# An application of the ontology based GOAL-Framework in a higher education institution in Australia: A case study

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*Abstract*: **The aim of this paper is to investigate and develop a methodology to analyse organizational data in order to evaluate the level of the organizational goals achievement. In order to achieve this aim, we proposed a framework, named GOAL-Framework for the organizational goals based on an ontology. The framework utilizes the organizational goals ontology, including an approach to identify the organizational goals and associated measurement metrics. The case study is presented to explain in detail, along with a description as to how the framework is applied, implemented and evaluated in a higher education institution in Australia. The results show that the framework is effective and efficient in assisting the decision-making process to specify to what extent the organizational goals are achieved. The outcome demonstrates that the framework can be applied for analysis and decision-making based on the metrics presented in the dashboard to evaluate the level of the goals achievement.**

*Keywords*: application tool; decision-making; GOAL-Framework; ontology; organizational goals

## I. Introduction

Government agencies and large, medium and small private enterprises in many domains, such as engineering, education, manufacturing, are drowning in an ever-increasing deluge of data [1] because they create and collect massive amounts of data in their daily business activities. Thus, having an ability to analyse their data in a timely fashion can ensure businesses have a competitive edge to improve productivity in relation to the organizational goals. Data is the most important assets to assist the decision-making process and achieve the organizational goals. However, the trustworthiness of organizational data in relation to the organizational goals is often questionable due to the huge amount of data within the organization [2, 3]. At the same time, some of this data are not relevant to the organizational goals. Even though professionals, such as data analysts, are trained to analyse data, the increased amount of organizational data has become a major problem in using this data to achieve the organizational goals. Modelling the organizational goal structure is important in identifying the dependency relationships between the organizational data that relate to the organizational goals. An ontology improves the understanding of the organizational goal structure as it shows the dependency relationship between the organizational goals [2, 3].

Many studies on the organizational ontology have been proposed in relation to this issue from the business process point of view which addresses the development of the organization modelling and structure [4-7]. However, there is a shortcoming when it comes to evaluating organizational data in relation to the organizational goals [2, 3]. Modelling organization goals is limited to the business process and the organizational process [4-7]. Even though the concept of the organizational goals have been developed, modelling the structure of organizational goals is often difficult. In order to overcome this limitation, one approach to develop a common understanding of the organizational goals structure is by using an ontology [2]. An ontology is explicit and contain formal specifications of knowledge, especially implicit or hidden knowledge [8]. An ontology is also an approach to support data sharing [9]. Thus, an ontology assists with part of the integration problem in relation to the organizational goals. An ontology can be used to improve communication and collaboration between decision makers and users [10]. This paper presents an application of the proposed methodology utilizing the organizational goals ontology to measure organizational data dependency in an effort to assist domain experts and entrepreneurs in the decision-making process to

achieve the organizational goals where such measurement can be applied.

### A. Research Problem

Previous research in this area has mainly examined the issue from the data process point of view that addresses either software development or data mining, both of which are beyond the scope of this paper [11]. While many studies have examined the process of data collection, our main contribution is to develop a framework which can incorporate organizational data and can lead to reliable decision-making in relation to meeting the organizational goals. Therefore, it is important to develop a flexible and widely applicable framework to evaluate the relevance of organizational data to evaluate the extent to which the organizational goals have been achieved.

Most studies which have been conducted on this issue focus on business intelligence (BI) [12-14], data mining [15-17], data linkage [18-20] and knowledge discovery in databases (KDD) [21, 22]. Even though these studies focus on decision-making, they do not focus on the interaction between organizational data and organizational goals, as shown in Fig. 1. Therefore, it is difficult to identify the relevant organizational data that relate to the organizational goals.

For example, KDD is an interdisciplinary field that searches for valuable information in large volumes of data and has played an important role in identifying effective patterns from a vast amount of data [11]. KDD is a concept of identifying new knowledge in the field of computer science that describes the process of searching a vast amount of data in order to produce knowledge but it misses the link to organizational goals. However, KDD applies the concept within the system instead of searching and evaluating the organizational data.

