**ASSIGNMENT COVER SHEET**

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| Title of assignment | Analysis of Propel Tech’s Service Delivery Process |  |
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# Table of Contents

[Table of Contents 2](#_Toc168226844)

[Introduction 2](#_Toc168226845)

[Analysis of Propel Tech’s Service Delivery Process 2](#_Toc168226846)

[Suggesting Process Improvement for Propel Tech 9](#_Toc168226847)

[Identifying process outcomes 9](#_Toc168226848)

[Process Measurement 10](#_Toc168226849)

[Task 3 13](#_Toc168226850)

[Conclusion 13](#_Toc168226851)

[Appendix A 13](#_Toc168226852)

[Figure 1: Porter’s Value Chain Analysis for Propel Tech 13](#_Toc168226853)

[Figure 2: Propel Tech’s Primary Activity Map 13](#_Toc168226854)

[Figure 3: Harmon’s Organisation Diagram of Propel Tech 13](#_Toc168226855)

[Figure 4: Service Delivery Process Scope Diagram 14](#_Toc168226856)

[Figure 5: Service Delivery Process Hierarchy Diagram 14](#_Toc168226857)

[Figure 6: Process Swim-Lane Flowchart 14](#_Toc168226858)

[Figure 7: Fishbone Diagram of Risk Factors to Service Delivery 14](#_Toc168226859)

[Figure 8: Stakeholder Interest / Grid Ratio Chart 14](#_Toc168226860)

[Figure 9: Primary Stakeholders 14](#_Toc168226861)

[Figure 10: Billable Hours Lagging & Leading measurements. 14](#_Toc168226862)

[Figure 11: Client Headcount Lagging & Leading measurements. 14](#_Toc168226863)

[References 14](#_Toc168226864)

# Introduction

This essay aims to employ a variety of analytical techniques against Propel Tech, a software consultancy, to expose inefficiencies with their service delivery. The goal is to identify and model solutions for re-designing the process to address its weaknesses, later discussing how adoption of machine learning can benefit the organisation.

This process was selected as it has the largest impact on profitability and client retention within the organization.

# Analysis of Propel Tech’s Service Delivery Process

Before analysing a specific process, the wider organization must first be understood to establish the scope of the process. Shown below, a value chain analysis is a means of evaluation on a company-wide basis (Stobierski, 2020).

A diagram of activities with different colored squares

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Figure 1 Porter's Value Chain Analysis of Propel Tech

Porter (1985, p.33) states that value chain analysis, shown in Figure 1, helps “understand competitive position and improve their performance”.

While Figure 1 helps outline primary activities, it does not yet fully identify high-level processes of the organisation.

A diagram of a company

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Figure 2 Propel Tech’s Primary Activity Map

Figure 2 displays the relationships between each primary activity, displaying ahigh-level process map, which Harmon (2019, p.86) states “helps to understand the overall process flow and the relationships between major process components”.

A diagram of a company

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Figure 3 - Harmon's Organisation Chart

Figure 3 illustrates Propel Tech’s organisation diagram. Harmon describes this as displaying the “relationship of the organization to its external environment”.

This format is excellent at establishing the boundaries of what a business can control but can also help guide changes to process by identifying external factors that can be beneficial to the process.

Looking externally, its apparent high-level processes have emerged, indicating our earlier primary activities are more accurately mid-level processes.

Service delivery appears to have a large impact both internally and externally, proving the importance of highlighting inefficiencies through further analysis.

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Figure 4 Service Delivery Business Process Scope Diagram

Figure 4 depicts a process scope diagram, at a high level, for service delivery. This diagram helps to understand the inputs and outputs of the service, as well as the controls that regulate it and enablers that support it and finally identifies key stakeholders.

Harmon (2019, p.139) advises that “when you are just starting to try to figure out what might be wrong with a process a scope diagram is much more powerful than a flow diagram”.

With figure 3 indicating influences that are directly related to the process, it can be confidently asserted the entities modelled in the diagram are critical to its efficiency.

Examining figure 4 shows evidence that the process has many factors that show potential for profitability. The process does not require physical resources to produce goods or services, like a typical manufacturing chain. This allows increased demand to be met by scaling up engineer capacity through recruitment and training.

Also, the use of free open-source software and premium cloud service providers boost development speed and efficiency. While cloud services are typically expensive, these can be expensed to customers as a service charge.

However, there are also potential weaknesses in this chain. As engineer time is the primary resource used to generate revenue, it must be leveraged effectively, otherwise services may be provided that cannot be charged for. Poor time estimation and invoicing can lead to irrecoverable losses.

These potentials can be analysed deeper by mapping out the process hierarchy.

