promote vital guest satisfaction and future loyalty by offering empathy through flexibility)
- Optimized marketing spend on targeted customer segments of guests

SOLUTION AND KEY FEATURES

Guest profiling tool that enables hotels to identify guest behaviour (i.e. areas visited, spending patterns etc.) by segmentation in order to drive more targeted marketing campaigns – Key features include:

- Ability to segment guest data based on purpose of visit, spend and top visited areas to understand guests
- Ability to view frequency of visits into Singapore for each profile and length of stay
- Ability to compare top countries of origin for foreign guests
- Ability to benchmark against other hotels

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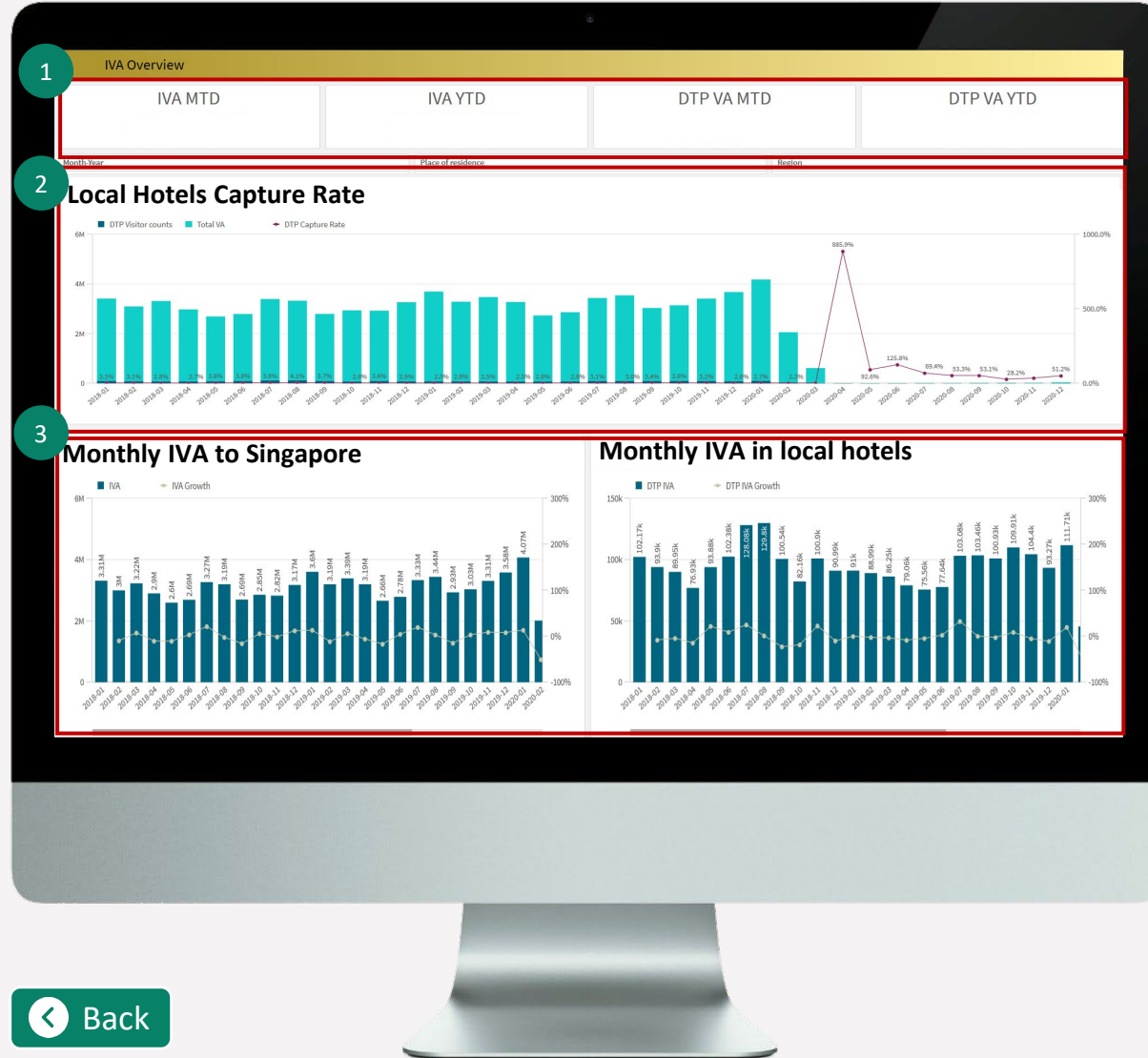


Summary

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Data

Customer Profiling Tool [1/4]



Key features

- 1 Month to Date (MTD) and Year to Date (YTD) for IVA and VA of selected hotels
- 2 Hotel capture rate of total IVAs
- 3 Monthly IVA to Singapore and IVA staying in selected hotels

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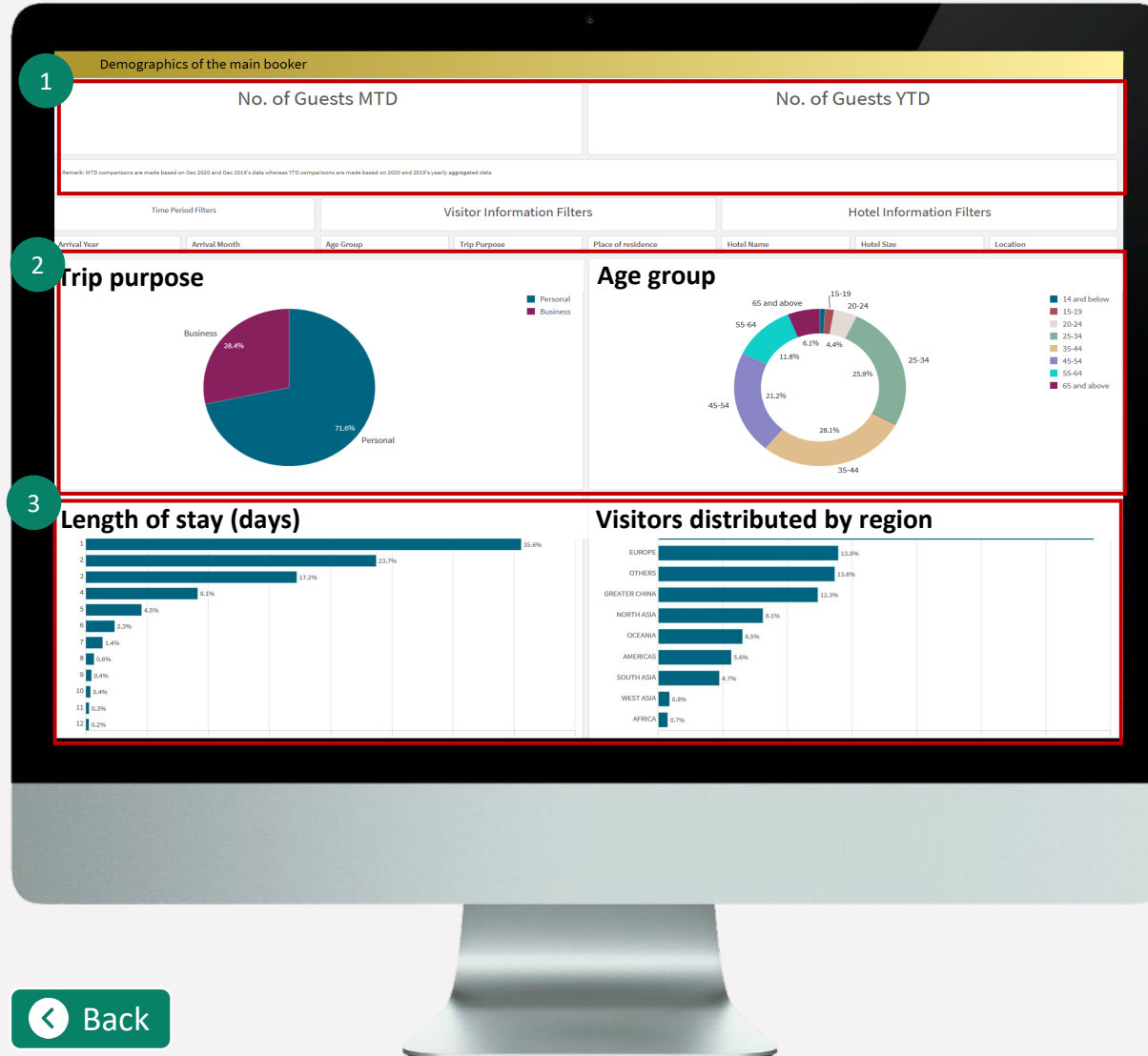


Summary

Concept

Data

Customer Profiling Tool [2/4]



Key features

- 1 Month to Date (MTD) and Year to Date (YTD) for no. of guests
- 2 Trip purpose and age group breakdown
- 3 Length of stay and place of residence by region and country

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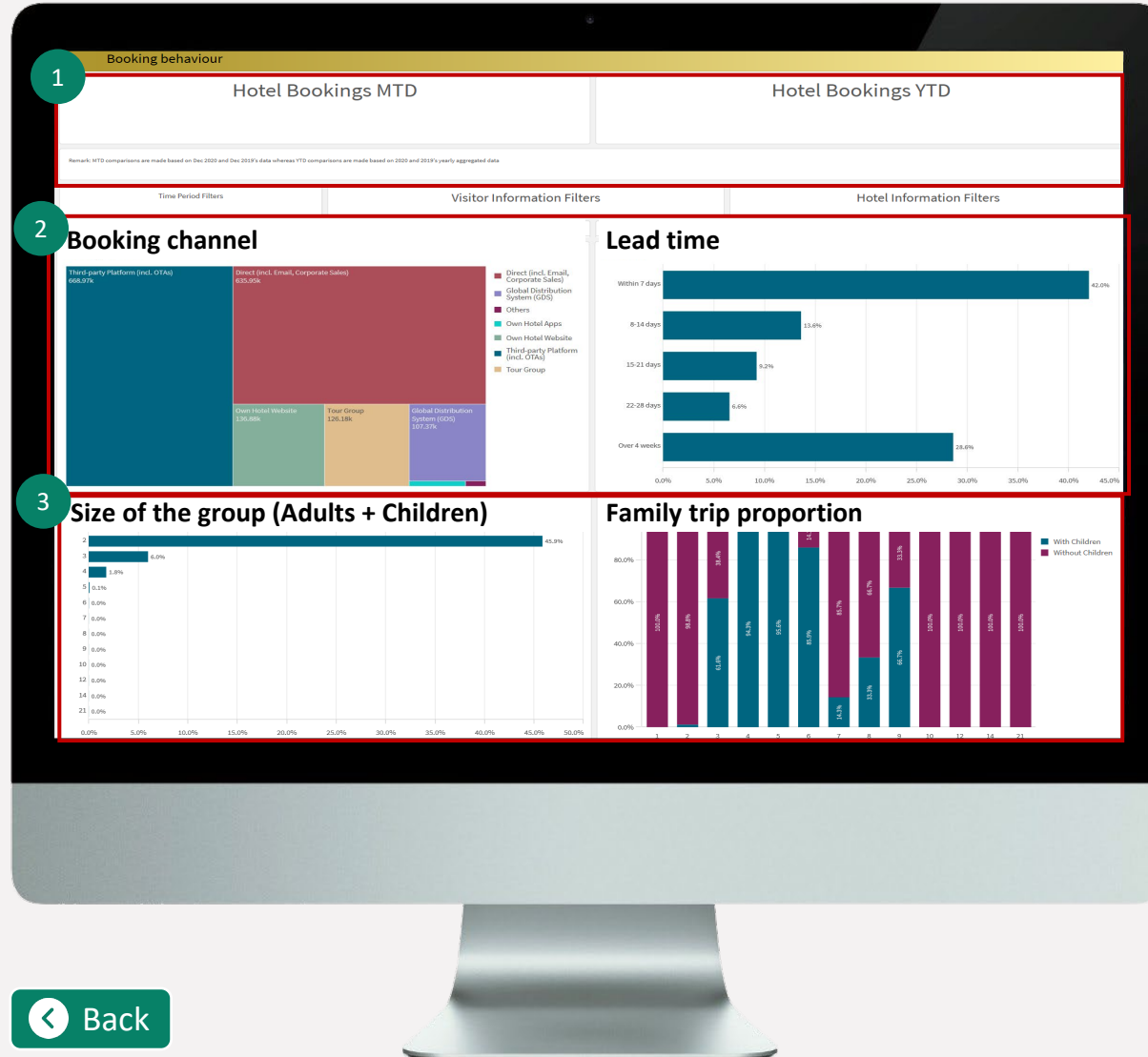


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Data

Customer Profiling Tool [3/4]



Key features

- 1 Month to Date (MTD) and Year to Date (YTD) for no. of bookings
- 2 Booking channel distribution and booking lead time
- 3 Size of group and proportion of family trips

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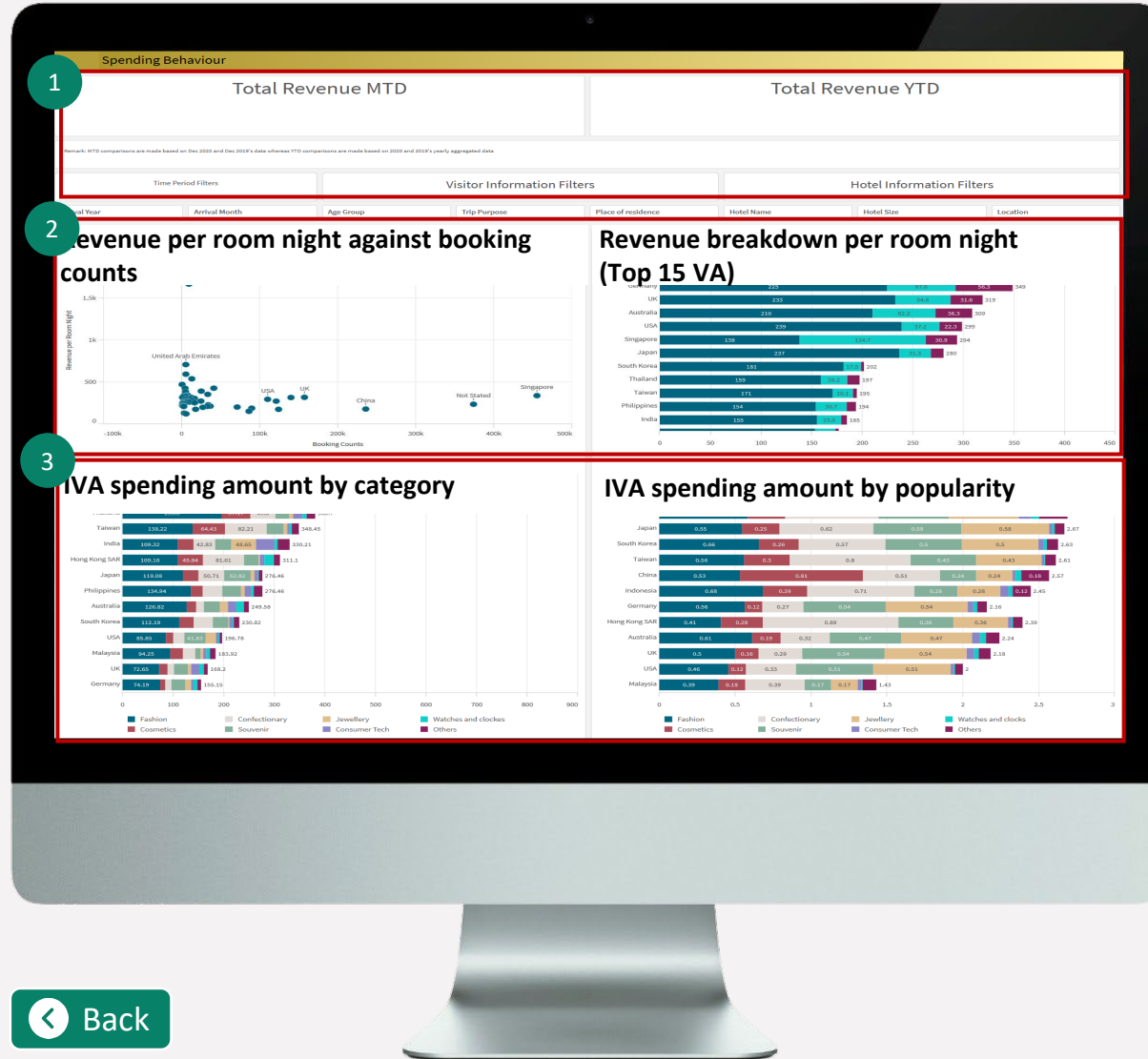


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Data

Customer Profiling Tool [4/4]



Key features

- 1 Month to Date (MTD) and Year to Date (YTD) for total revenue
- 2 Revenue per room night vs booking counts, Revenue per room night (Top 15 countries)
- 3 Average expenditure per capita on shopping in Singapore for IVAs

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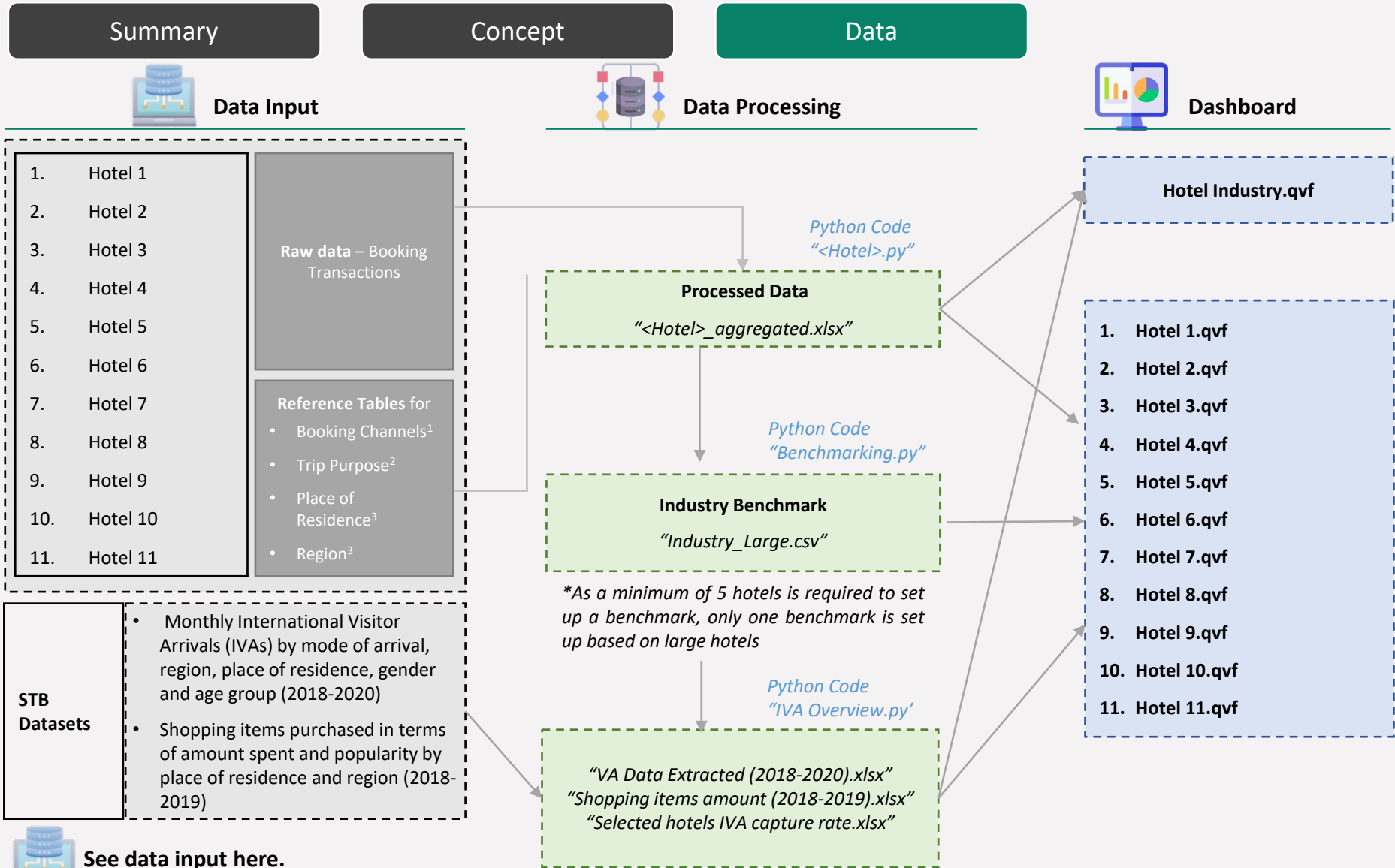
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POC 1: Reaching beyond data to understand guests needs and optimize marketing spend