Another example is business intelligence (BI). BI is a computer-based technique to analyse business data which provide past and current information on the business strategies and business operation and has been utilized in competitive intelligence to support better decision-making. BI aims to analyse business data by providing past and current data as a strategy to assist decision-making. Meanwhile, data linkage is a process to identify data from different datasets. Christen [1] defined data linkage as a process of data pre-processing to identify quality data.

We tackle the problem of evaluating organizational goals by proposing a framework to advance the understanding of the organizational model based on an ontology to assist the decision-making process in relation to the organizational goals. We propose this framework as a tool to evaluate the organizational data in order to support decision-making and thereby assist the organization to achieve its goals. We suggest that this framework is important in an effort to evaluate the relevance of organizational data. This framework is also important in measuring the extent to which organizational data are consistent with organizational goals [3].

In this paper, proposed framework addresses the limitations inherent in the previous organizational processes in relation to the organizational goals.
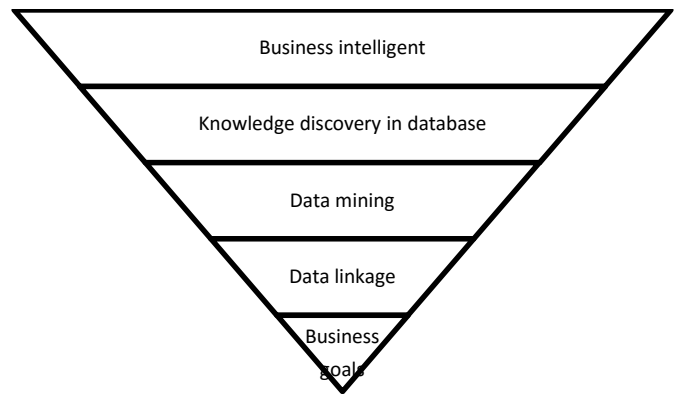


**Figure 1.** Problem scope.

As a result, this framework is proposed as an extension to introduce the organizational goals process in an effort to measure the dependency organizational data that relate to the organizational goals. In this paper, the only organizational resource which is examined is organizational data, as it is suggested that organizational data is the most important organizational resource in relation to the organizational goals [2, 3]. The outcome of this thesis will improve the process of evaluating the degree to which the organizational goals have been met.

### B. Objective

The aim of this paper is to propose a framework as a platform to evaluate the extent to which the organizational goals have been achieved. The framework provides a solution for evaluating the relevance of organizational data in relation to achieving the organizational goals. It is important to evaluate the organizational data as an effort to identify which organizational data is relevant in relation to the organizational goals. At the same time, the framework provides systematic steps as a tool to help domain experts and entrepreneurs make better decision by enabling them to analyse relevant organizational data to discover useful information. Such information can ensure organizations have a competitive edge to improve productivity in relation to the organizational goals.

In order to test the applicability of the framework, we present a case study to test the real potential of the framework in a real world situation. The case study is important to validate the flexibility of the framework to assist domain experts and entrepreneurs in the decision-making process in relation to the organization goals. Meanwhile, the case study presented in this paper is applied to discover any issues or gaps which may be identified during the application process of the framework and how these gaps can be addressed in the future.

The remainder of this paper is organized as follows. Section II discusses the background. Section III is the methodology. Section IV is the introduction of the GOAL-Framework. Section V is the case study. A general discussion is given in Section VI. The final section contains some concluding remarks.

## II. Background

Recently, there have been substantial growths in data linkage activities [19, 23, 24]. Most of these studies focused on the task of identifying data from datasets in order to prevent any redundancies of data. To our knowledge, no studies have been carried out in the development of organizational data in relation to the organizational goals. Even though study on the organizational goals has been carried out but most of the studies focused on the modelling concept for the organization performance [25-28]. Therefore, it is important to identify the linkage between organizational data and organizational goals as we suggest this data should be relevant to assist decision-making process.