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Figure 5 Service Delivery Process Hierarchy Diagram

Figure 5 displays multiple levels of processes contained within service delivery, Propel’s major processes directly influence each other, showing a link between them. This diagram focuses directly on child-processes of service delivery.

Šaulinskas-et-al (2013, p.62) describes middle processes as being “directed towards fulfilling the company’s major aims”. The displayed mid-level processes encapsulate each of Propel’s departments; Project Management, Engineering, Testing and Infrastructure, all working together to fulfil the requirements of the higher-level process.

Next, low-level processes demonstrate how each department operates internally, depending on the size of Propel’s client, an individual or team would be required. These have sub-processes (procedures) which describe the explicit steps required to achieve each process, however, in the case of a large project an additional layer may be required to divide the large procedures further.

While these processes appear linear, departments operate in synchrony to ensure efficient service delivery, shown below.

A diagram of a company

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Figure 6 – Process Swim-Lane Flowchart

Figure 6 expands on the process hierarchy diagram; using more realistic low-level processes, divided into swim-lanes to represent each department responsible for service delivery at Propel. Harmon (2019, pg. 127) describes complex processes as “involving multiple steps, departments and continuous co-ordination”, figure 6 clearly demonstrates these characteristics.

The diagram highlights areas of efficiency, notably; the higher-level service allows for multiple lower-level processes to run simultaneously, allowing multiple departments to work asynchronously, with project management re-aligning departments at key stages. A visual representation of this in the diagram is when a process triggers multiple processes across swim-lanes before feeding back into the project managers swim-lane.

Conversely, it shows that all swim-lanes are involved before the client has agreed to pay for work. This is a risk to Propel as several employees could invest time with no revenue generated.

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Figure 7 - Fishbone Diagram of potential causes for delivery over budget.

Cause and effect diagrams, known as fishbone diagrams, use the frontal node to identify a problem, then supporting nodes represent categories of causal factors, each with their own branches to represent individual factors. (George et al., 2005, p. 146)

Figure 7 illustrates a map of internal and external factors that can impact the effectiveness of Propel’s service delivery. As this is the profit centre of the business, effectiveness would be measured by profitability. Engineers’ hours not being billable is typically a result of work being delivered over budget (under-estimate).

A clear trend can be observed, most risk factors surround the depth of understanding of Propel’s clients’ systems, needs and technical demands. In summary, these risk factors, coupled with estimation being done by test and software engineers, can lead to missed requirements and under-estimation of task difficulty, due to the additional layers of communication they must pass through. The engineers’ varying levels of expertise can make these issues unpredictable.

# Suggesting Process Improvement for Propel Tech

Firstly, below is a list of the core problems discovered through analysis the following suggestions will aim to resolve.

* All department layers being involved in estimation exposes Propel to risk of time investment without revenue.
* Engineers’ hours not being billable due to under-estimated work, caused by inconsistencies in engineer skill & ability.
* Misunderstanding clients’ systems technical demands & requirements leads to task underestimation.

## Identifying process outcomes

Before modelling and justifying suggestions for change, Propel needs to identify people who influence the process as well as an effective way to measure process performance. Without considering these elements, it isn’t possible to objectively measure the outcomes of process change.

A diagram of a company's project

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Figure 8 - Stakeholder Power/Interest Grid

A stakeholder power/interest grid allows a business to discover stakeholders who have the most influence over process change. Change of business process should be targeting the interests of the stakeholders in the higher quadrants. This is important, as typically business process change occurs only at the management level, Kotter (1996) argues you must involve all levels of the organisation for successful change.

A diagram of service delivery

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Figure 9 - Primary Stakeholders

The primary stakeholders to keep involved, based on figure 8, are displayed in figure 9.

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Figure 10 - Stakeholder Interest Table

Using Harmon’s method (p.96, 2019), figure 10 describes performance indicators and objectives of key stakeholders, this information is vital in understanding the desired outcomes of process change modelling.

## Process measurement.

Furthermore, to understand measurable factors of Propel’s service delivery, the following section details internal and external points, categorised by Harmon’s (2019, p.85) lagging and leading data analytical tools.

A graph of a bar and a graph of a bar

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Figure 11 - Billable Hours Lagging & Leading measurements.

Propel measure internal billable hours as the primary indicator of revenue, historical average hours logged is a lagging metric to compare to for year-on-year progression, whereas the number of hours scheduled is a leading metric to judge how work Propel is acquiring. Both can be used to create targeted outcomes for business process change, illustrated in figure 11. A process change that enables Propel to increase both engineer utilization (billable percentage) and increase their backlog is required to meet their main goal of profitability.