[See data input here.](#)

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Data input:

X

Data Element Name	Description
Adults	# of adults checked-in with guest. Adults are defined as 12 years old and above
Arrival_Date	Date of check-in
Booking_Channel	How booking was made (i.e. Direct, MICE groups, own hotel website, third-party website, tour group)
Business_Centre_Revenue	Revenue of providing multi-purpose meeting rooms and business event venues
Children	# of children checked-in with guest. Children are defined as 12 years old below
Creation_Date	The date of booking
Customer_Confirmation_Number	Unique confirmation code
Customer_Profile	The profile of guest and travel companions (i.e. Business / family with children / friends / leisure solo / partner / spouse)
Departure_Date	Date of check-out
DOB	Date of birth
FnB_Revenue	Hotel revenue that is from the sales of food and beverage services at hotel's F&B outlets, including room service, mini bar, banquet, outdoor catering, restaurants, cafes, lobby lounges, breakfast and other meals
Hotel_Name	Name of hotel
Nationality	The citizenship of a person
No_of_Room_Nights	# room nights booked
Other_Revenue	Other revenues include no show, telephone, miscellaneous, laundry, retail
Place_of_residence	If a person resides for more than a year in a given country and has a centre of economic interest (i.e. predominant amount of time), he/she is considered as a resident of this county.
Reservation_Status	Whether guest has checked-in, checked-out, cancelled, or no show
Room_Revenue	Total Room Revenue should exclude cost of inclusive breakfast, other meals, service charges, GST and Cess Tax (where applicable)
Total_Revenue	Total revenue over stay in hotel, including room revenue, F&B revenue, wellness revenue, business centre revenue and other revenue
Trip_Purpose	The purpose of guest's visit (i.e. business or leisure)
Wellness_Revenue	Total wellness revenue should include spa, beauty clinic, salon, thermal / mineral springs, treatments, gym, fitness and health clubs

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INDUSTRY
**Attraction,
Hospitality, F&B**

BUSINESS AREA
Customer Insights

PROBLEM STATEMENT

How might we create a data-centric loyalty proposition to bridge data gaps and drive spend at our Partners?

OBJECTIVES

- Assess solution proposition’s ability to drive footfall and spend
- Assess merchants’ willingness to become part of the ecosystem
- Assess solution’s ability to collect new demographic and behavioural data

ACHIEVEMENTS

- Increased data capture capabilities (demographic and behavioral)
- Increased engagement with visitors to drive frequency of visits and spend
- Leveraged on data insights to:
 - launch tactical campaigns for selected customers segments
 - launch new campaigns for under or overperforming merchants
 - analyse crowd movement, cross-visits and drive footfall
- Created new marketing channels for merchants

SOLUTION AND KEY FEATURES

The solution consists of a customer mobile app and an admin portal - Key features include:

- Ability to earn loyalty points through predefined set of activities e.g. spending at merchants
- Ability to use loyalty points for payment and redemption – without the need to integrate with the merchant POS system
- Ability to generate customer data insights and launch targeted campaigns
- Ability to have a consolidated view of the ecosystem performance including campaigns ROI

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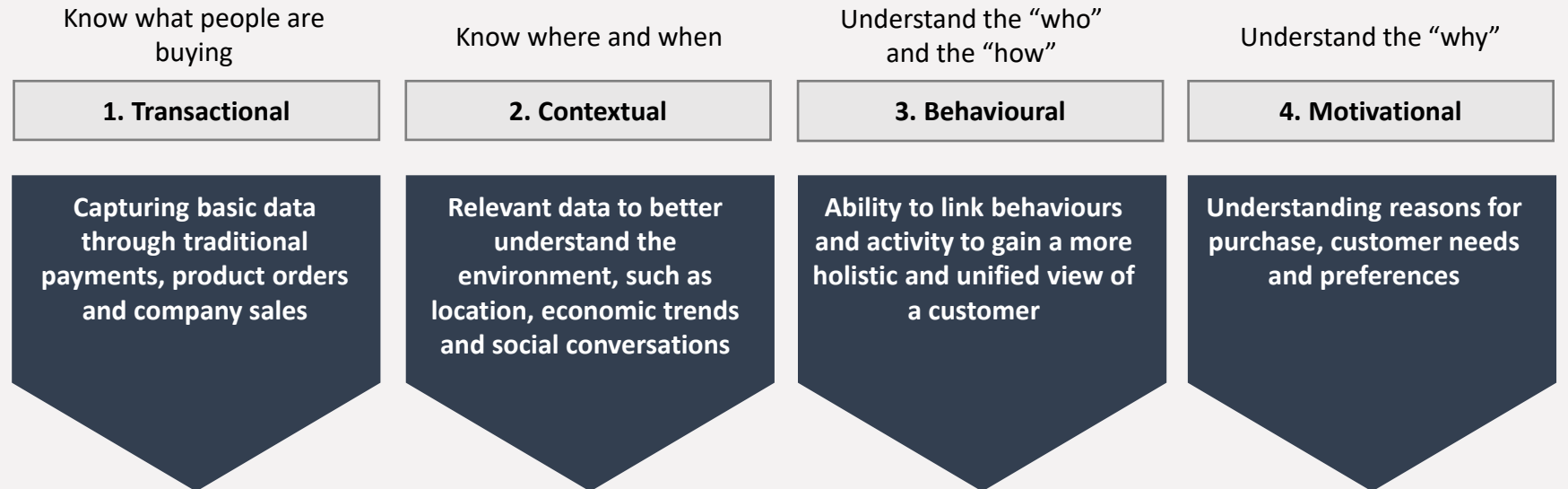


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In order to understand customers' evolving needs, different types of datasets need to be captured:



By creating a loyalty ecosystem, data-solution was able to capture the different types of datasets in a consistent and inter-linked format that enable customer insights generation

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Customer analytics dashboard [snapshot]



Key features

- 1** Demographic data which was collected via the onboarding process can be viewed
- 2** 'Transaction per Campaign' shows the period of time during the campaign where users made the most transactions
- 3** Customer segmentation based on transaction value and number of visits per user

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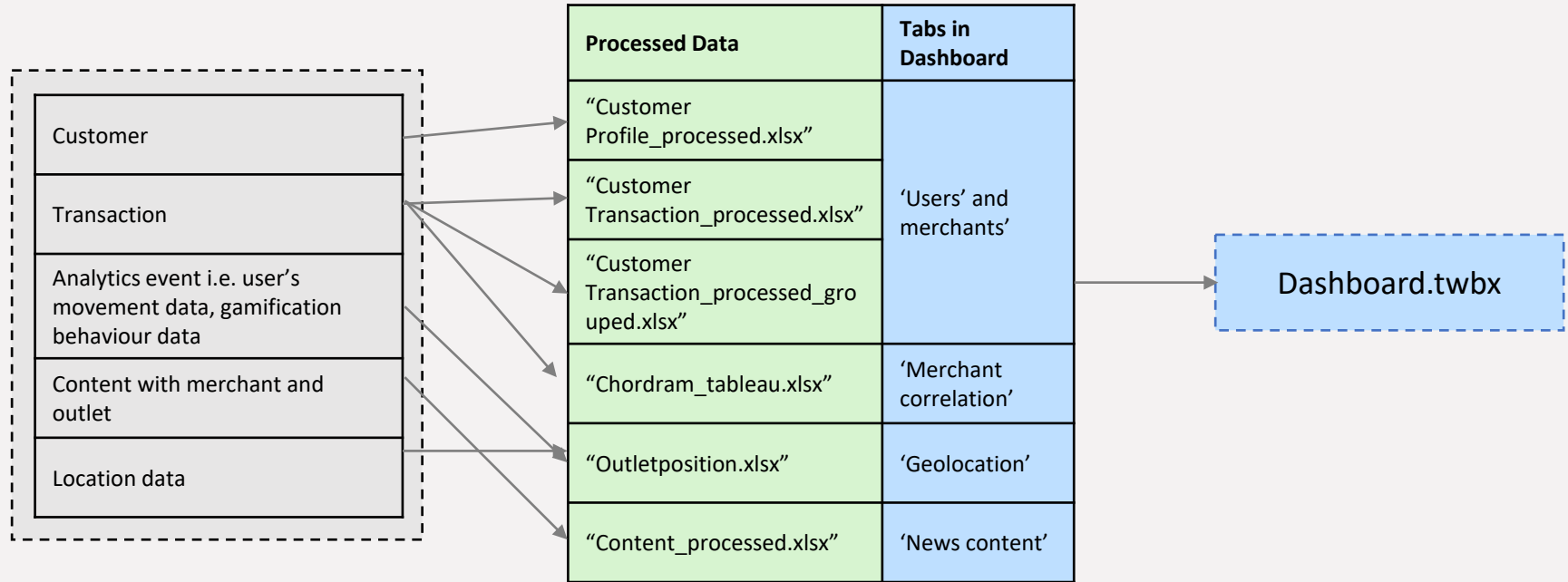
Data Input



Data Processing



Dashboard



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Change Management

INDUSTRY
Attraction

BUSINESS AREA
Sales & Marketing

PROBLEM STATEMENT

How might we leverage on data to enhance our visitor experience and optimise our business performance?

OBJECTIVES

- Assess marketing propositions' ability to drive footfall and recurring visits
- To collect demographic, behavioral and spend data
- To extract business insights based on data collected

ACHIEVEMENTS

- A deeper understanding of visitors' demographics, behaviors and motivations through richer data capture
- Increased user engagement
- Enabled greater synergies driven within the attraction ecosystem and their merchants. Thus, increased visitor monetisation
- Understood different visitor segments through the collection of locational data

SOLUTION AND KEY FEATURES

Solution consists of a customer mobile app and an admin portal - Key features include:

- Enable customers to engage in a loyalty ecosystem where points are awarded for expenditure and challenges, which can then be utilised to drive spend at merchants
- Allow the Attraction to capture richer data on visitor transactions, spending behaviour, demographics, online payments and POS spending analytics
- Facilitates the capture of data inside and outside of gated areas, providing a more holistic view of visitor interactions and footfall

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Data dashboard



Key features

- 1 The number of visitors shows the number of users who allowed geolocation tracking on their phones
- 2 Avg app view time shows the average geolocation time tracked for users who activated it on their phones
- 3 Average dwell time shows how much time a user spends in one location
- 4 Data can be filtered by gender and mode of transport, which unveils common routes and least visited areas

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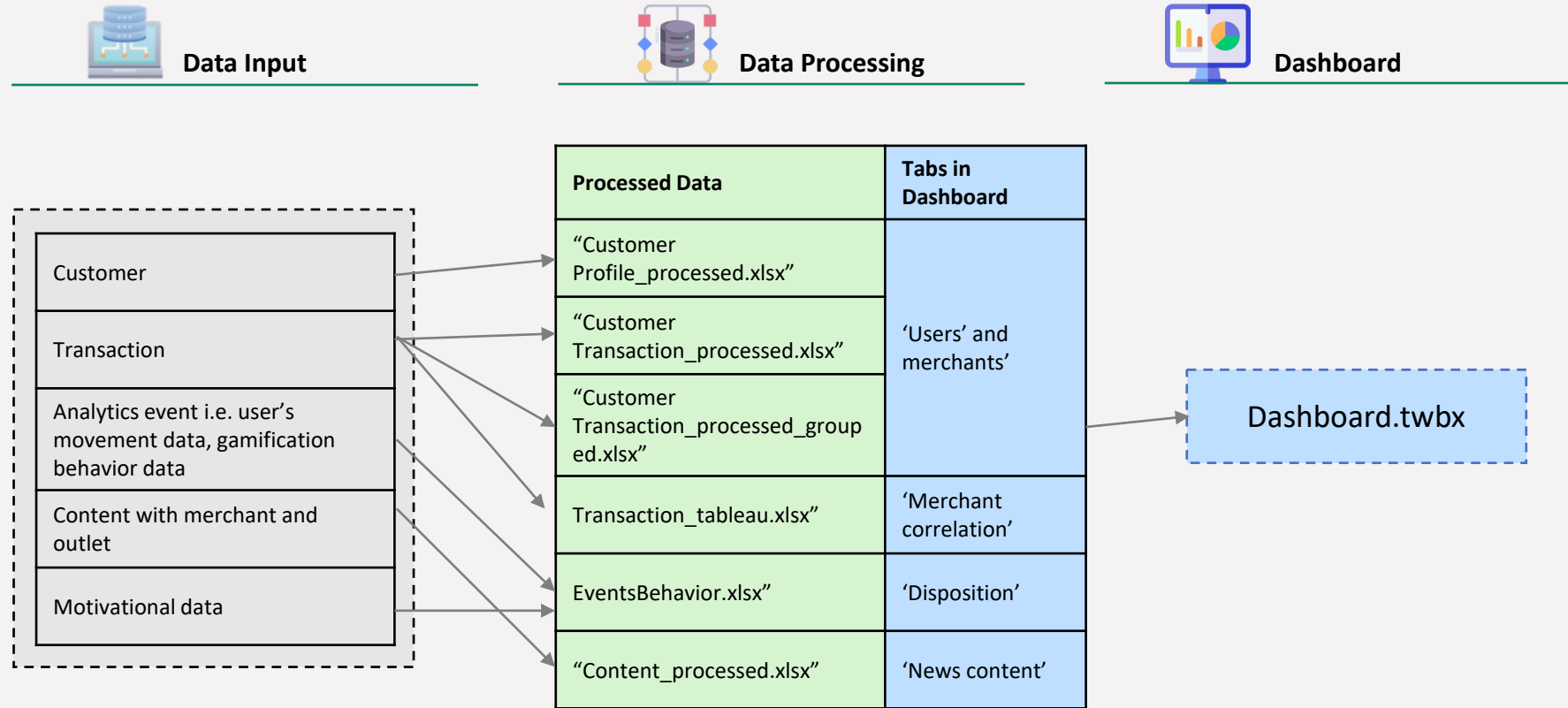
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POC 3: Bridging data gaps in guests demographics, movement, and spend through engagement



Key initiatives

Adopt a data-driven mindset

- Conduct awareness sharing of the success stories of data-driven initiatives and use cases
- Leadership needs to drive critical decisions with the support of data insights and analytics

Establish/Review data champion network/community

- The network includes key stakeholders supporting the initiative, people delivering/running the program and the end users
- Sharing success stories or mini challenges through the various platforms to engage the organisation at the working level
- Provide incentives for the champions and the communities to encourage engagement

Develop training program

- Conduct creative/design thinking workshops to introduce data analytics and learn how to develop use cases
- Identify the short term training needs
- Identify long term training needs

Expand the data team to accelerate the initiatives for data lake and CRM set up. Consider hiring a generalist

- Expand the data team to push forward the key initiatives for the CRM & Data by hiring someone with experience with the setting up of Data Lake
- Conduct an assessment every 6 months on capabilities gap and needs
- Prior to the launch of the Data lake, review the need for additional hires. Conduct a review of recruitment strategy -in-house or outsourced and determine if it is a short term or long term need to ensure effective resource management for the data team

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POC 3: Bridging data gaps in guests demographics, movement, and spend through engagement



Key initiatives

Explore more advanced data analytics use cases to show the business values

- Workshop with businesses units periodically to identify high value use cases which can be addressed using data analytics. Use outcomes of the exercises to showcase values and gain buy-in across the organization.

Set up data lake

- Vendor selection, e.g. consider both consultancies and providers in Singapore
- Working with vendors to
 - Undertake detailed data audit to assess how Attraction's data is fit for given purpose
 - conduct information modelling of core business processes
 - Construct a Conceptual Data Model and plan how databases from various systems would be linked
 - Set up primary tools to build the right long-term structure of data and components i.e. Data ingestion tool; data integration; data computation
 - Set up secondary tools to lift the quality of data i.e. Data provisioning; continuous integration; Meta data and data catalogue
 - Undertake engagement with business units to understand business needs so the solution can be tailored accordingly.
 - A data migration plan should be developed based on criticality, significance of data, and consideration of data analytics use case priorities
 - Develop disaster recovery plan, in case of any system failure
- Arrange general access rights for appropriate officers according to access policies

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POC 3: Bridging data gaps in guests demographics, movement, and spend through engagement



Key initiatives

Assessing data literacy

- Data and analytics leaders are responsible for creating the narrative for data literacy, highlighting the business value to be gained. Start by assessing data literacy with a few question i.e. How many people in your business do you think can interpret statistical based dashboards
- Conduct data literacy assessments to identify gaps and use as a baseline
- Data and analytics leaders and data teams must lead by example. Ensure that the teams are speaking data in all meetings when discussing business outcomes and in other business situations.

Establish a data literacy program

- Identify the fluent and native data speakers. Look at business analyst, data stewards and architects who are able to speak data naturally and effortlessly.
- Identify skilled translator who can serve as mediators for business groups.
- Set up a capability academy for data skills. A capability academy is a place where employees can go to advance specific job-related skills. Carefully select the data skills needed by their workforce to arrive at the targeted a skills framework.

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POC 3: Bridging data gaps in guests demographics, movement, and spend through engagement



Key initiatives

Establish data governance organization structure

- Define goals and understand the benefits
- Analyse current state and delta analysis
- Develop and plan the data governance program i.e. Define data domains;
- Define primary roles and responsibilities within data governance i.e. Data Manager; Data Owner; Data Steward; Data User

Develop data governance policies

- Set up goals of the data governance program and metrics for determining success
- Compile a list of data inventory of the data sources within the organisation
- Define permissions and who has access to which data elements
- Classify the data into different levels such as “Secret”, “Confidential”, “Restricted”, “Public”, etc., along with the levels of security and protection required at the different levels. Employ and update data security tools on a regular basis.
- Define data quality measurement, aims and objectives, as well as a range of supporting activities and processes, e.g. develop SOPs, Manual, guideline for front office to capture data consistently and accurately
- Create master data/metadata/data dictionary along with data lake development and implementation
- Integrate training on data privacy on general training program and onboarding for new staff (including data regulations of different countries i.e. GDPR, PDPA)

Train staff on requirement, establish control processes and enforce policies:

- Train staff on the requirements of the organisational data policy, suggestions for implementation and the penalties of non-compliance
- Review the data life cycle within their department to identify how policy requirements relate to each stage of the cycle
- Ensure department implement appropriate controls with thresholds to determine whether an instance of non-compliance has occurred
- Monitor compliance with data governance requirements
- Non-compliance incidents should be documented within a tracking system. This could involve making amendments to the relevant department’s SOPs.