Organizational goals are defined as the organization main target. It is the higher and important achievement target in every organization and it consist the process of identifying the aim of the organization [3]. It is important to understand the organizational goals structure. The structure of the organization is important to develop the efficiency and flexibility of the organization to cope with unpredictable [25]. For example, organizational structure is developed to achieve the performance of the organization [27] or the goal structure is developed to achieve the performance of goals [26, 28-30]. The example showed a number of the studies that looked at the organizational structure toward the performance. This is because the organizational performance depends on the organizational structure. Same with the goal structure and the goal performance, in which the organizational goal depends on the goal structure toward the goal performance.

There are number of studies on the organizational goals that focused on the performance such as system performance [31, 32], goal performance [29, 30, 33] and organization performance [25-28]. It is important to identify the entire organizational modelling process as an effort to look at the organizational performance and the goal performance. However, the process can be very large and it is very difficult to evaluate the organizational data as an effort to achieve the organizational goals. As a result, it is important to identify organizational data that relates to the organizational goals. Therefore, the linkage of organizational data from datasets should be consistent to identify the relevance of organizational data. Therefore, it can be evaluated in relation to the organizational goals.

Even though the concept of the organizational goals is developed but modelling the structural of the organizational goals always questionable. We suggest an ontology is important to develop a common understanding of the organizational goals structure [2]. At the same time, an ontology is explicit and formal specifications of the knowledge, especially implicit or hidden knowledge [8]. An ontology also considered as an approach to support data sharing [9]. An ontology assists with part of the integration problem in relation to the organizational goals. Therefore, an ontology can be used to improve communication between decision makers and users collaborating [10], where in our case, the communication between the decision makers in relation to the organizational goals.

## III. Research Methodology

The methodology includes the design and development of an approach to specifically identify the relevant organizational data to assist the decision-making process in relation to the organizational goals. In order to achieve this aim, we develop a framework. This framework is going to be named GOAL-Framework. GOAL-Framework provides step-by-step process as a platform to evaluate the level of the organizational goals.

The framework begins by identifying the organizational goals and the dependency relationship between the organizational data that relate to the organizational goals based on an ontology. This would allow the domain experts and entrepreneurs to evaluate relevant organizational data to assist decision-making process in respect to the organizational goals. Therefore, domain experts can identify to what extent certain organizational goals are achieved. The framework allows users to identify the dependency relationship between organizational goals elements and organizational data. In this paper, we will identify the organizational goals elements, and then we develop the dependency relationship based on certain ontology between organizational data and organizational goals. Metrics will be defined for this dependency to measure relevant organizational data in relation to the organizational goals.

The scope of the framework consists of the deployment approach so domain experts and entrepreneurs can access available organizational data to assist the decision-making process in relation to the organizational goals. As part of the organizational goals ontology, we introduce an approach to analyse organizational data to consider whether it is relevant. In contrast to the work in Rao et al. [7], Sharma & Osei-Bryson [5] and Fox et al. [34], the framework in this paper proposes an analysis approach to identify the dependency between organizational data and organizational goals and to evaluate the weight of this dependency. The aim being to specify to what extent the organizational goals are achievable. This provides knowledge to improve the applicability of the framework so future approach can be suggested to address any gaps or problematic issues in achieving the organization goals. The application of the framework aim to be:

- Capable to be applicable in wide range of domains.
- Flexible to define the organizational goals.
- Flexible to identify the sub-goals.
- Flexible to identify the dependency relationship between sub-goals and organizational goals.
- Capable to identify relevance of the organizational data from datasets.
- Capable to define a metrics to evaluate the level of the organizational goals achievement by evaluating organizational data that relate to the organizational goals.

The framework is divided into three main tasks.