A graph of a graph showing a graph of a client proposal

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Figure 12 – Client Headcount Lagging & Leading Measures.

Externally, client acquisition and retention rates are a metric of projected success, as they indirectly contribute to total billable potential through new projects and support work. Lagging measures for this metric are the trend of client headcount over time and percentage scores from client feedback surveys, whereas leading measures are the number of leads and proposals sent to clients, as these create opportunities for Propel to win new clients. Figure 12 displays an example of how these metrics would be tracked.

## Options for process change.

Propel require a change to increase engineer billable hours by minimising variance in estimates and quotes, and the inefficiencies discovered in the requirements analysis phase of their service delivery process.

Rather than relying on individual skill and experience, Propel could invest resources into training programmes and mentorship workshops, aimed at establishing a standardised process for estimation. Upskilling the existing team minimises process change but requires additional processes. This can lead to short term losses during training but still risks variance.

Propel could reshape the earlier stages of service delivery (see Figure 6), leaving requirements analysis and quotation to a Solution Architect (SA). Having an expert with a specific skillset allows consistent estimates across all solutions, this proses a higher risk, with a much greater reward as engineers are left solely for implementation and delivery.

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Figure 13 - Architect vs Training costs

Considering the methods of measurement in earlier analysis, the profitability of both options must be weighed against each other. Training engineers is both an upfront and recurring cost when recruiting, additionally, this is a skill that not all engineers will have experience with, exposing additional risk. Contradictory the salary invested in an architect can provide immediate return on investment through additional billable capacity. Figure 13 illustrates an example projection.

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Figure 14 - Human Performance Analysis

Harmon (2019, pg. 166) advocates for analysing human performance, as both options involve human factors, Figure 14 adapts Rummler’s (1990) “Human Performance Analysis” to show considerations for quality of estimation.

The “Software Estimation Activity” encapsulates all sub-processes displayed in Figure 6, until the “Project Kick-Off” procedure. This activity is the primary location process change for Propel Tech is proposed. This flowchart is adapted in Figure 15 to illustrate the proposal changes under this activity.

The analysis shown in Figure 14 reveals that implementation of training programmes could introduce friction, as each of the factors shown in the human performance analysis would have to be considered for each engineer, this could expose Propel to further challenges including managing human performance across all departments, requiring a greater effort and potentially recruitment of human resources staff.

Despite higher initial risk, recruiting a Solution Architect and re-structuring the estimation/quotation stage of the process best aligns with the interests, KPIs and objectives identified for key stakeholders in Figure 10 and measures in Figure 11. This approach ensures accurate estimates, satisfies client interests, and increases engineer billable potential.

All analysis conclusively suggests that recruiting a Solution Architect has the best outcomes for Propel Tech’s service delivery process.

## Modelling process change

A diagram of a flowchart

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Figure 15 - Left: Existing Process Swimlane Flowchart. Right: Process Swimlane Flowchart. Adapted for Solution Architects.

The flowchart above, adapted from Figure 6, proposes the change to the process, showing how engineer’s responsibilities are reduced to project implementation and support resolution. The departmental overlap described earlier is removed from the earlier phase of service delivery entirely. The new structure of this flowchart closely resembles the waterfall project management methodology, which is uniquely beneficial in consulting, as billable work is tied to a previously agreed upon scope.

# Implementation details of service delivery process change

This section builds on goals and metrics observed through stakeholder analysis, discussed earlier in this report. It will discuss implementation techniques, scheduling, methods of ongoing monitoring and evaluation. Additionally, the role of machine learning, a technology that has existing since the 1950s (Foote, 2021), but is currently re-shaping how we incorporate technology into business processes.

Harmon (p.184-187) discusses management of business process change activities as requiring an organised plan for implementing change to ensure a smooth transition between the existing and proposed process. This also involves cross-department communication and monitoring process metrics during and after change - these metrics were displayed in Figure 10.

Harmon (p.124-126, p.184), discussing Business Process Management (BPM), also advises that a process owner oversees the implementation. He suggests that process owners are typically managers of higher-level processes and monitor performance, while process managers are responsible for general process activities.

## Scheduling and measuring implementation

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Figure 16 - Schedule of Process Implementation

Due to this process requiring recruitment of a new department, the best approach is to prepare process stakeholders during the recruitment phase, the duration of this phase is indeterminable due to employment notice periods, however it is estimated to take between three to six months.

Once recruitment has concluded, clients can be prepared while the solution architect is onboarded. As this is a high-risk high-reward change, it should be trialled with a few appropriate clients first, with later clients integrated depending on metrics measured during the trial period. Finally, Propel will monitor the capacity of the solution architect, deciding whether another is required to cover the requirements of all clients.