[Click here to read STB’s Data Governance and Data Quality Playbook.](#)

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PROBLEM STATEMENT

How might we enable Attractions to compare their business performance and visitors with their peer group to make smarter data-driven decisions on cost optimization and growth opportunities?

OBJECTIVES

- Getting a holistic view of the Attractions business performance in correlation with visitor arrival data
- Ability to conduct peer comparison by a specific segment (i.e. Attraction type, size and precinct)
- Ability to profile customers based on demographics, spending and transactions
- Ability to extract business insights related to pricing, revenues, marketing and manpower cost trends and more ...

ACHIEVEMENTS

- A deeper understanding of Attraction’s business performance both in relation to visitor arrivals and in comparison to industry peers
- Increased visibility on revenue drivers by channel and cost drivers
- Ability to profile customers better based on spending data, transactional information on top of regular ticket and CRM data on customers

SOLUTION AND KEY FEATURES

Performance benchmarking tool for peer comparison of Attractions with each other, to enable opportunities for improvements - Key features include:

Business Performance Metrics:

- Revenue split by channel
- Manpower cost as % of revenue
- Marketing cost as % of revenue and more..

Customer Profiling Metrics:

- Visitor arrival by region and purpose of visit
- Visitor profiling by age group
- Average time per visit
- Average spend per visit
- Time of visit to Attraction and more..

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Data dashboard



Key features

- 1 MTD & YTD KPI Cards
- 2 Overall IVA, IVA by Travel Purpose, Region and Top Spending Categories
- 3 Customer profile metrics
- 4 Transactional data metrics such as 'Types of tickets sold', 'Time of visit', 'Avg spend per visit'
- 5 Aggregated revenue and costs metrics

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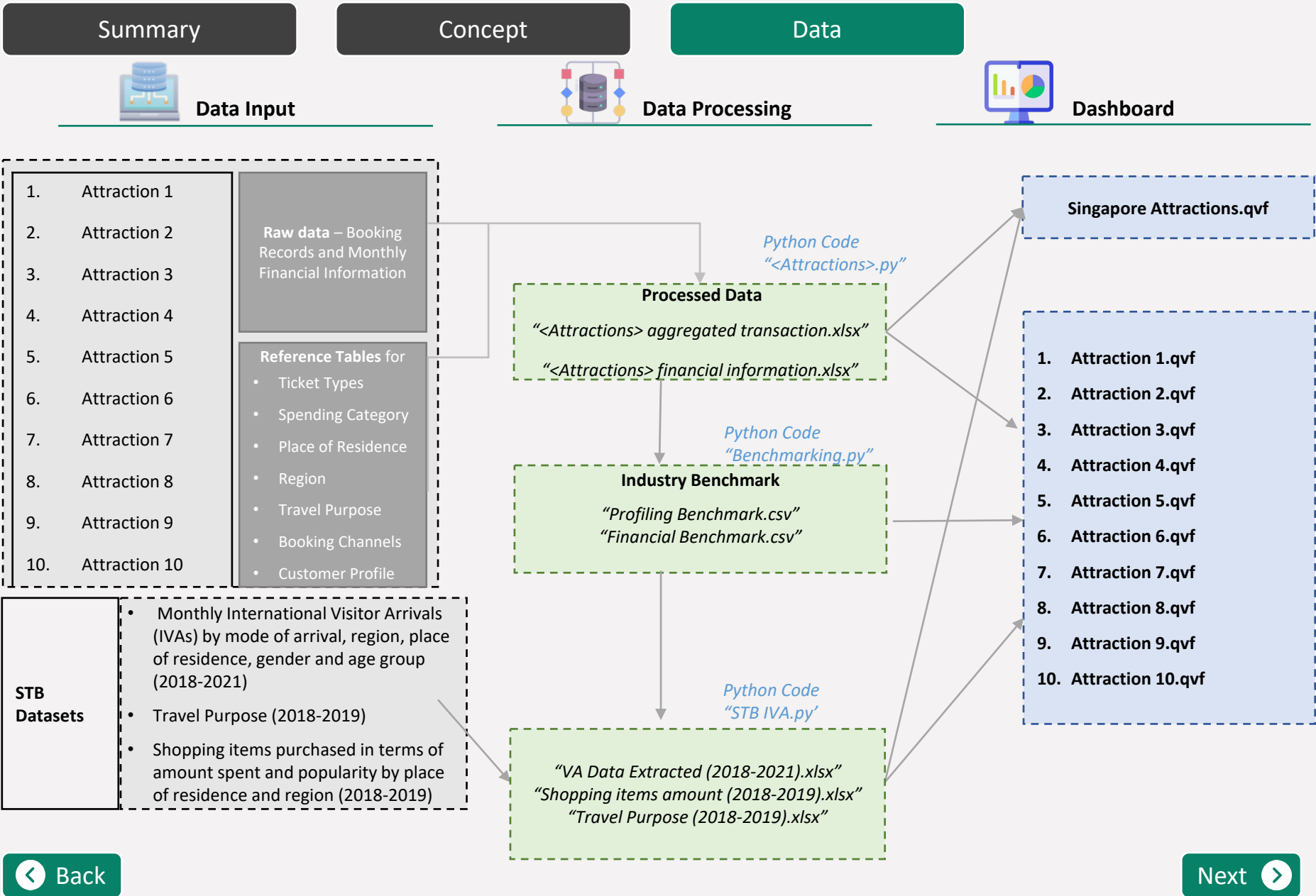
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POC 4: Benchmarking business performance and visitor profiling with peers for cost optimization and growth opportunities



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INDUSTRY

MICE

BUSINESS AREA

Event Venue /
Event Organizer

PROBLEM STATEMENT

How can we utilise buy-side data effectively to target exhibitors?

OBJECTIVES

- Increase conversion of exhibitors to join events by showing the value these events provide based on insights from buy-side data
- Consolidate and analyze data from existing databases of new digital touchpoints in hybrid events

ACHIEVEMENTS

- Multi-dimension visibility of data through integration of multiple data sources and analysis of key data points on buyers and their behaviour, helping to provide exhibitors with more reliable estimates on their potential performance
- New capabilities in profiling and monitoring buyer behaviour
- Organisational change towards greater awareness and recognition of the benefits of data analytics

SOLUTION AND KEY FEATURES

Tool which provides multi-dimensional view and analysis of buy-side data with focus on determining customer behaviour, propensity to spend and spending capacity – Key features include:

- Ability to model an estimate buyers' propensity and ability to spend through consolidated insights on buyers' profile and behaviour
- Ability to profile and classify buyers and industry segments automatically with important profile and behavioural details

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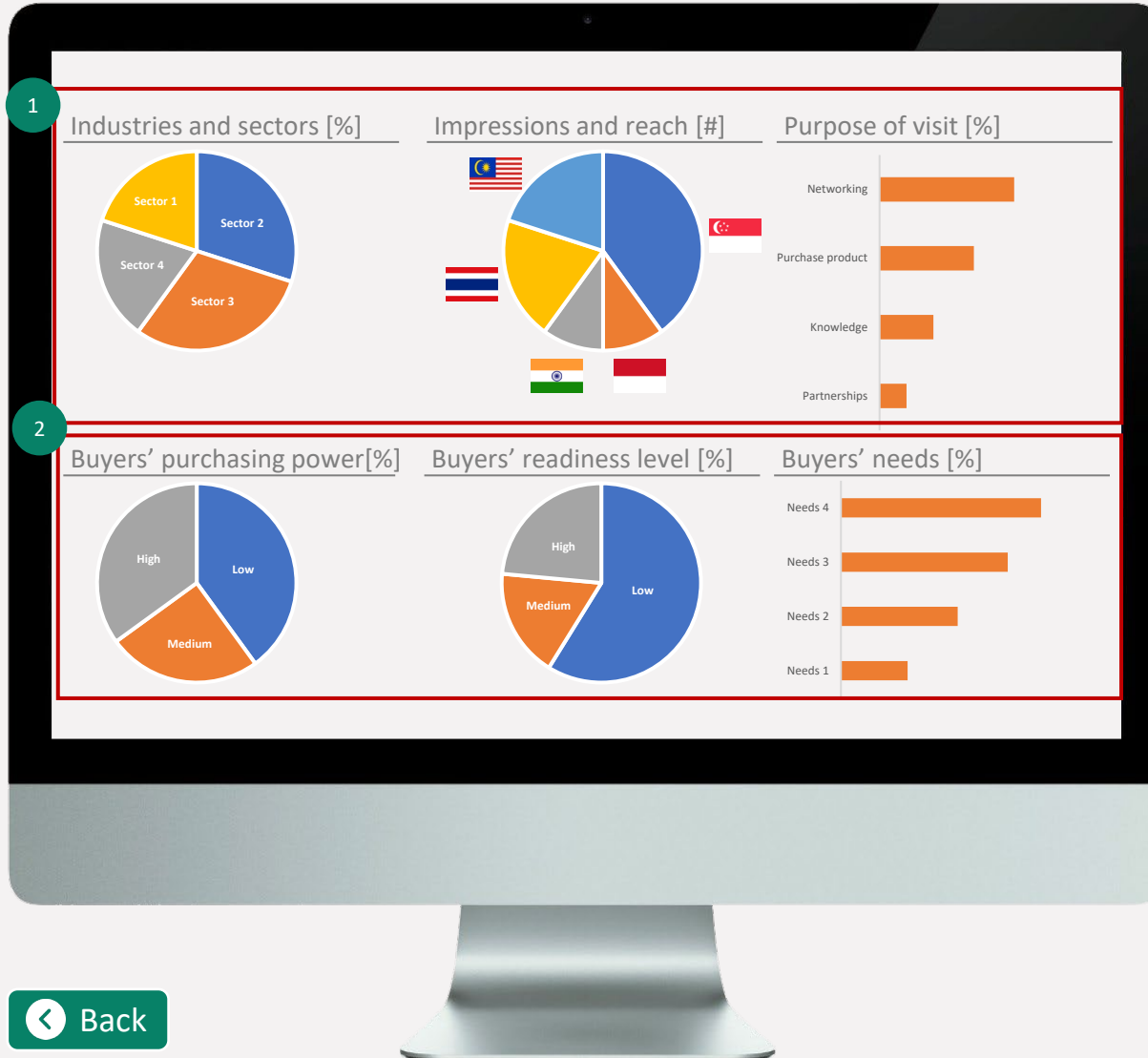
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Data dashboard



DATA DASHBOARD

Key features

- 1 Multi-dimensional view of buy-side data to provide estimates and insight into exhibitor performance and value
- 2 Automated insights into buyer profiles and behaviour based on consolidated data sets

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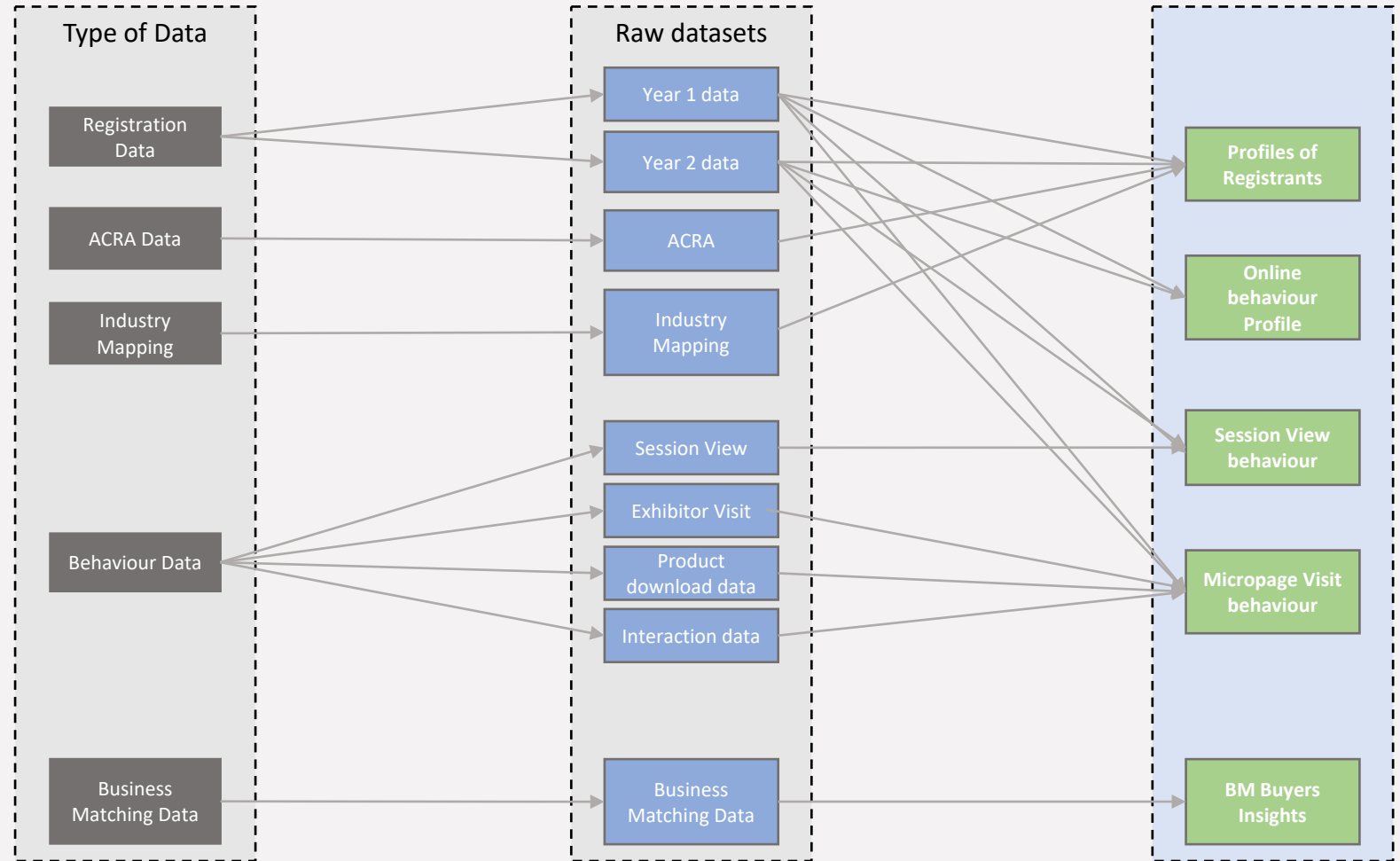
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POC 5: Empowering sales team to target exhibitors effectively through buy-side data



Key initiatives

Develop mindset change

- Conduct awareness of the organisation's data vision through success stories
- Design a Communication strategy and plan to spread awareness in the organisation
- Drive critical decisions with the support of data insights

Establish a data champion network

- Establish the network including key stakeholders supporting the initiative (executive level), People delivering/running the program (project level – i.e. data analytics team), end users (other department key staff)
- Build a community for the champions to share success stories or mini challenges through the various platforms to engage the organisation at the working level
- Provide incentives for the champions and the communities to encourage engagement

Develop training program

- Conduct creative/design thinking workshops to introduce data analytics and learn how to develop use cases (e.g. how can we improve our lives through data analytics?)
- Identify the short term training needs (e.g. foundations of DA training for staff or for implementation of POC or data lake)
- Identify long term training needs (i.e. intermediate training of department staff)

Setting success indicator (KPIs)

- Reach out to the data champions and respective departments to set individual and firm-wide targets
- Monitor these indicators and benchmarks across departments.

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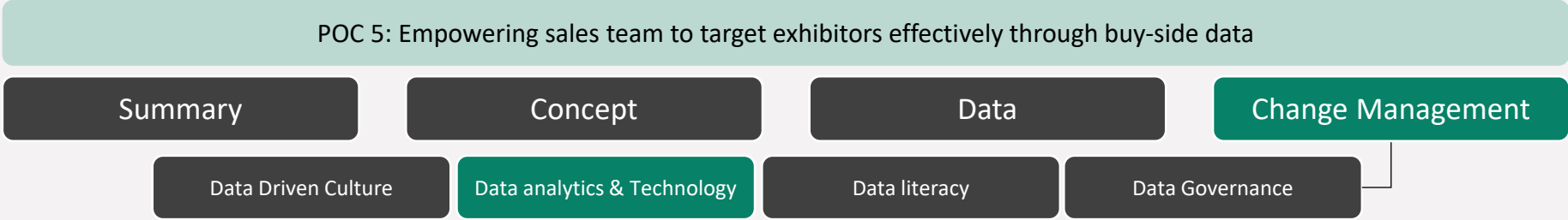
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Key initiatives

Further development of the POC to identify potential buyers

- Improve data capture
- Work with vendors to improve data quality
- Improve the NLP models with more labelled sample data. Currently the model is trained using business matching data. The developed NLP classification model could be applied to similar interactions by buyers
- Replicate the POC for other events

Explore more advanced data analytics use case to show the business values

- Workshop with businesses units periodically to identify the needs of data analytics
- Identify/select departments and business problems to employ greater analytics capabilities (e.g. Predictive and prescriptive analytics) and showcase the business value

Set up primary and secondary tools

- Procure and install required tools based on the nature of the data and expected targeted performance. Decide and procure the data lake based on how quickly it does scale up and down during the peak vs off-peak time. High priority tools includes – Data ingestion, data integration, data computation, data quality profiling, data backup, version control system, issue tracking, data modelling
- Procure and install required secondary tools such as data provisioning, continuous integration, meta data and data catalogue, reference and master data management.
- Set up training for these tools

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POC 5: Empowering sales team to target exhibitors effectively through buy-side data



Key initiatives

Assessing data literacy

- Data and analytics leaders are responsible for creating the narrative for data literacy, highlighting the business value to be gained. Start by assessing data literacy with a few question i.e. How many people in your business do you think can interpret statistical based dashboards
- Conduct data literacy assessments to identify gaps and use as a baseline
- Data and analytics leaders and data teams must lead by example. Ensure that the teams are speaking data in all meetings when discussing business outcomes and in other business situations.

Establish a data literacy program

- Identify more employees who can be data translators serving as mediators to the business side and to other groups within the business
- Identify skilled translator who can serve as mediators for business groups.
- Set up a capability academy for data skills. A capability academy is a place where employees can go to advance specific job-related skills. Carefully select the data skills needed by their workforce to arrive at the targeted a skills framework.