1. Firstly, to identify the dependency relationships between the organizational goals based on an ontology [2, 3]. An ontology is important to define a specification of a conceptualization. An ontology is developed to improve the understanding of the organizational structure and the relationships between the organisational goals. The process

concerns the relationships between possible sub-goals and variables that relate to the organizational goals.

2. Secondly, to identify the dependency relationships between the organizational data and the organizational goals. It is important to identify this dependency relationship as this is the first step in identifying which organizational data are relevant in relation to the organizational goals. The first step in analysing which organizational data are relevant is to identify the dependency set of organizational data that relates to the organizational goals. This dependency shows how organizational data can be matched to the possible variables that relate to the sub-goals or the main goals. It provides knowledge for the domain experts and entrepreneurs to identify which organizational data are relevant in relation to the organizational goals.

3. Thirdly, the development of a metrics approach as an analysis tool to measure the organizational data which is relevant in relation to the organizational goals.

## IV.  GOAL-Framework

GOAL-Framework is proposed as an extension approach from the previous studies on the organizational model to introduce a model for the organizational goals based on an ontology, as defined in Table 1. GOAL-Framework is defined as a tool to discover a systematic pattern in defining the organizational goal, use ontology to develop the relationship of the organizational goals, analyse the organizational data that relate to the organizational goals and come out with decision-making in evaluating the level of the organizational goals achievement.

Table 1. Definition of the GOAL-Framework.

| GOAL-Framework | | | |
|---|---|---|---|
| | Mnemonic | Descriptions | Questions |
| G | Goals [4, 5, 7]. | Using the framework we define the goals in the organization. | What goals we want to define and evaluate? |
| O | Ontology [4, 5, 7], Organization [4, 5, 7, 35-37], Organizational data [2, 3]. | We use ontology to identify the relationship between the organizational goals elements, and between organizational data and organizational goals. | What sub-goals relate to the goal? Which data relate to the goal? Can we develop the dependency relationship between these two? |
| A | Analysis [7, 38-40], Achievement [2, 3]. | We analyse organizational data for the goals achievement. | How do we want to evaluate the data that relate to the goals? How to define the metrics that relate to the goals? |
| L | Level of the organizational goals achievement [2, 3]. | Final results from data analysis will assist decision-making to evaluate the level of the organizational goals achievement. | Are the final results relevant for decision-making to evaluate the level of the goals achievement? |

In this framework, it is important to develop this dependency relationship to identify the main goals for the organization and to identify which organizational data is relevant for the achievement of the organizational goals. In order to identify the relevance of organizational data from organizational datasets, metrics is defined as a measurement tool to analyse organizational data in order to consider this organizational data are relevant to the organizational goals.

We designed and developed a tool embedded in the framework to assist domain experts with the application process of the framework. This tool will allow the flexibility to identify which goals to be evaluated and to evaluate the relevant organizational data from huge amount of datasets that relate to the organizational goals. GOAL-Framework is designed so that it can be customized and adjusted without being effected with the change of the organizational goals and organizational data.

### A.  Organizational goals ontology

The organizational goals ontology aim to develop the dependency relationship between the organizational goals elements and dependency relationship between organizational data and organizational goals [3]. An ontology is applied as a tool to develop the dependency relationship between the organizational goals elements which include sub-goals and organizational data [2, 3]. It provides the means to understand this dependency relationship as shown in Fig. 4. Therefore, domain experts and entrepreneurs can define the organizational goals based on their requirement.

An ontology shows the dependency relationship of the organizational goals, dependency relationship of organizational data that relate to the organizational goals and to evaluate the weight of this dependency between organizational data and organizational goals. The evaluation aims to test the flexibility of the ontology to develop these dependencies and to define the organizational goals.

In order to develop the organizational goals ontology, several structures that were proposed in the previous models are combined [5, 7, 34]. We adopted these models as a reference for the organizational goals ontology. However, the scope of the proposed organizational goals ontology in this methodology do not cover all the organizational processes as discussed in Sharma & Osei-Bryson [5], Fox et al. [34] and Rao et al. [7].