As Propel is a small sized company, the role of process owner falls to the Operations Director, they will refer to the example measurements illustrated in Figure 11, analysing the trend of billable targets for engineers working on clients selected for the trial period, compared against lagging data.

## Machine learning for process evaluation

Mitchell (1997) describes Machine Learning (ML) as “the study of computer science algorithms that improve automatically through experience”. It is a subset of artificial intelligence (AI), which uses machine learning to train models on monumental datasets (Caltech, n.d).

Open-source platforms like Tensorflow offer a set of tools and pipelines to create bespoke neural networks, a model that makes decisions in a manner like the human brain (IBM, n.d), using individual datasets.

Propel can leverage Tensorflow to translate their process measurement metrics into a custom model, trained on their leading and lagging data, to create custom dashboards for evaluating both the performance of business process change and guidelines on project estimation tailored to each client and system that Propel support.

Cfeate platform

Use for gains

# Task 3

Notes:

Consider Page 174 Figure 10.10 from Paul Harmon, Automation Modelling etc.

Dive into Business Process Management Software tools

Machine Learning to aid calculation of task estimates.

**Discuss implementation and process management of the business process from Task 2 using relevant module material. Review the role of technology and reflect on the tools/concepts that can be utilised to assess viability to support organisational choices.**

**You may consider one or more of the following technologies or choose other alternatives in your reflection: Artificial Intelligence, Machine Learning, and Robotic Process Automation (RPA) as possible areas of discussion. Discuss the importance and application of ongoing monitoring and evaluation of processes.**

# Appendix A

### Figure 1: Porter’s Value Chain Analysis for Propel Tech

This figure illustrates the value chain analysis for Propel Tech, it identifies the primary and secondary activities involved in the company's operations.

### Figure 2: Propel Tech’s Primary Activity Map

This figure builds on Figure 1’s value chain analysis, taking each of the primary activities, mapped as high-level processes displays the relationship between the processes.

### Figure 3: Harmon’s Organisation Diagram of Propel Tech

This figure highlights the central (high-level) processes of Propel Tech’s organisation, and how the interact within the environment external to the business.

### Figure 4: Service Delivery Process Scope Diagram

This figure takes the high-level Service Delivery process and displays the scope of all impacting factors, including Inputs, Outputs, Controls and Enablers. It aims to display where inefficiencies can exist within the process.

### Figure 5: Service Delivery Process Hierarchy Diagram

This figure displays a hierarchy of Propel Tech’s Service Delivery. While traditionally each branch would have multiple lower-level child processes, only one branch is displayed per tier here.

### Figure 6: Process Swim-Lane Flowchart

This represents a flowchart with swim-lanes for each major stakeholder group that make up the high-level service delivery process of Propel Tech. The purpose of this diagram is to illustrate how lower-level processes in a hierarchy diagram can intersect with each other.

### Figure 7: Fishbone Diagram of Risk Factors to Service Delivery

This chart illustrates the problem (work delivered over-budget) and then several risks that contribute to this problem, organised into categories.

### Figure 8: Stakeholder Interest / Grid Ratio Chart

This chart maps internal & external stakeholders that can influence change within the service delivery process of Propel Tech.

### Figure 9: Primary Stakeholders

This diagram displayed the 4 most important stakeholders, adapted from figure 8.

### Figure 10: Stakeholder Interest Table

This table lists the key stakeholders identified from earlier analysis to involve in process change management. It details their interests, key performance indicators and objectives set to achieve them.

### Figure 11: Billable Hours Lagging & Leading measurements.

This bar chart displays examples of measuring lagging and leading data for mapping billable hour percentages over time. It shows how a target goal can be modelled for the future.

### Figure 12: Client Headcount Lagging & Leading measurements.

This plotted line graph shows both lagging and leading data for client headcount and acquisition. This graph is effective as it identifies the impact of the leading metric and the resultant lagging data trends.

### Figure 13: Architect vs Training expenses.

This graph represents an example measurement of how cost scaling can differ between a single architect and training of an entire engineering team, which is an ongoing process.

### Figure 14: Human Performance Analysis.

Adapted from Rummler (1990), this illustration documents items to measure the human factors of software task estimation.

### Figure 15: Left: Existing Process Swimlane Flowchart. Right: Process Swimlane Flowchart. Adapted for Solution Architects.

This illustrates an updated Service Delivery flowchart, with the recommendations in place utilizing a solution architect, rather than cross-department estimation, paired against the existing estimation process.

### Figure 16: Schedule of Process Implementation

This illustration displays actions for process change management over a 12-month period.

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