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POC 5: Empowering sales team to target exhibitors effectively through buy-side data



Key initiatives

Establish data governance organization structure

- Define goals and understand the benefits
- Analyse current state and delta analysis
- Develop and plan the data governance program i.e. Define data domains;
- Define primary roles and responsibilities within data governance i.e. Data Manager; Data Owner; Data Steward; Data User

Develop data governance policies

- Set up goals of the data governance program and metrics for determining success
- Compile a list of data inventory of the data sources within the organisation
- Define permissions and who has access to which data elements
- Classify the data into different levels such as “Secret”, “Confidential”, “Restricted”, “Public”, etc., along with the levels of security and protection required at the different levels. Employ and update data security tools on a regular basis.
- Define data quality measurement, aims and objectives, as well as a range of supporting activities and processes, e.g. develop SOPs, Manual, guideline for front office to capture data consistently and accurately
- Create master data/metadata/data dictionary along with data lake development and implementation
- Integrate training on data privacy on general training program and onboarding for new staff (including data regulations of different countries i.e. GDPR, PDPA)

Train staff on requirement, establish control processes and enforce policies

- Train staff on the requirements of the organisational data policy, suggestions for implementation and the penalties of non-compliance
- Review the data life cycle within their department to identify how policy requirements relate to each stage of the cycle
- Ensure department implement appropriate controls with thresholds to determine whether an instance of non-compliance has occurred
- Monitor compliance with data governance requirements
- Non-compliance incidents should be documented within a tracking system. This could involve making amendments to the relevant department’s SOPs.



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POC 6: Consolidating financial and customer data to derive business insights and enhance guests experience on the ground

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PROBLEM STATEMENT

How might we process our transactional and financial data to generate business insights?

OBJECTIVES

- Achieve better and faster insights on customer preferences from data collected
- Improve data collection, storage and analytics processes

ACHIEVEMENTS

- A holistic view of the Attraction's business performance in correlation with customer's arrival data
- Conducted peer comparison by a specific segment (i.e. Attraction type, location and customer profile)
- Profiled customers based on demographics, spending and preferences
- Extracted relevant business insights related to pricing and customer lifetime value

SOLUTION AND KEY FEATURES

Data consolidating and reporting tool that enables the Attraction to have a holistic view of their business performance and customer's profile.

Key features include:

- Customer's profiling by place of residence; age group; time of visit; actual vs expected footfall etc.
- Types of tickets sold
- Breakdown of tickets sold by channels
- Business performance in terms of revenues and costs

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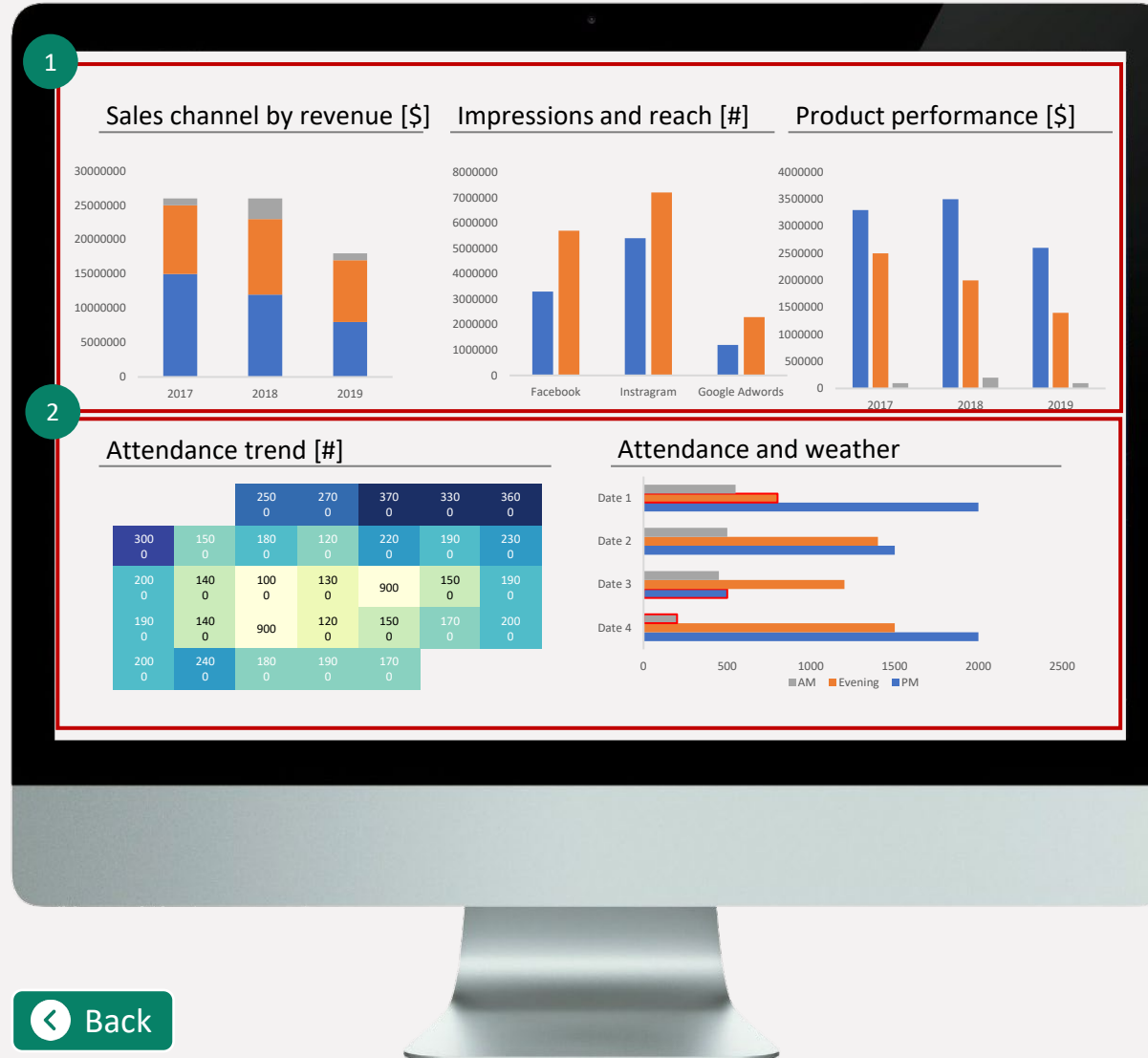
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Data dashboard



Key features

- 1 Automatically receive updated insights into revenue, performance and marketing impact
- 2 Generate important time series to review how day/time/ weather impacts sales

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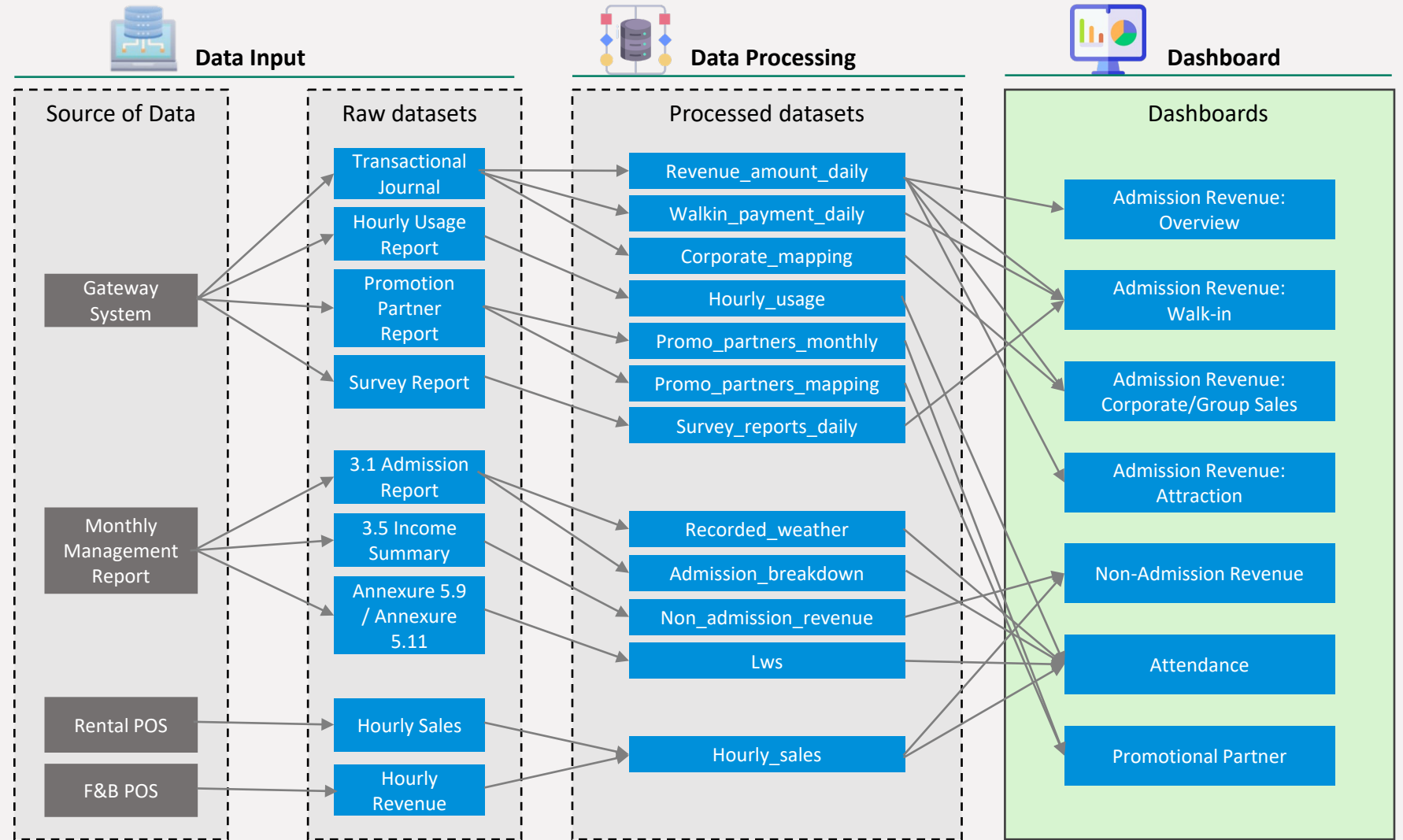
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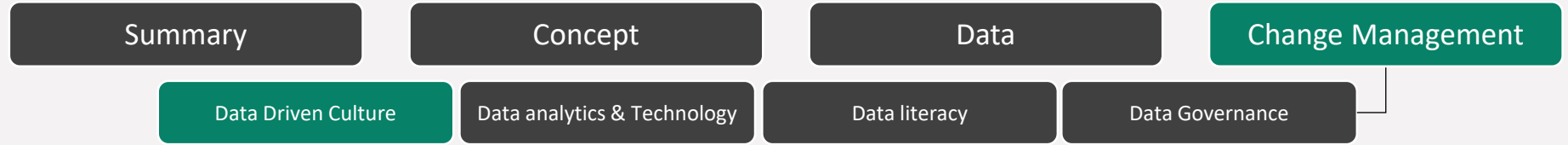
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POC 6: Consolidating financial and customer data to derive business insights and enhance guests experience on the ground



Key initiatives

Set up a Project Transformation Team

- Identify employees from various business units to be part of the Project Transformation Team
- Clearly define team structure within the team (i.e. roles and responsibilities, reporting lines etc.)
- Determine recruitment and onboard strategy of Project Transformation Team
- Leadership team to show visible sponsorship of data transformation initiatives

Established a dedicated data analytics team

- Identify short-term skills gaps against roles for implementation of POCs and train existing staff up by providing relevant training programmes to maintain and update POCs
- Clearly define team structure within the D&A Team to be set up (e.g. roles and responsibilities, reporting lines etc.)
- Expand the D&A Team to hire data analysts and data scientists to support internal data projects

Conduct skills audit on the organization

- Conduct a comprehensive skills audit targeted at all employees
- Deliver an organisation-wide skills audit survey
- Conduct audit with key representatives from identified business units

Develop comprehensive training programmes

- Identify short-term training needs
- Conduct training to be provided for employees of the organisation
- Project transformation team to work closely with business units within the organisation to understand their needs and skill gaps

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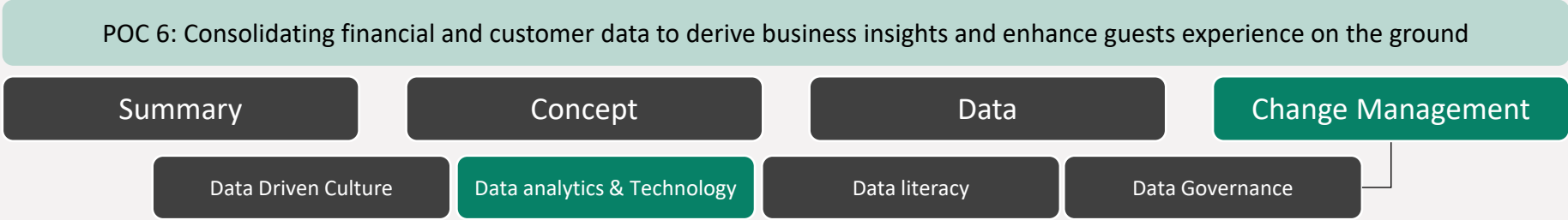
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Key initiatives

Data audit

- Start a high-level data audit by compiling a list of datasets currently available
- Carry out in-house data auditing
- Semi-annual stock-take on proportion of data collected that is used for analytics

Data ingestion and use cases

- Ingestion of data into data warehouse via a series of use cases
- Further development of use cases such as the 'Data Consolidation Reporting Tool ' and 'Online Digital Marketing Tool'
- Develop use cases such as 'B2B Tiered Pricing', 'Demand Forecasting Model', 'B2C demand-based Pricing Model' and 'Customer Profiling Tool'

Set up data warehouse

- Requirement gathering
- Procure hardware and setup environment
- Arrange general access rights for appropriate officers according to access policies

Set up primary and secondary tools

- Procure and install required tools based on the nature of the data and expected targeted performance.
- Set up training for these tools

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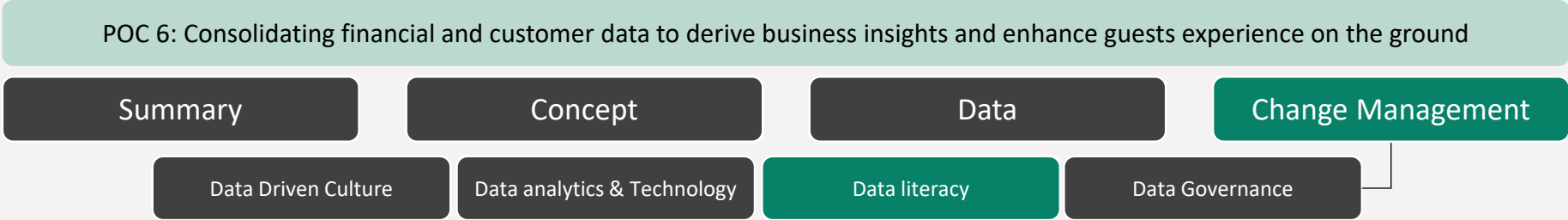
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Key initiatives

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- Conduct data literacy assessments to identify gaps and use as a baseline
- Data and analytics leaders and data teams must lead by example. Ensure that the teams are speaking data in all meetings when discussing business outcomes and in other business situations.

Establish a data literacy program

- Identify the fluent and native data speakers. Look at business analyst, data stewards and architects who are able to speak data naturally and effortlessly.
- Identify skilled translator who can serve as mediators for business groups.
- Set up a capability academy for data skills. A capability academy is a place where employees can go to advance specific job-related skills. Carefully select the data skills needed by their workforce to arrive at the targeted a skills framework.

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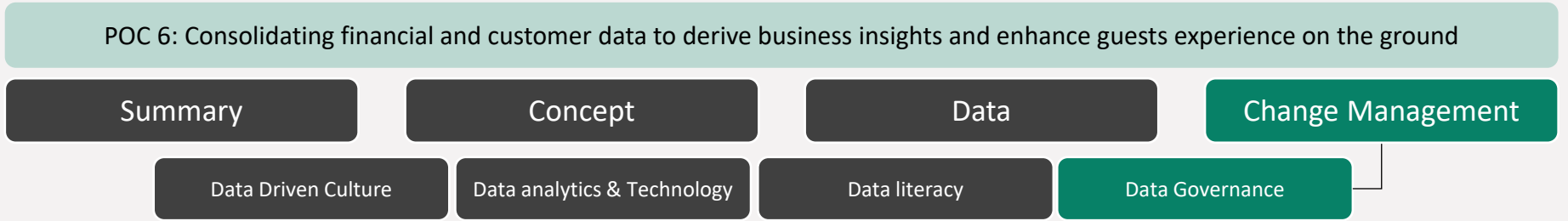
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Key initiatives

Data access

- Establish an enterprise-wide list of all data sources and data collected. This can be collected through data audit process.
- All sources should be catalogued for easier searching so that business stakeholders could make thorough use of the data.
- Duplicate data sets should be identified and highlighted to the respective departments.
- A formal intra- and inter-department sharing mechanism should be established to facilitate the timely sharing of data while also providing an adequate audit trail of requests (including the details of the Officer approving the request).

Data governance framework

- Define the data governance policies
- Train staff on requirements, establish control processes with acceptable thresholds
- Enforce policies

Analytical governance policy

- Policy should be developed with the following principles in mind:
 - ✓ Clarity of definitions and expectations
 - ✓ Accountability
 - ✓ Accessibility of models and documentation
 - ✓ Community – buy-in from department
 - ✓ Standardization of definitions, policies and practices
- Draft and implement an enterprise-wide analytical governance policy covering:
 - ✓ Guidelines for developing, testing, reviewing and deploying models
 - ✓ Formalize tracking and coordinating of analytical projects across the organization
 - ✓ Central storage of analytical models to enable staff to access and reuse models, and to encourage knowledge exchange
 - ✓ Formalised model review process



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INDUSTRY

Hotel

BUSINESS AREA

Sales & Marketing

PROBLEM STATEMENT

How might we identify successful corporate accounts to help the sales team to expand our customer portfolio?