Fox et al. [34] focused on structuring the linkage between organizational structure and behavior. This is critical for enterprise model development. However, the authors do not emphasize any organizational resources such as data and information but they focus on the roles and activities within the organization.

Meanwhile, Sharma & Osei-Bryson [5] developed a framework for an organizational ontology in an effort to increase an understanding of the business. However, the authors do not specifically identify the relationship between organizational resources, such as data and the organizational goals. In this model, the authors adapted the work of Fox et al. [34], where the authors discussed the physical resources and role of the organizational model.

Recently, Rao et al. [7] developed an organizational ontology in order to build a knowledge map within the organization. The structure includes the flow of knowledge within the organization in the context of knowledge sharing and knowledge storage. In this model, the authors discussed the organizational resources, as in Sharma & Osei-Bryson [5]. Another aspect that is similar to Sharma and Osei-Bryson's work is that both models include business processes. However, Rao et al. [7] discussed business processes from the organizational goals point of view and Sharma & Osei-Bryson [5] discussed business processes from the organizational activity point of view. Most of these studies focused on the organizational structure and performance.

Table 2 shows the results from the previous models on the organizational goals using an ontology but none of these studies focus on the evaluation level of the organizational goals achievement. Table 2 also shows that these models do not focus on organizational data. At the same time, there is no study on metrics to evaluate the dependency relationship of organizational data that relate to the organizational goals. The gaps of these issues are important during the development of the framework.

Table 2. Review of issues.

| Authors | Organizational goals ontology | | Resources | | | Metrics |
|---|---|---|---|---|---|---|
| | Goals | Sub-goals | Information | Knowledge | Data | Dependency relationship |
| Fox el al. [34] | / | / | ✗ | ✗ | ✗ | ✗ |
| Sharma & Osei-Bryson [5] | / | / | / | | ✗ | ✗ |
| Rao et al. [7] | / | / | / | / | ✗ | ✗ |

We proposed the organizational goals ontology as shown in Figure 2. In this figure, we show that each organization has many organizational goals and each organizational goal consists of sub-goals. In order to identify the level of the organizational goals achievement, organization relies on organizational resource include organizational data to evaluate this level of the organizational goals achievement.

Compare to Sharma & Osei-Bryson [5], our organizational goals ontology focus on the usage of organizational data instead of knowledge, information or tools because organizational data is a major resource in every organization and it is important to evaluate the relevance of this organizational data in achieving the organizational goals. We also suggest organizational data is important as information and knowledge to assist the decision-making process [3].

In organization, it is extremely important for the manager to have access to the most relevant organizational data in relation to the organizational goals. Simsek et al. [41] pointed out that sharing important data and information can provide the required knowledge to assist successful decision-making. It is crucial for organizations to create and generate new data and evaluate it to enhance decision-making. Different ways of generating new ideas, information and knowledge will help in terms of decision-making and will enable teams within the organization to use the most relevant organizational data to successfully achieve the organizational goals.

Data is presented in many forms such as documents and statistics. These data are the most important resources in relation to the organizational goals. In this paper, we defined this data as organizational data and we refer to this term in the rest of this paper.
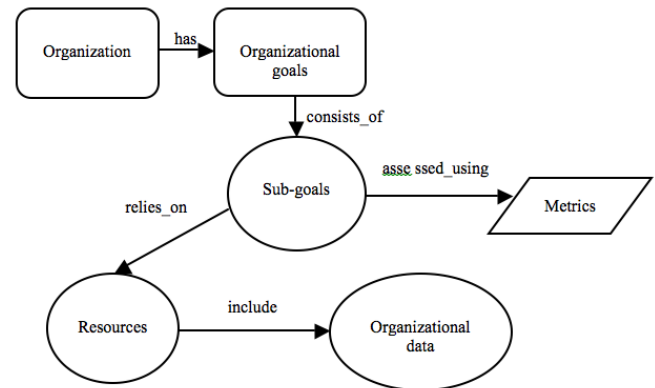


**Figure 2.** Organizational goals ontology.

Figure 2 is different to other studies which either did not include metrics at all [5, 34] or only used the metrics to measure the knowledge within the organization [7].