OBJECTIVES

- Identify key characteristics of successfully converted corporate accounts
- Develop a model to analyze and target such customers with specific marketing strategies

ACHIEVEMENTS

- Improved data capture by widening prospecting to third party data sources
- Consolidated data from different systems to provide increased visibility at account level performance
- Identified new high potential accounts for prospecting

APPROACHED METHODOLOGY

The full name for NLP is ‘Natural Language Processing’. Its main purpose here involved preparing and “cleaning” text data for machines to be able to analyze it. Pre-processing puts data in workable form and highlights features in the text that an algorithm (i.e. clustering analysis) can work with. Clustering analysis itself is not one specific algorithm, but the general task to be solved. It is the task of grouping a set of objects which are similar are grouped together and are significantly different from objects of another group. In this POC, 6 models are being used to compare their results and the best model (Logicstic Regression) that identify key attributes for successful accounts for customer segmentation was identified

SOLUTION AND KEY FEATURES

Corporate customer targeting tool that enables hotels to analyse and target customers based on converted accounts – Key features include:

- Ability to standardise information across systems using NLP techniques to obtain holistic view of customer and market analysis
- Ability to tease out behaviour and key drivers of successfully converted corporate customers
- Ability to predict likelihood scores for potential accounts based on both internal data and external data

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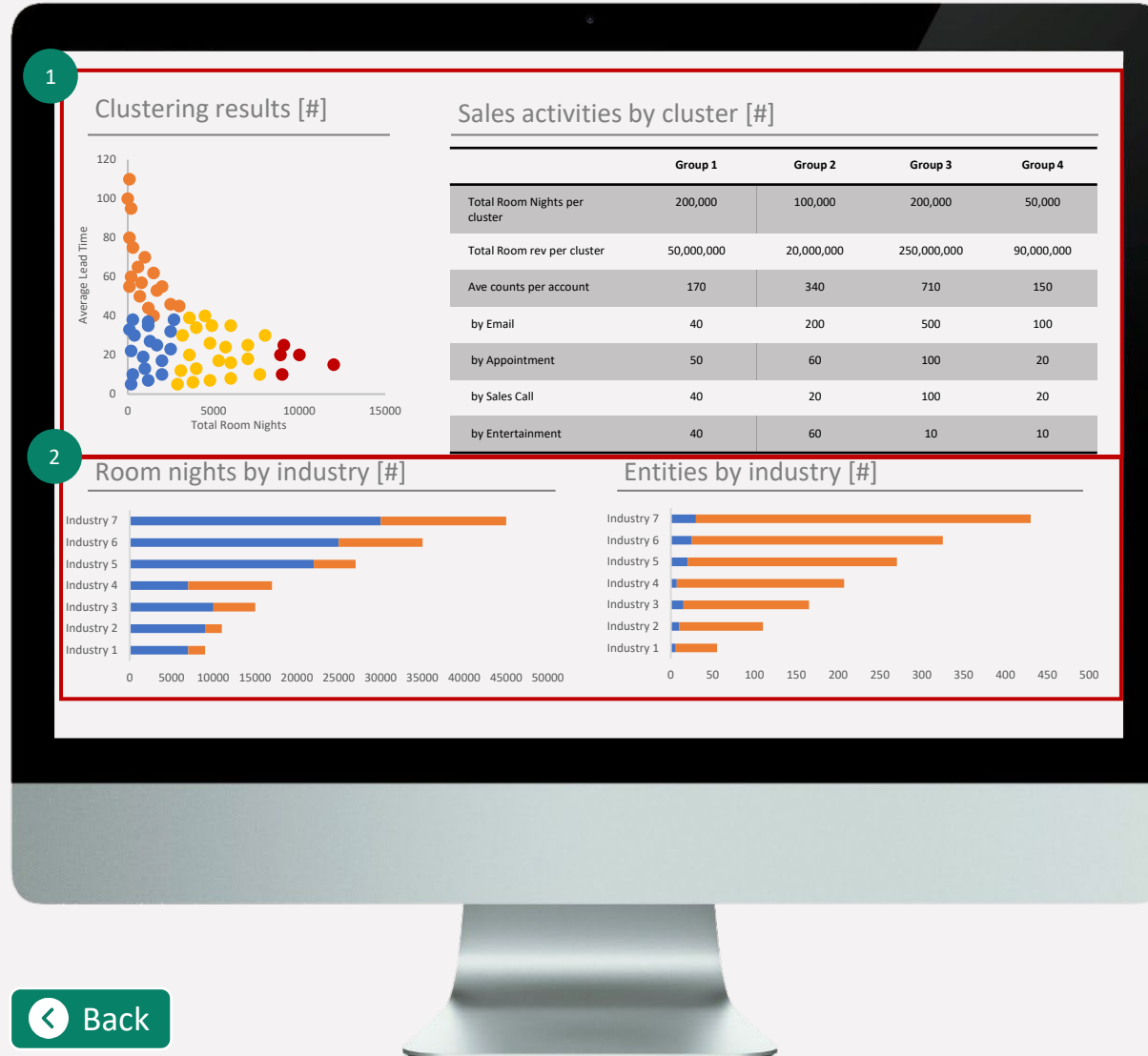
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Data dashboard [1/2]



DATA DASHBOARD

Key features

- 1 Data can be classified into clusters and displayed by these clusters
- 2 Insights into industry level performance

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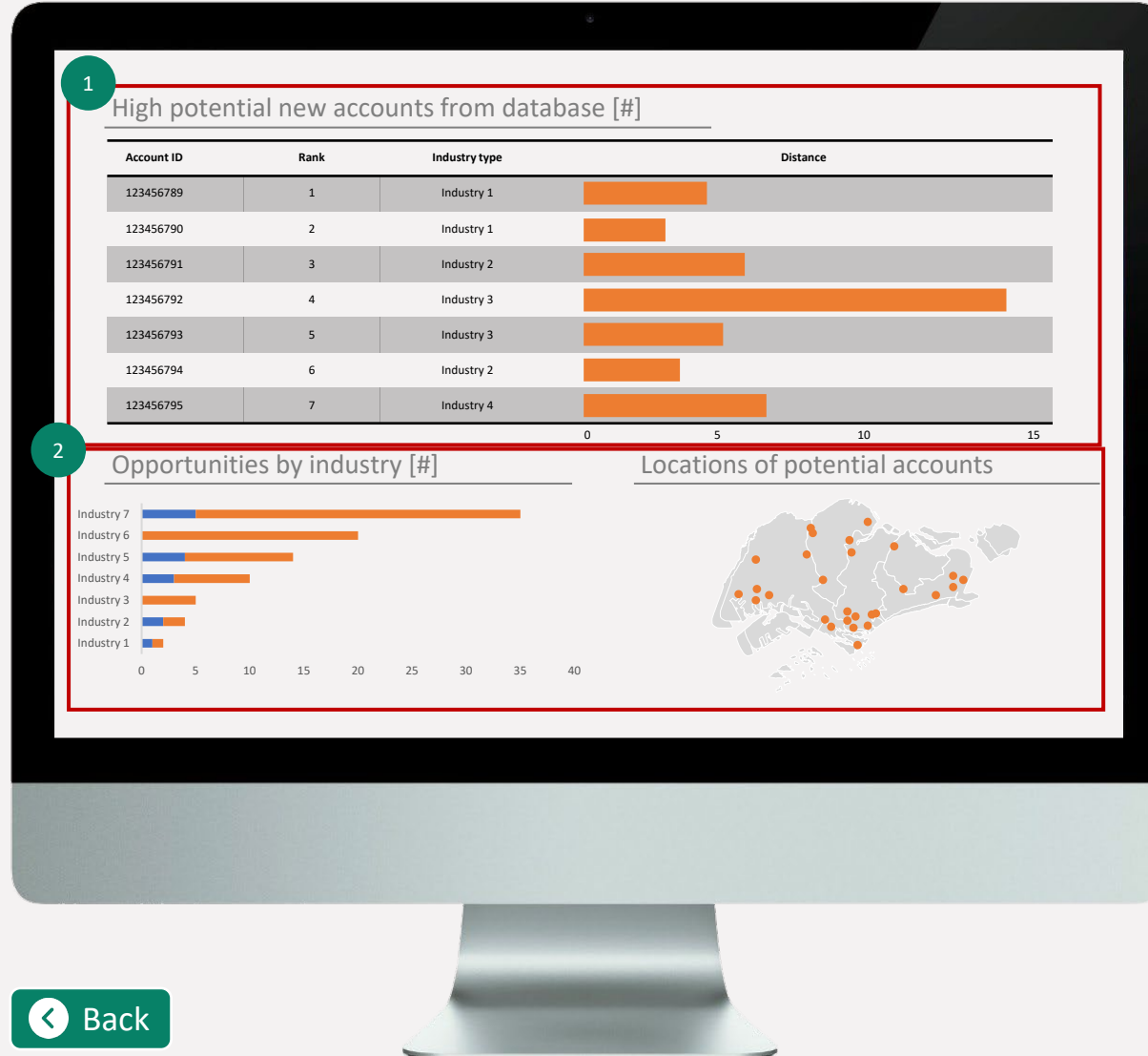
Summary

Concept

Data

Change Management

Data dashboard [2/2]



DATA DASHBOARD

Key features

- 1 High potential new accounts can be obtained and focused on
- 2 Insights on potential new accounts can be obtained

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HOW CAN I GET STARTED?

- ▶ Assessing current capabilities to become a data-driven organisation
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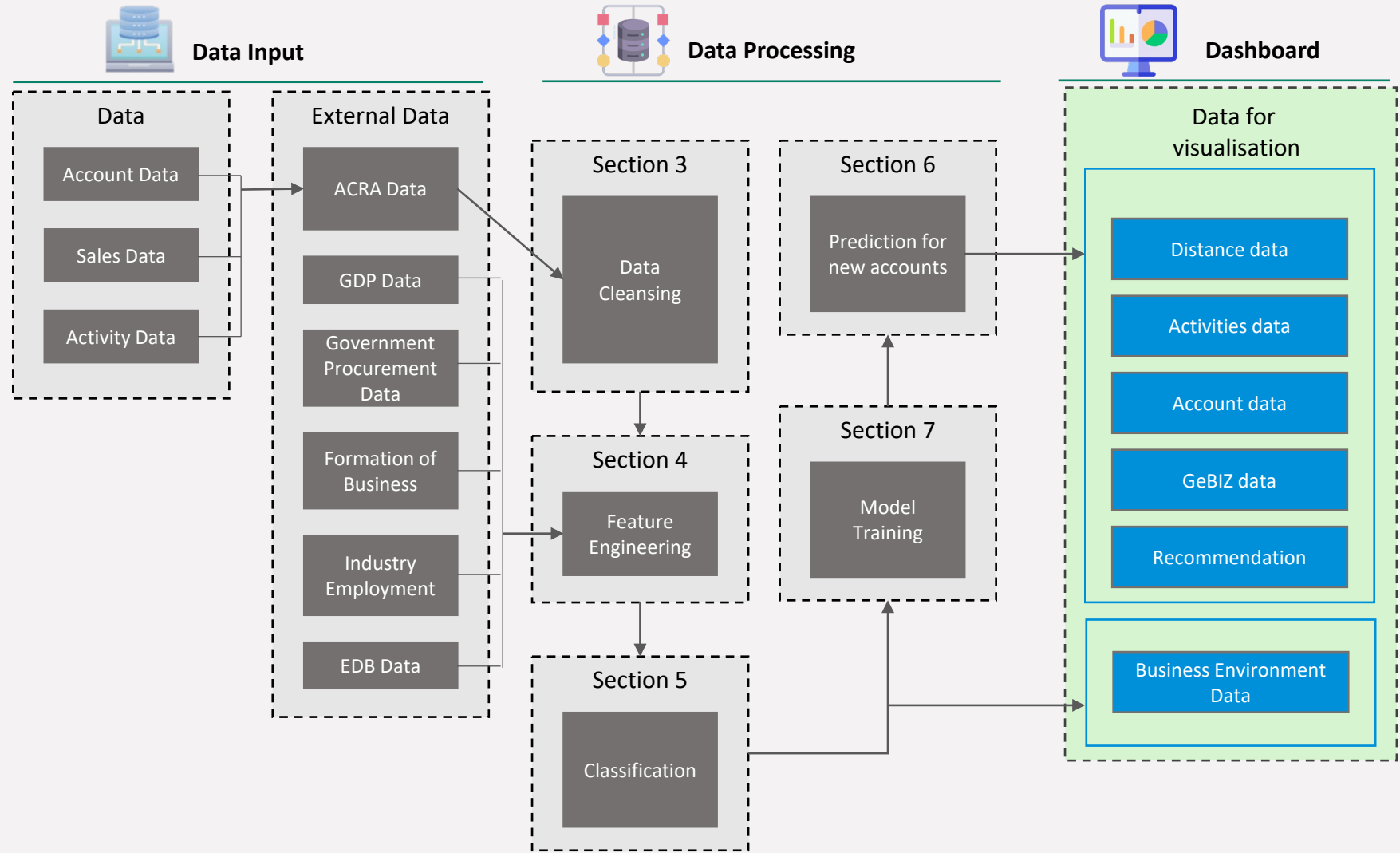
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POC 7: Building clustering models to identify successful corporate accounts and help sales team identify potential accounts

Summary Concept **Data** Change Management



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POC 7: Building clustering models to identify successful corporate accounts and help sales team identify potential accounts



Key initiatives

Set up a Project Transformation Team

- Identify employees from various business units to be part of the Project Transformation Team
- Clearly define team structure within the team (i.e. roles and responsibilities, reporting lines etc.)
- Determine recruitment and onboard strategy of Project Transformation Team
- Leadership team to show visible sponsorship of data transformation initiatives

Established a dedicated data analytics team

- Identify short-term skills gaps against roles for implementation of POCs and train existing staff up by providing relevant training programmes to maintain and update POCs
- Clearly define team structure within the D&A Team to be set up (e.g. roles and responsibilities, reporting lines etc.)
- Expand the D&A Team to hire data analysts and data scientists to support internal data projects

Conduct skills audit on the organization

- Conduct a comprehensive skills audit targeted at all employees
- Deliver an organisation-wide skills audit survey
- Conduct audit with key representatives from identified business units

Develop comprehensive training programmes

- Identify short-term training needs
- Conduct training to be provided for employees of the organisation
- Project transformation team to work closely with business units within the organisation to understand their needs and skill gaps

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POC 7: Building clustering models to identify successful corporate accounts and help sales team identify potential accounts



Key initiatives

Data audit

- Start a high-level data audit by compiling a list of datasets currently available
- Carry out in-house data auditing
- Semi-annual stock-take on proportion of data collected that is used for analytics

Set up data warehouse

- Requirement gathering
- Procure hardware and setup environment
- Arrange general access rights for appropriate officers according to access policies

Set up primary and secondary tools

- Procure and install required tools based on the nature of the data and expected targeted performance.
- Set up training for these tools

Ready, set, go!

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Key initiatives

Assessing data literacy

- Data and analytics leaders are responsible for creating the narrative for data literacy, highlighting the business value to be gained. Start by assessing data literacy with a few question i.e. How many people in your business do you think can interpret statistical based dashboards
- Conduct data literacy assessments to identify gaps and use as a baseline
- Data and analytics leaders and data teams must lead by example. Ensure that the teams are speaking data in all meetings when discussing business outcomes and in other business situations.

Establish a data literacy program

- Identify the fluent and native data speakers. Look at business analyst, data stewards and architects who are able to speak data naturally and effortlessly.
- Identify skilled translator who can serve as mediators for business groups.
- Set up a capability academy for data skills. A capability academy is a place where employees can go to advance specific job-related skills. Carefully select the data skills needed by their workforce to arrive at the targeted a skills framework.

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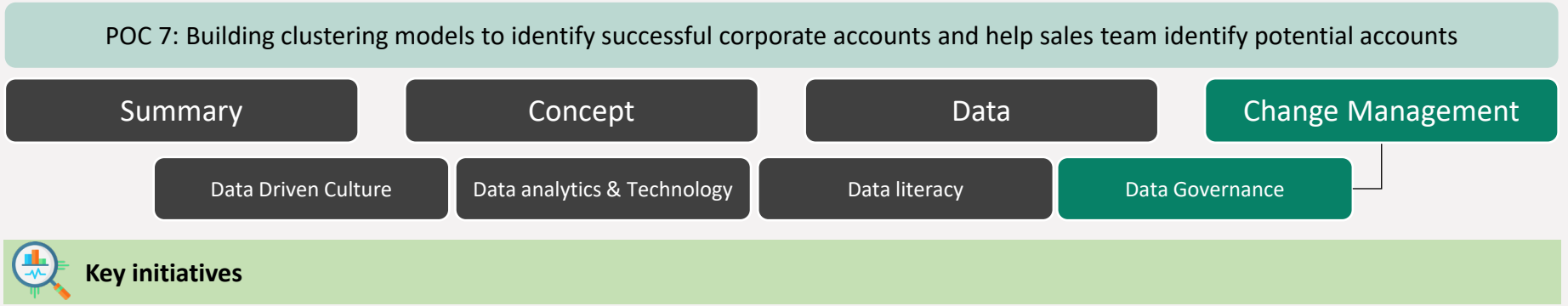
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Key initiatives

Define data governance policy and communicate policy

Typically, a data governance covers the rules, roles and responsibilities of the below elements:

- Goals
- People & organisation (e.g. data ownership, stewardship, etc.)
- Data inventory
- Data access
- Data security
- Data quality
- Data integrity and integration
- Metadata and reference data

Train staffs on requirements, establish control processes with acceptable thresholds

- Trained on the requirements of the data policy, suggestions for implementation and the penalties of non-compliance
- Review the data life cycle within their department to identify how policy requirements relate to each stage of the cycle
- Based on this review, the department should implement appropriate controls with thresholds to determine whether an instance of non-compliance has occurred

Enforce policies

- Monitor compliance with data governance requirements
- Non-compliance incidents should be documented within a tracking system. This could involve making amendments to the relevant department's SOPs.



[Click here to read STB's Data Governance and Data Quality Playbook.](#)



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INDUSTRY

Hotel

BUSINESS AREA

Business Performance

PROBLEM STATEMENT

How might we reduce manual data processes for reporting purposes and enable more timely data-driven business decisions?

OBJECTIVES

- Help to reduce manual data processes generating reports for decision making
- Enable quicker decision making through visualization that is real-time and easy to understand
- Generate more transparency on operating costs and manpower dynamics

ACHIEVEMENTS

- Enabled live view on running operating costs
- Consolidated financial information in one centralized location which is visualized for business decision making
- Enabled better planning of manpower

SOLUTION AND KEY FEATURES

The solution is a data consolidation and reporting tool that brings together and visualizes key information relevant for quick decision making in the areas of operations, finance and manpower to see own performance as well compare to industry performance which can be defined by time-periods on metrics – Key features include:

Performance and Revenue Metrics:

- Room Revenue
- F&B revenue
- Revenue per available room
- Occupancy rate

Operational Metrics:

- Operating cost over time
- Staff cost per occupied room
- Utility consumption

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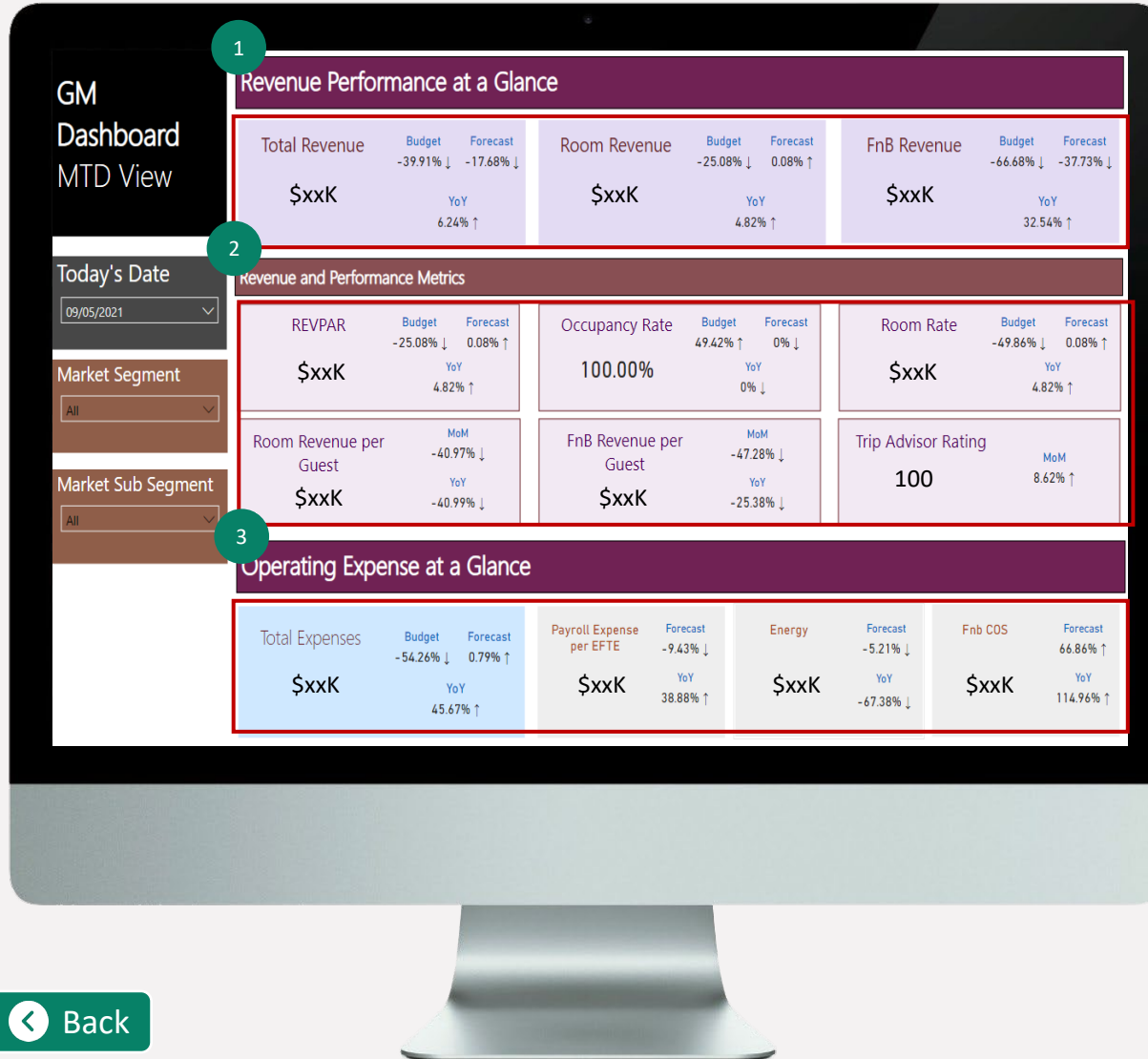
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Data dashboard



Key features

- 1 Revenue Performance Figures
- 2 Revenue & Performance Metrics
- 3 Operating Expense Figures

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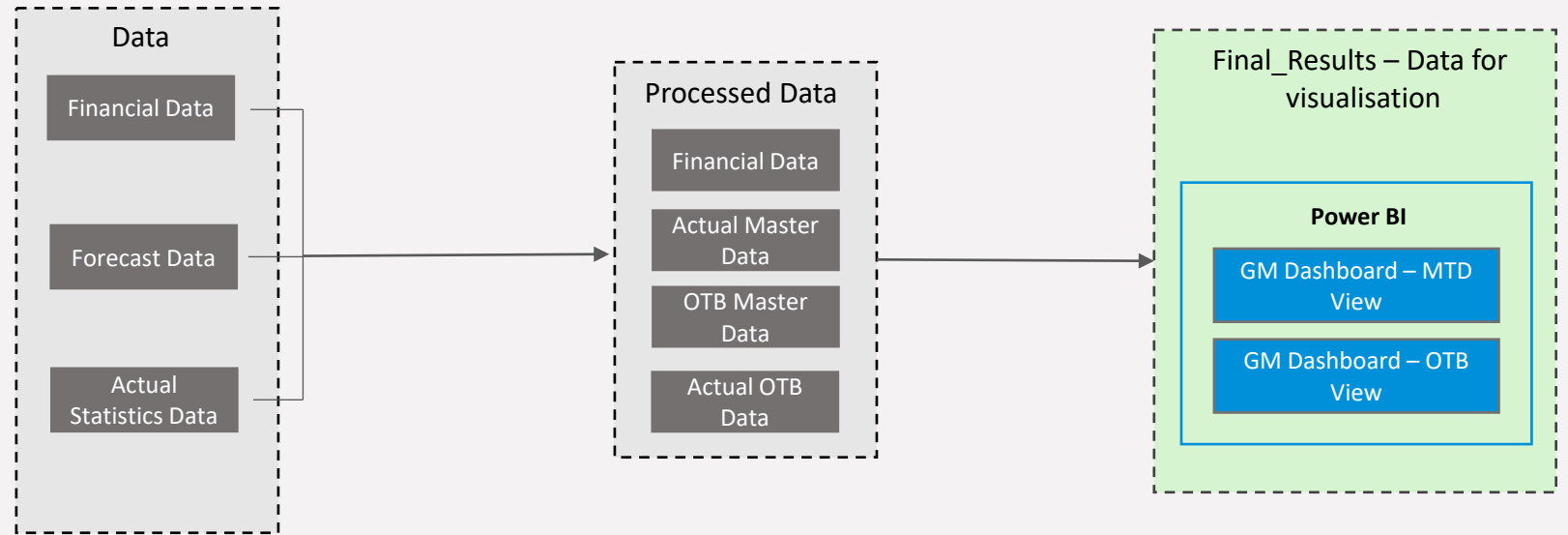
Data Input



Data Processing



Dashboard



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POC 8: Simplifying reporting processes for quicker business decisions making



Key initiatives

Adopt a data-driven mindset

- Conduct awareness programmes on data analytics skills by identifying success stories that shows the importance and relevance of data analytics such as sharing the outcomes of data solution that help achieve hotel’s objectives. i.e. sharing through newsletter
- Design an agile communication strategy and plan for spreading awareness i.e. consistent communication across the team on data strategy
- Leadership needs to drive critical decisions with the support of data insights and technology for visualization and adoption (e.g. use of Tableau for visualizing)

Develop a comprehensive training program

- Identify short term core training modules by doing research and identify off-the-shelf/ongoing programmes for training on data analytics – especially for foundational concepts for existing staff.
- Participate in Data Analytics Shift Program (DASH) to train staff in data transformation and data analytics skills
- Identify and analyse existing skills gaps within the hotel and address them. The solution could include, but are not limited to, conducting in-house training with expertise and engaging third parties to conduct on/off-site workshops
- Identify long term training modules - elective modules for some staff such as training courses on visualisation & business intelligence tools

Expand the data team

- Hire data specific roles to push forward the key initiatives for the hotel hiring generalists i.e. Business Analyst who can help to bridge the gap between IT and the various business functions using data analytics is a good start off; also a data engineer who can help to prepare data for analytical or operational uses).
- Define a clear team structure within the team (e.g. roles and responsibilities, reporting lines etc.)
- Conduct a review of recruitment strategy - in-house or outsourced and determine if it is a short term or long term need to ensure effective resource management for the data team
- Conduct an assessment every 6 months on capabilities gaps and needs – if additional hires are required

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POC 8: Simplifying reporting processes for quicker business decisions making



Key initiatives (1/2)

Preparation for setting up a CRM system

- Map out your goals and objectives. i.e. What business challenges are you wanting to solve?
- Conduct a Feasibility study to:
 1. Understand business needs across the organisation and gather business requirements
 2. Define the IT roadmap and the future state solution architecture
 3. Define the User Access Matrix
 4. Conduct a Fit Gap analysis for the solution
 5. Vendor Selection Assessment
 6. Business Case Development
- Be realistic about the total investment i.e. map out budget and how much time you are willing to dedicate to CRM implementation and ongoing management

Set up primary and secondary tools

- High priority tools i.e. 'Data Computation', 'Data Quality profiling', 'Data backup', 'Version control system', 'Issue Tracking' and 'Data modelling'
- Secondary tools that enhance the quality of data i.e. 'Continuous integration', 'Meta data and Data Catalogue', 'Reference and Master Data Management'
- Procure and install required tools based on the nature of the data and expected targeted performance
- Decide and procure the data based on how quickly it does scale up and scale down during the peak vs off peak time
- Set up training for tools implemented

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POC 8: Simplifying reporting processes for quicker business decisions making



Key initiatives (2/2)

Preparation of data lake/data warehouse solution

- Tender document preparation
- Request for quotation (RfQ) from selected vendors
- Initial discussion with vendors on the comparison of infrastructure solutions and what is the best fit for the organization considering the nature of business, type/volumn/frequency/speed of data, analytics use cases, etc.
- Based on the feedback from selected vendors, refine the scope (if needed)

Adopt advance analytics tools for automated reporting in real time

Choose the tools that best meet the business needs. Below are some examples of features which can be considered in choosing of the tools:

- having automated reporting features as well as interactive dashboard (i.e. Power BI, QlikSense or Tableau)
- having advanced ways to perform quality analysis such as predictive and prescriptive analytics (i.e. Python, SPSS, SAS)
- data connectors to view all information at one place (i.e. Informatica)
- data alerts that let you know when anything unconventional happened with the data (i.e. AWS CloudWatch)
- feedback alerts when there is any negative feedbacks that need to attend to immediately (i.e. Python NLP on feedbacks)

Explore more advanced data analytics use cases to show the business values

- Carry out workshops with businesses units periodically to identify high value use cases which can be addressed using data analytics. Use outcomes of the exercises to showcase values and gain buy-in across the organization.
- Some illustrative use cases which organization can explore in the future internally or with vendors:
 - 1) Improve the customer's experience in the organization's various touchpoints
 - 2) Aligning calendar and agendas to the actual demand (i.e. between the revenue and marketing department so as to boost the outreach better)
 - 3) Dynamic pricing / package optimization
 - 4) Optimize resource allocations for the organization's daily operations
 - 5) Personalized marketing that are more effective and give a personal touch
 - 6) Customer profiling for a better understanding of customer so that products and service can be adjusted to meet their needs, wants and interests
 - 7) Prediction of bookings trends using historical data

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POC 8: Simplifying reporting processes for quicker business decisions making



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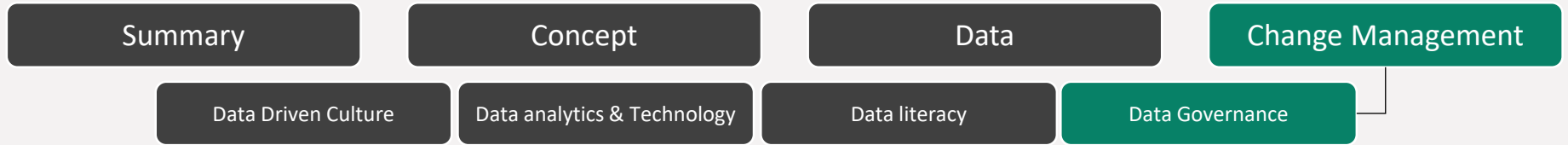
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POC 8: Simplifying reporting processes for quicker business decisions making



Key initiatives

Establish data governance to staff and enforce policies

- Define roles and responsibilities such as data owners who have decision making authority and able to access and edit data or data stewards who manage data and focus on data quality
- Train staffs on the requirements of data policy, suggestions for implementation and the penalties of non-compliance
- Data governance team will be the main team overseeing the policies and enforcing them
- Establish appropriate enforcement actions for each breach based on the level of severity
- Integrate training on data privacy in general training programs and onboarding for new staff (including data regulations of different countries i.e. GDPR, PDPA)

Develop data governance policies and framework

- Define data governance policies - each policy typically includes the rules, policies, procedures, roles and responsibilities which covers the below areas:
 - Set up goals of the data governance program and metrics for determining success
 - Keep a record of the data inventory of the data sources within the hotel
 - Classify the data accordingly into different levels such as “Secret”, “Confidential”, “Restricted”, “Public”, etc., along with the levels of security and protection required at the different levels.
 - Define data quality measurement, data integrity, integration, aims and objectives, as well as a range of supporting activities and processes e.g. develop SOPs, manual, guideline for front office to capture data consistently and accurately

Accessing data in centralized data sharing system

- Create master data/metadata along with any data related development and implementation
- Build data library and data dictionary that contains all the descriptions of every data elements
- Build data lineage to track how data flows through data value chain from source (origin) to use (destination)
- Organise data for easy discovery via a few techniques such as tagging, organising by amount of usage, etc.
- Establish data protection office (legal counsel) to ensure compliance with PDPA
- Standardise unique identifiers across the hotel, institute data sharing and ingestion processes
- Establish a tracking system to document non-compliance incident – incidents should be reviewed to identify the root cause and develop a strategy to prevent future occurrences



[Click here to read STB's Data Governance and Data Quality Playbook.](#)



Ready, set, go!

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POC 9: Creating a performance benchmarking and visitor profiling tool which could help the TAs to compare their performance with a selected peer-group over a specific period of time. And mine into the main pillars that support travelling and tourism in the macro view

Summary

Concept

Data

INDUSTRY

Travel Agents

BUSINESS AREA

Business Performance Benchmarking & Customer Profiling

PROBLEM STATEMENT

How might we enable the TAs to compare their business performance and visitors with their peer group to make smarter data-driven decisions on cost optimization and growth opportunities? How can we help the TAs to understand what are the macro-economic factors that will support travel & tourism industry

OBJECTIVES

1. Monitoring the trend of key macro-economic drivers that support travelling and tourism industry
2. Peer comparison tool that consolidates shared data to enable TAs to understand their business performance relative to their industry
3. Customer profiling that enables TAs to identify customer profiles, behavior, and preferred services in order to drive targeted marketing campaigns

ACHIEVEMENTS

- Enabled a good understanding of the key macro-economic factors that support the T&T industry
- Conducted peer comparison by a specific segment (i.e. size of TA)
- Profiled customers based on demographics and preferences i.e. Age group, service package
- Extracted relevant business insights i.e. revenue trends, cost breakdown

SOLUTION AND KEY FEATURES

Performance benchmarking and customer profiling tool for peer comparison of TAs, to enable opportunities for improvements - Key features include:

Macro-economics factors/Business Performance Metrics:

- Correlation between TA's revenues with macro-economic factors
- Visitors count vs exchange rate index by market
- TA revenue trend and Y-o-Y growth
- TA revenue by service package and more..

Customer Profiling Metrics:

- TA visitors arrival by place of residence
- TA visitors arrival by age group
- TA visitors arrival by service package and more..

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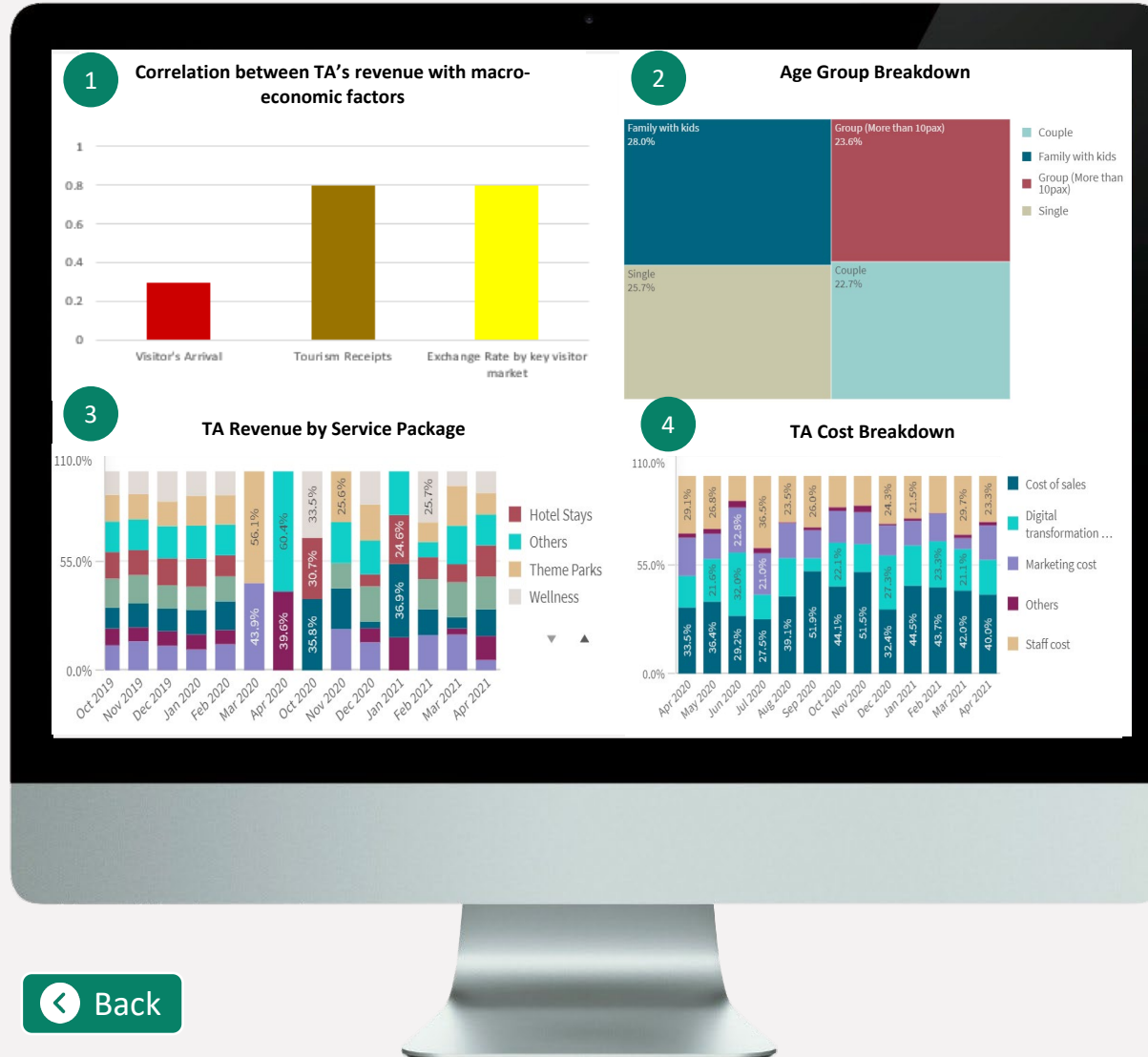
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Summary

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Data

Data dashboard [1/3]



Key features

- 1 Correlation between TA's revenue with macro-economic factors
- 2 Age group breakdown
- 3 TA revenue by service package
- 4 TA cost breakdown

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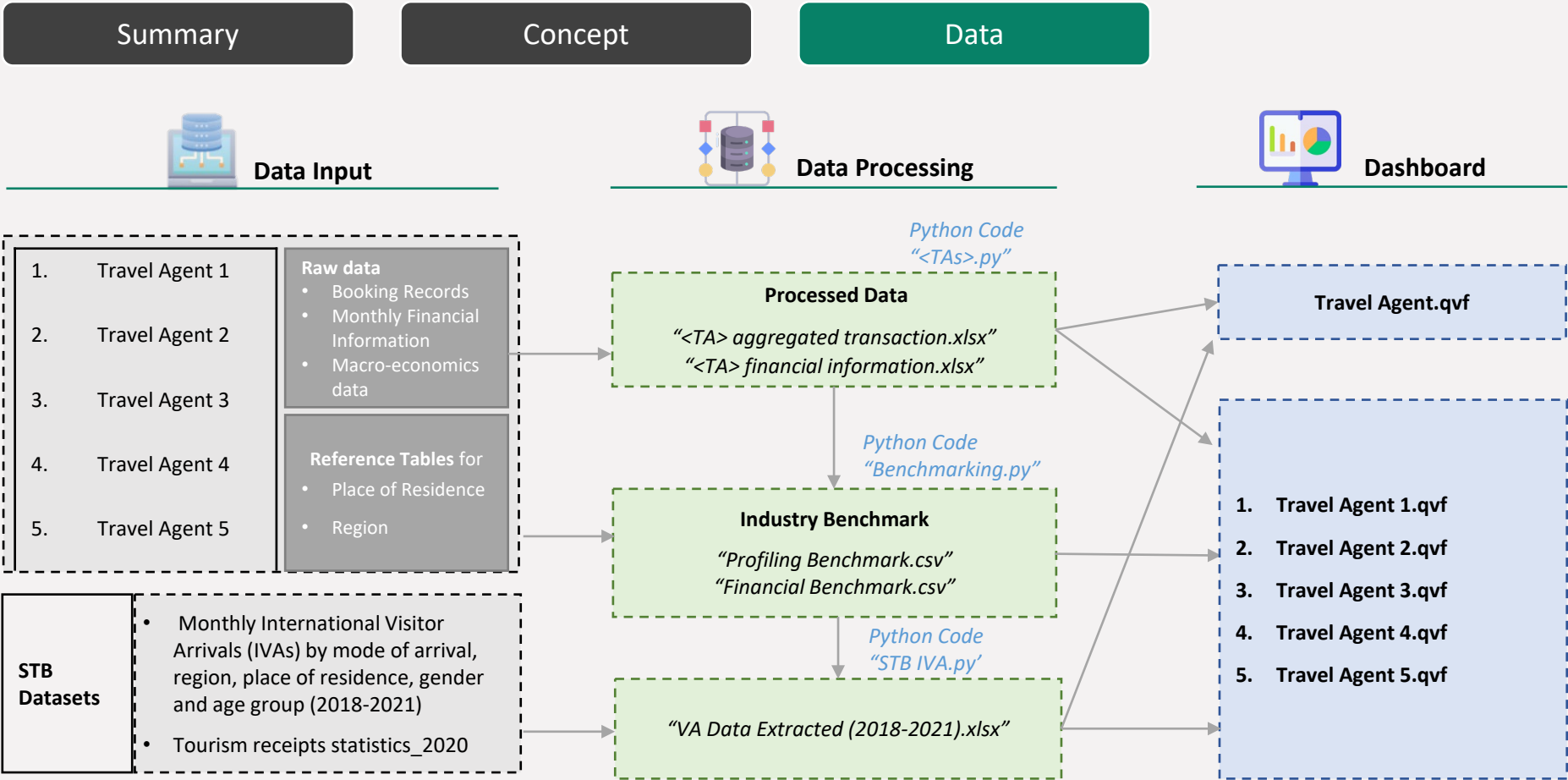
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INDUSTRY
Attraction

BUSINESS AREA
CRM

PROBLEM STATEMENT

How might we leverage on data captured through a new edutainment proposition to drive parents' engagement and teach children important life skills?

OBJECTIVES

- Shore up a compelling proposition to become a data source for consumer engagement and an educational app for children
- Validate mobile app's ability to collect new sets of data not captured today and maintain relationship with current members

ACHIEVEMENTS

- Drove user (parents and children) engagement through missions-based learning, gamification and immersive content
- Increased user participation through attractive rewards, live stream videos and donations which are aligned with the client's educational vision and values
- Increased data capture capabilities (demographic and behavioural)

SOLUTION AND KEY FEATURES

The solution consists of a customer mobile app and an admin portal - Key features include:

- Ability to capture parent and child demographic and behavioural data
- Ability to earn loyalty points through gamification
- Ability to redeem loyalty points for rewards and offers
- Ability to track usage of the app and key performance metrics
- Ability to create and track the performance of new reward initiatives

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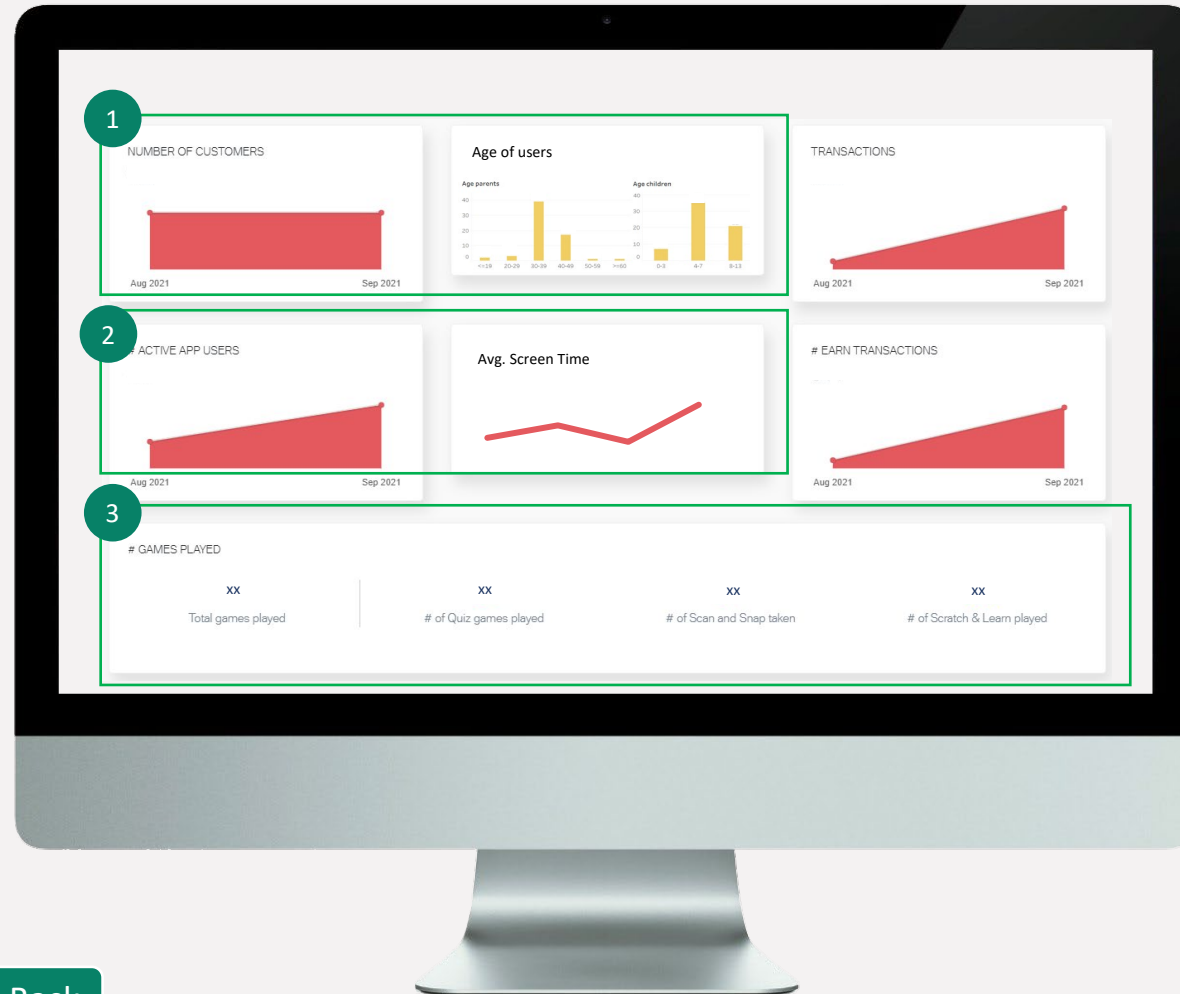
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Data dashboard



Key features

- 1 Demographic data e.g. age, gender, interests, etc.
- 2 App engagement data e.g. average screen time, daily active users, etc.
- 3 Transactional data e.g. rewards redeemed, points earned from participating in missions, etc.

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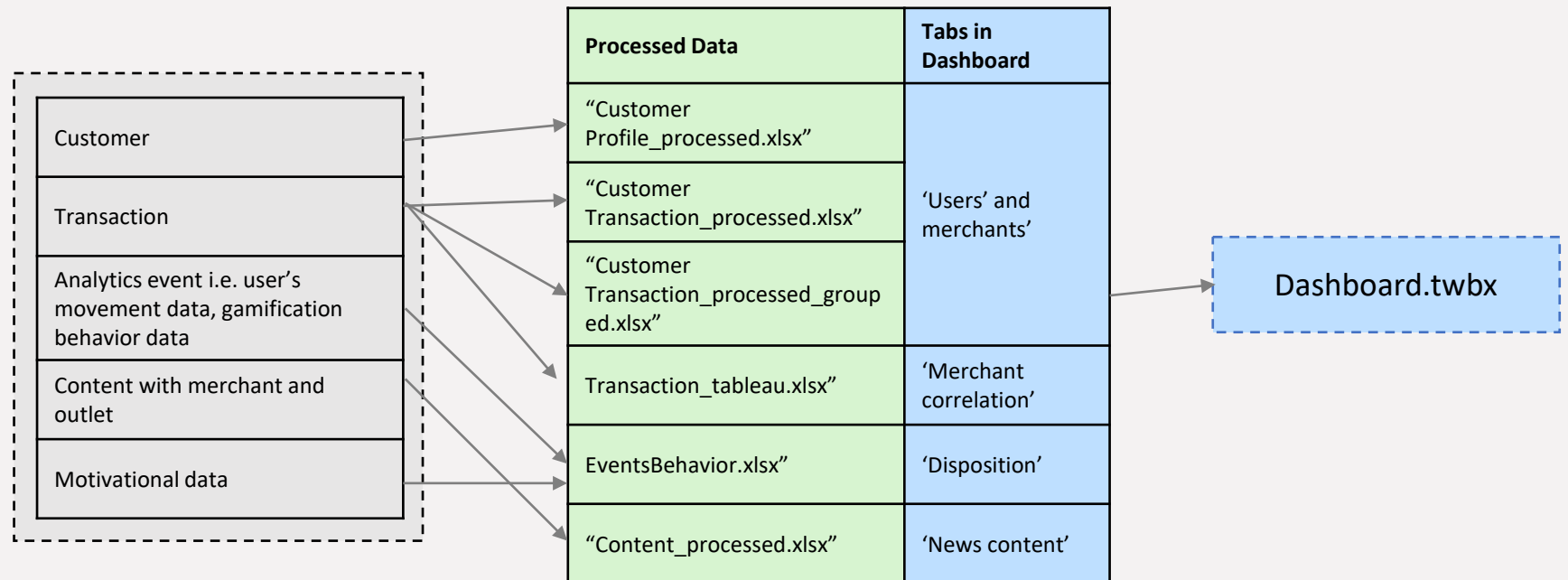
Data Input



Data Processing



Dashboard



Ready, set, go!

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POC 10: A data capture and engagement tool to better understand users' demographic, behavioural and motivational data

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Data Driven Culture

Data analytics & Technology

Data literacy

Data Governance



Key initiatives

Adopt a data-driven mindset

- Conduct awareness sharing of the success stories of data-driven initiatives and use cases
- Design an agile communication strategy and plan for spreading awareness
- Leadership needs to drive critical decisions with the support of data insights and analytics

Develop comprehensive training program

- Identify the short term core training modules by doing research and identify off-the-shelf/ongoing programmes for training on data analytics
- Participate in Data Analytics SHift Program (DASH) to train staff in data transformation and data analytics skills
- Identify and analyse existing skills gaps and address them
- Identify long term training modules

Expand the data team

- Hire data specific roles to push forward the key initiatives
- Define a clear team structure within the team
- Conduct a review of recruitment strategy - in-house or outsourced and determine if it is a short term or long term need to ensure effective resource management for the data team
- Conduct an assessment every 6 months on capabilities gaps and needs

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POC 10: A data capture and engagement tool to better understand users' demographic, behavioural and motivational data



Key initiatives (1/2)

Set up a cloud data warehouse

- Undertake data audit to assess whether the data is fit for given purpose
- Conduct information modelling processes that shows how business processes are interrelated and linked.
- Develop disaster recover plan in case of any system failure.
- Develop strategies for the loading of data. Volume of data ingested, complexity and format of data are examples of items to consider

Preparing to adopt the cloud

- Keep records of what is done and what is next to ensure all the moving pieces (i.e. reports, data, databases) end up where they should.
- Create baseline of the current IT support
- Establish some cloud migration key performance indicators (KPIs)
- Develop a framework for new operating model when migrated to cloud which should be scalable to accommodate new system in future

Set up primary and secondary tools

- Set up high priority tools (i.e. Data computation; Data quality profiling; Data backup)
- Set up secondary tools that enhance the quality of data (i.e. Meta data and Data Catalogue; Reference and Master Data Management)
- Procure and install required tools based on the nature of the data and expected targeted performance
- Decide and procure the data based on how quickly it does scale up and down during the peak vs off peak time
- Set up training for tools implemented

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POC 10: A data capture and engagement tool to better understand users' demographic, behavioural and motivational data



Key initiatives (2/2)

Adopt advance analytics tools for automated reporting in real time

Choose the tools that best meet the business needs such as:

- Having automated reporting features as well as interactive dashboard (i.e. Power BI, QlikSense or Tableau)
- Having advanced ways to perform quality analysis such as predictive and prescriptive analytics (i.e. Python, SPSS, SAS)
- Data connectors to view all information at one place (i.e. Informatica)
- Data alerts that let you know when anything unconventional happened with the data (i.e. AWS CloudWatch)
- Feedback alerts when there is any negative feedbacks that need to attend to immediately (i.e. Python NLP on feedbacks)

Explore more advanced data analytics use cases to show the business values

- **Carry out workshops with businesses units periodically** to identify high value use cases which can be addressed using data analytics. Use outcomes of the exercises to showcase values and gain buy-in across the organization.
- Explore some uses cases internally within the business units or with vendors.

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POC 10: A data capture and engagement tool to better understand users' demographic, behavioural and motivational data



Key initiatives

Assessing data literacy

- Data and analytics leaders are responsible for creating the narrative for data literacy, highlighting the business value to be gained. Start by assessing data literacy with a few questions i.e. How many people in your business do you think can interpret straightforward statistical operations such as correlations.

Establish a data literacy program

- Identify the fluent and native data speakers. Look at business analyst, data stewards and architects who are able to speak data naturally and effortlessly.
- Identify employees who can be skilled data translators serving as mediators to the business side and other groups within the business

Beware of communication barrier

- Look for areas where communication barriers mean that data isn't being utilized to its full business potential.
- Conduct data literacy assessments to identify gaps and use as a baseline
- Ensure that the teams are speaking data in all meetings when discussing business outcomes and in other business situations. Data and analytics leaders and data teams must lead by example.
- Champion data literacy and evangelize the benefits of eliminating the data literacy gap.

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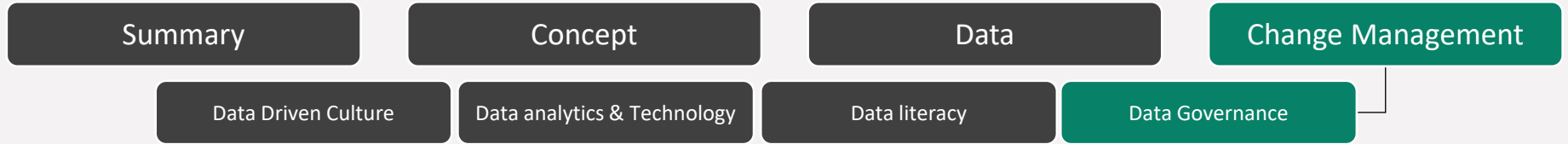
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POC 10: A data capture and engagement tool to better understand users' demographic, behavioural and motivational data



Key initiatives

Establish data governance to staff and enforce policies

- Define roles and responsibilities
- Train the staff on the requirements of data policy, suggestions for implementation and the penalties of non-compliance
- Data governance team will be the main team overseeing the policies and enforcing them
- Establish appropriate enforcement actions for each breach based on the level of severity
- Integrate training on data privacy in general training programs and onboarding for new staff

Develop data governance policies and framework

- Define data governance policies:
 - Set up goals of the data governance program and metrics for determining success
 - Keep a record of the data inventory of the data sources
 - Classify the data accordingly into different levels such as “Secret”, “Confidential”, “Restricted”, “Public”, etc., along with the levels of security and protection required at the different levels.
 - Define data quality measurement, data integrity, integration, aims and objectives, as well as a range of supporting activities and processes

Accessing data in centralized data sharing system

- Create master data/metadata along with any data related development and implementation
- Build data library and data dictionary that contains all the descriptions of every data elements
- Build data lineage to track how data flows through data value chain from source (origin) to use (destination)
- Organise data for easy discovery
- Establish data protection office (legal counsel) to ensure compliance with PDPA
- Standardise unique identifiers, institute data sharing and ingestion processes
- Establish a tracking system to document non-compliance incident



[Click here to read STB's Data Governance and Data Quality Playbook.](#)

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Data

INDUSTRY

Events

BUSINESS AREA

Sales & Marketing

PROBLEM STATEMENT

How might an event organiser leverage on NLP to identify new leads in new geographies more effectively?

OBJECTIVES

- Enable sales personnel to save time in identifying new targets through online secondary research
- Ability to modify and customize the search logic independently and based on the business needs

ACHIEVEMENTS

- Reduced amount of time spent on targeting new leads, based on up-to-date information and past successfully converted leads
- Enabled sales personnel to be up to date with key industry news and ensured that they are targeting the right customer with relevant content
- Enabled project probability of conversion of leads, which allowed for better estimation of resources and time allocated to conversion

SOLUTION AND KEY FEATURES

A tool was developed to provide a list of latest and most relevant news, corresponding companies, and news content on certain domain i.e. renewable energy and country to facilitate prospecting process and find leads more efficiently. Key features include:

- Constructed APIs to get latest news
- Leveraged NLP techniques to extract company names and news content
- Developed both source code version and user friendly UI version for both advance and regular users

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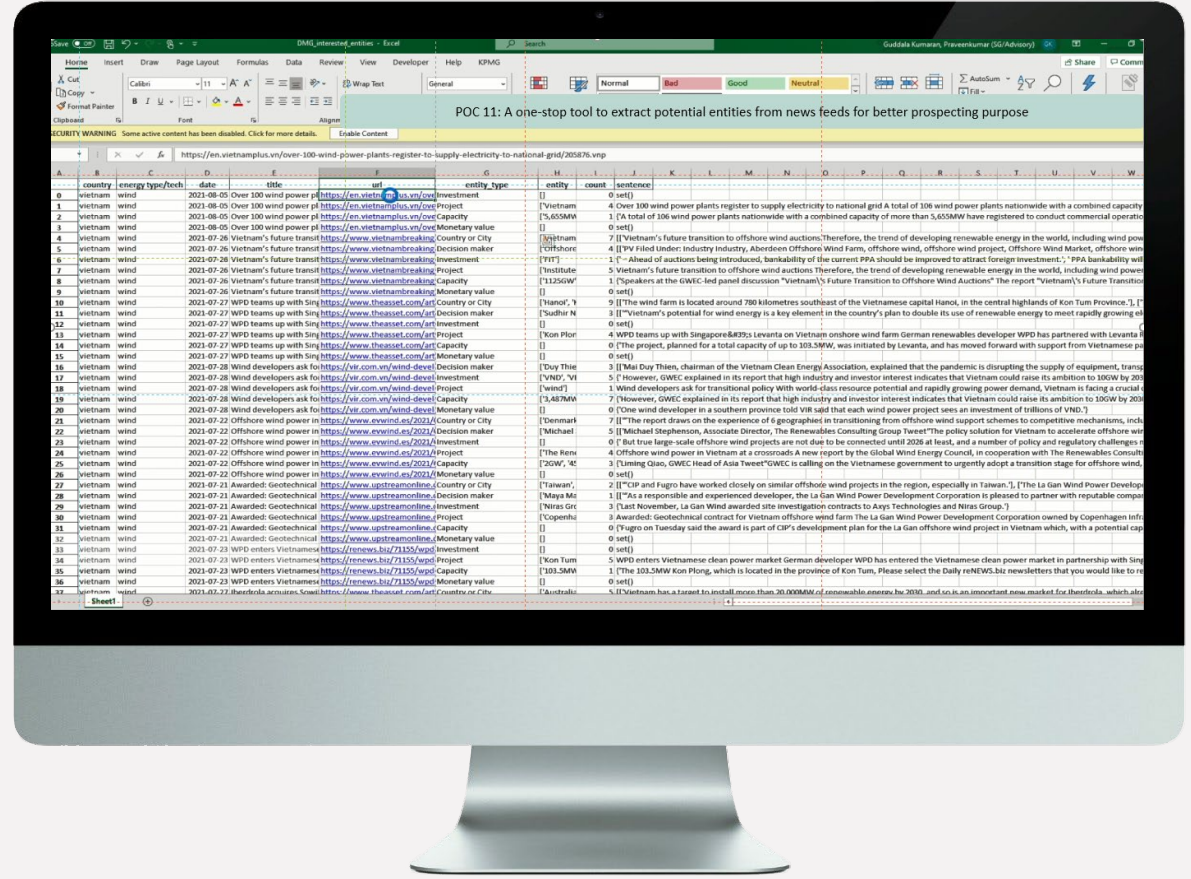
Summary

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Data

The extraction and consolidation of key information like project names, details of company involved, name of the decision maker, monetary information, news date, etc., from the news articles published daily through NLP-NER algorithm would benefit event organizer to identify new leads in unfamiliar markets.

 [Click here to read MICE NPL toolkit](#)



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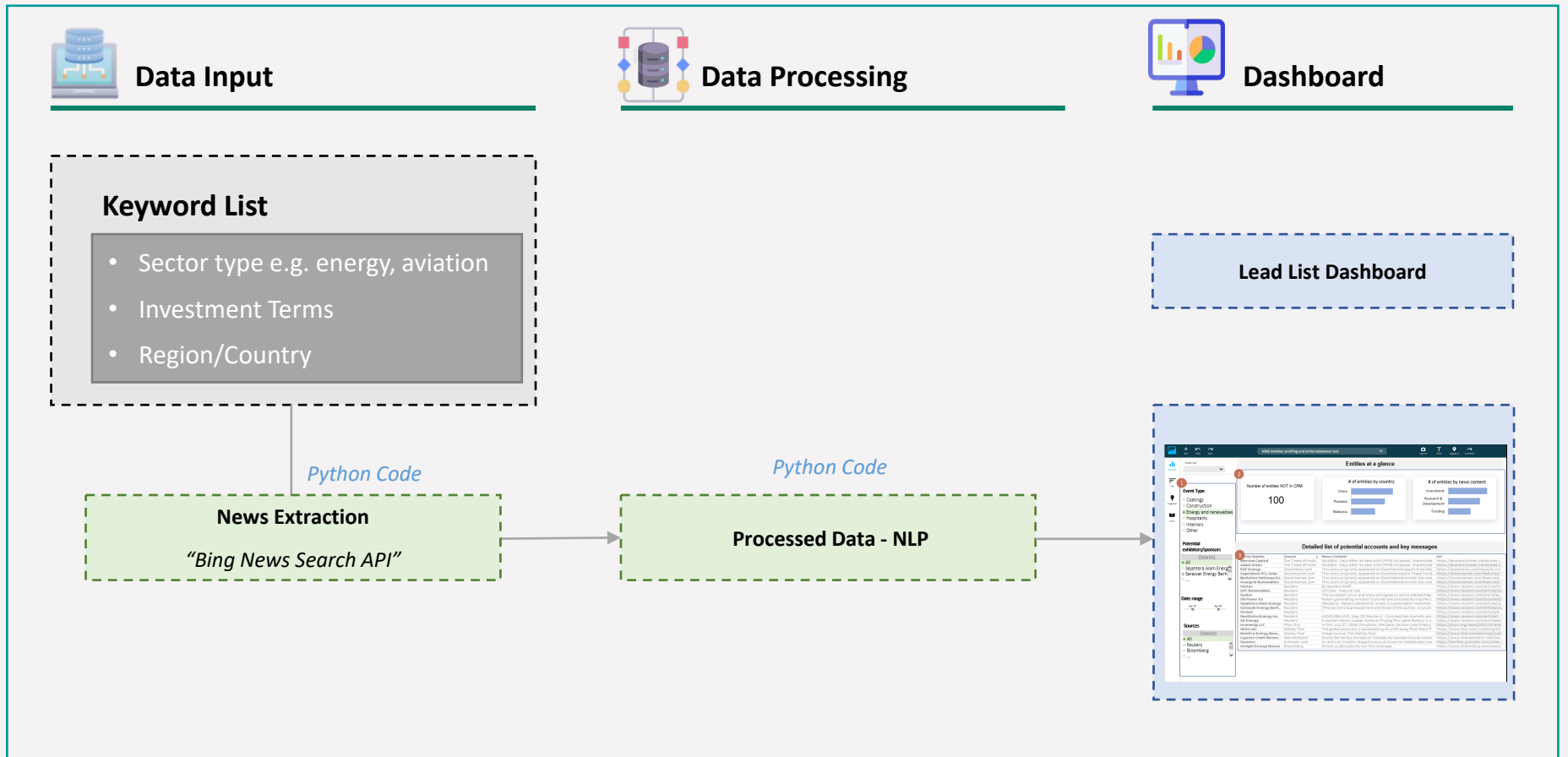
POC 11: A one-stop tool to extract potential entities from news feeds for better prospecting purpose

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Users will key in the necessary keywords to the input file and the Bing news API search coupled with Named-Entity-Recognition NLP algorithm will be executed to generate the desired results in the output file.



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INDUSTRY

Hotel

BUSINESS AREA

Business performance

PROBLEM STATEMENT

How might we reduce manual data processes for reporting purposes and enable more timely data-driven business decisions?

OBJECTIVES

- Development of dashboard for business intelligence, visualization and analysis
- Enable quicker decision making through visualization that is real-time and easy to understand
- Help to reduce manual data processes generating reports for decision making

ACHIEVEMENTS

- Consolidated financial information in one centralized location which was visualized for business decision making
- Enabled quicker business decision making as the main financial reports were centralized in the same location
- Reduced manually processed reports

SOLUTION AND KEY FEATURES

The solution is a data consolidation and reporting tool that brings together and visualizes key information relevant for quick decision making in the areas of operations and finance. The key features include: -

Performance and Revenue Metrics:

- Room Revenue
- Total in-house guests
- Total F&B revenue
- F&B revenues by outlets
- Total Expense
- Total payroll
- Expenses breakdown
- Other expenses and more...

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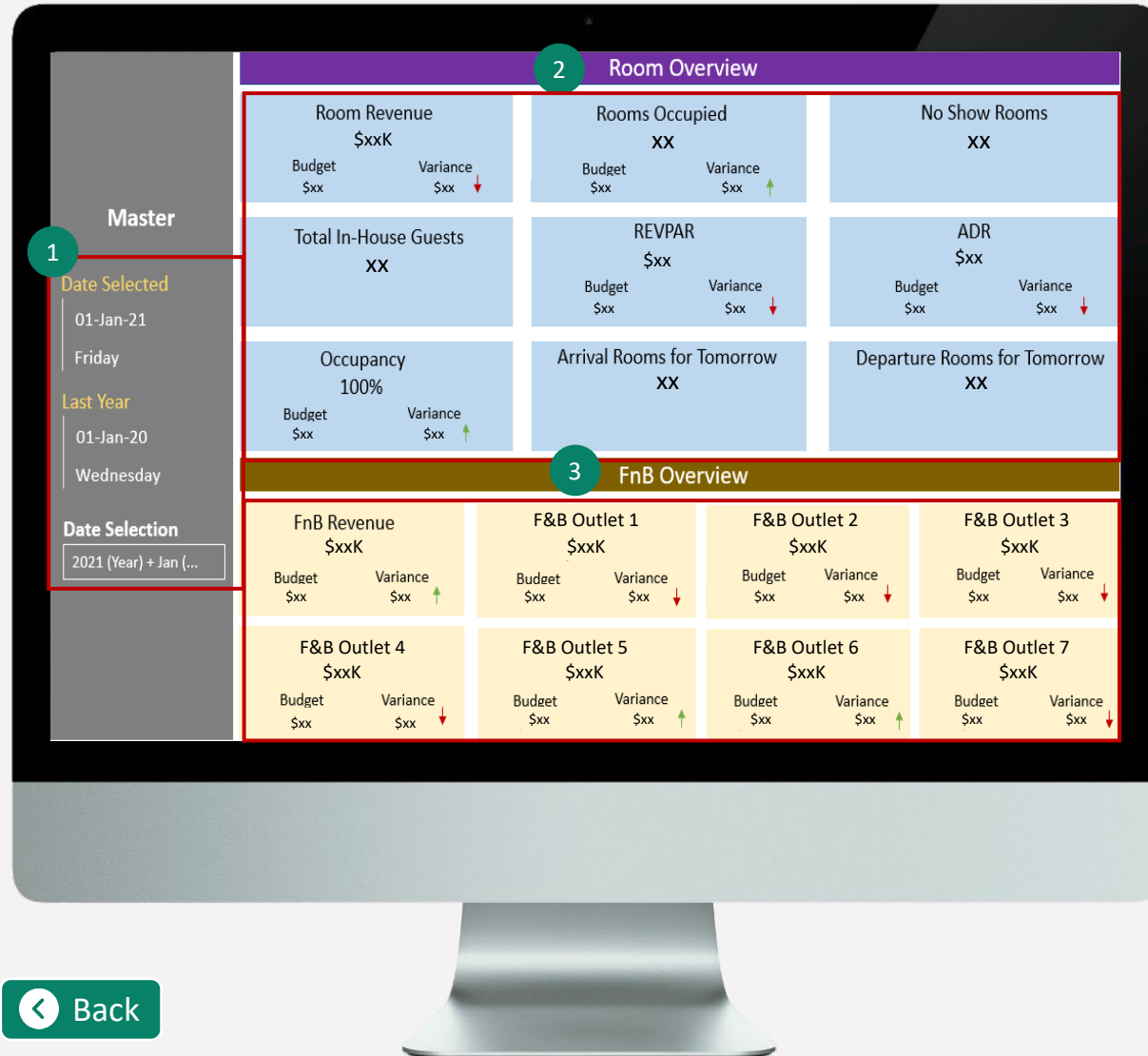
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Data dashboard



Key features

- 1 Date filter
- 2 Room overview KPIs
- 3 FnB Overview

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POC 12: A data consolidation and reporting tool to track business performance and simplify reporting process

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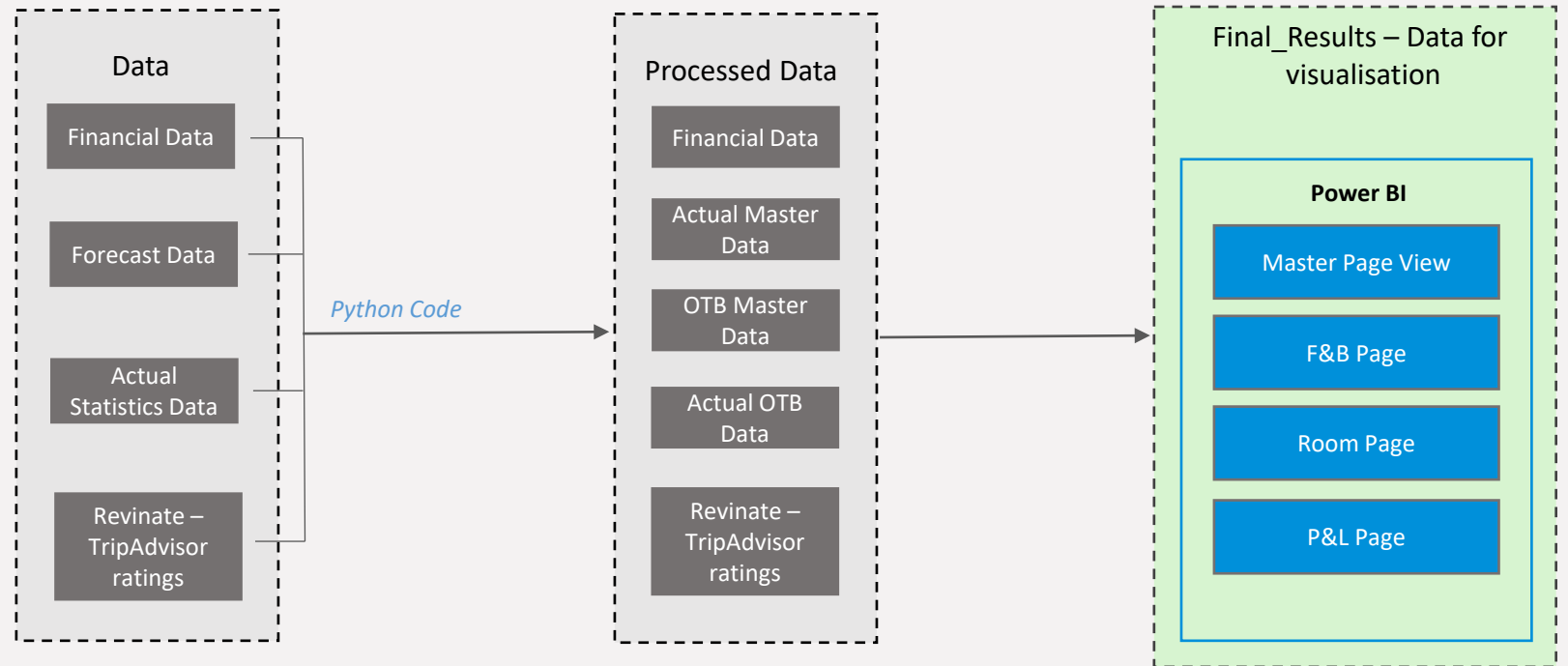
Data Input



Data Processing



Dashboard



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POC 12: A data consolidation and reporting tool to track business performance and simplify reporting process



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- Design an agile communication strategy and plan for spreading awareness
- Leadership needs to drive critical decisions with the support of data insights and analytics

Develop comprehensive training program

- Identify the short term core training modules by doing research and identify off-the-shelf/ongoing programmes for training on data analytics
- Participate in Data Analytics SHift Program (DASH) to train staff in data transformation and data analytics skills
- Identify and analyse existing skills gaps and address them
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Expand the data team

- Hire data specific roles to push forward the key initiatives
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POC 12: A data consolidation and reporting tool to track business performance and simplify reporting process



Key initiatives

Adopt advance analytics tools for automated reporting in real time

Choose the tools that best meet the business needs such as:

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- Having advanced ways to perform quality analysis such as predictive and prescriptive analytics (i.e. Python, SPSS, SAS)
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- **Carry out workshops with businesses units periodically** to identify high value use cases which can be addressed using data analytics. Use outcomes of the exercises to showcase values and gain buy-in across the organization.
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POC 12: A data consolidation and reporting tool to track business performance and simplify reporting process



Key initiatives

Assessing data literacy

- Data and analytics leaders are responsible for creating the narrative for data literacy, highlighting the business value to be gained. Start by assessing data literacy with a few question i.e. How many people in your business do you think can interpret statistical based dashboards
- Conduct data literacy assessments to identify gaps and use as a baseline
- Data and analytics leaders and data teams must lead by example. Ensure that the teams are speaking data in all meetings when discussing business outcomes and in other business situations.

Establish a data literacy program

- Identify the fluent and native data speakers. Look at business analyst, data stewards and architects who are able to speak data naturally and effortlessly.
- Identify skilled translator who can serve as mediators for business groups.
- Set up a capability academy for data skills. A capability academy is a place where employees can go to advance specific job-related skills. Carefully select the data skills needed by their workforce to arrive at the targeted a skills framework.

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Key initiatives

Establish data governance to staff and enforce policies

- Define roles and responsibilities such as data owners who have decision making authority and able to access and edit data or data stewards who manage data and focus on data quality
- Train staffs on the requirements of data policy, suggestions for implementation and the penalties of non-compliance
- Data governance team will be the main team overseeing the policies and enforcing them
- Establish appropriate enforcement actions for each breach based on the level of severity
- Integrate training on data privacy in general training programs and onboarding for new staff (including data regulations of different countries i.e. GDPR, PDPA)

Develop data governance policies and framework

- Define data governance policies - each policy typically includes the rules, policies, procedures, roles and responsibilities which covers the below areas:
- Set up goals of the data governance program and metrics for determining success
- Keep a record of the data inventory of the data sources within the hotel
- Classify the data accordingly into different levels such as “Secret”, “Confidential”, “Restricted”, “Public”, etc., along with the levels of security and protection required at the different levels.
- Define data quality measurement, data integrity, integration, aims and objectives, as well as a range of supporting activities and processes e.g. develop SOPs, manual, guideline for front office to capture data consistently and accurately

Accessing data in centralized data sharing system

- Create master data/metadata along with any data related development and implementation
- Build data library and data dictionary that contains all the descriptions of every data elements
- Build data lineage to track how data flows through data value chain from source (origin) to use (destination)
- Organise data for easy discovery via a few techniques such as tagging or organising by amount of usage.
- Establish data protection office (legal counsel) to ensure compliance with PDPA
- Standardise unique identifiers across the hotel, institute data sharing and ingestion processes
- Establish a tracking system to document non-compliance incident – incidents should be reviewed to identify the root cause and develop a strategy to prevent future occurrences



[Click here to read STB’s Data Governance and Data Quality Playbook.](#)



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Acknowledgements

We would like to thank the following organisations for their support and contributions to STB's Data Transformation Programme:



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Methodologies and Frameworks:

- Application of Data analytics (pg. 4)
- Attraction user journey (pg. 81)
- Data analytics maturity stages (pg. 10)
- Data architecture framework (pg. 37)
- Prioritisation criteria for POC (pg. 83)
- TXI framework (pg. 28)
- User-centered design approach (pg. 79)

Global use cases:

- Barcelona City Council – Optimising crowd flow and movement (pg. 11)
- Celebrity Cruises – Increasing usage of digital channels (pg. 6)
- Disneyland – Shaping demand through personalised experiences (pg. 8)
- Grandi Navi Veloci – Identifying new avenues of sales (pg. 15)
- Point Defiance Zoo – Better understanding of customer sentiments (pg. 7)
- Reed Exhibitions – Engaging stakeholders with data-driven analysis (pg. 13)

Survey and questionnaires:

- Attractions industry survey (pg. 20)
- Business assessment survey (pg. 80)
- Data literacy assessment questionnaire (pg. 40)
- Data maturity assessment survey (pg. 80)
- Hotel industry survey 2020 – 2021 (pg. 18)
- MICE industry survey (pg. 22)
- Travel agency industry survey (pg. 23)

STB's data initiatives:

- Tcube: How you can partner us | STB
- Data college: Data College | STB
- TXI: Tourism Transformation Index
- Stan: Stan Homepage

Data integration tools:

- API
- Message Queue
- Sage
- SFTP
- Shared drive

Data storage tools:

- ADLS
- MongoDB
- MS SQL
- MySQL
- Oracle
- PostgreSQL
- S3
- SQLite

Data processing tools:

- Excel
- Informatica
- Python
- R
- SQL
- SPSS
- Talend

Data visualisation tools:

- Power BI
- Qlik Sense
- Tableau

THANK YOU!