### B. Organizational goals

Organizational goals are the end results that an organization endeavours to accomplish through its operational performance. Thus, it is important to understand how to model the organizational goals structure. Organization modelling comprises organizational structure [5, 7], organizational setting [27, 30], organizational performance [25, 27, 28], goal performance [28] and goal structure [6, 7]. In contrast, we develop an organizational structure to identify the relationship between the organizational goals but modelling the structure of the organizational goals is much more difficult because every organization creates different data and has different organizational goals. However, the term organizational goal is broad and may lead to a misunderstanding of the scope of organizational goals defined in this paper.

The term organizational goals will be defined differently to advance the understanding as to how to merge the decision-making scope into the organizational goals scope. Therefore, it is important to carefully define the scope of organizational goals to improve the understanding of the methodology.

### 1) Goals definition

The first step during the application process is to identify the possible variables that relate to the organizational goals. It includes external variables that relate to the organizational goals. Therefore, we suggest that an ontology advance the understanding of the dependency for these variables that relate to the organizational goals.

In this paper, organizational goals can be defined in many ways. For example, goals might be defined in relation to

different requirements, such as what variables relate to the goals? what is the weight of these variables that relate to the goals? and if we examine each variable, can it be considered as a goal itself, as in the example discussed in the case study. This section give a brief idea as to how the goal can be defined based on different situations.
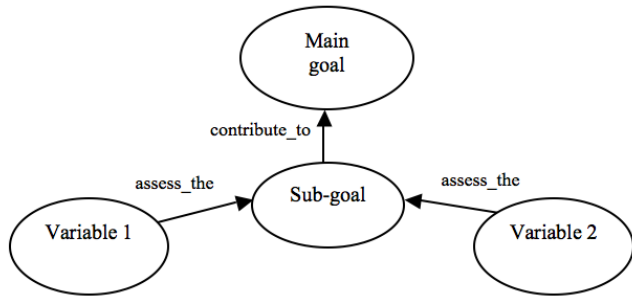


**Figure 3.** Dependency relationship between variables and organizational goals using an ontology.

Figure 3 shows one example on how the possible variables relate to the organizational goals. The example only shows two variables but in a real world situation, there might be more than two. In order to improve our understanding, we show that there are three different layers: the main goal, sub-goal and variables. There are different ways to identify the main goals, depending on the requirements of the domain experts and the entrepreneurs. For example, if we want to focus on sub-goal 1, as shown in the first layer, then this sub-goal 1 becomes the main goal as shown in the second layer. The same process applies to variable 1 and variable 2. This example is tested in the case study to show how the proposed definition of organizational goals can change based on different layers.

> Main goal
>> ▪ Sub-goal 1
>>> • Variable 1    First layer
>>> • Variable 2

> ~~Main goal~~
>> • ~~Sub-goal 1~~ Main goal
>>> • ~~Variable 1~~ Sub-goal 1  Second layer
>>> • ~~Variable 2~~ Variable 1

> ~~Main goal~~
>> • ~~Sub-goal 1~~
>>> • ~~Variable 1~~ Main goal  Third layer
>>> • ~~Variable 2~~ Sub-goal 1

The discussion in this section gives a brief introduction on how organizational goals are defined. The framework focuses on how the concept of the organizational goals is applied to define the goal in the case study.

*C. Application tool of the GOAL-Framework*

In this framework, we develop a tool associated from the organizational goals ontology to assist domain experts and entrepreneurs to be able to analyse and evaluate the level of the organizational goals. The tool assist the flexibility of the

framework to identify the dependency relationship between the organizational goals element and the dependency relationship between organizational data and organizational goals [2, 3]. This dependency relationship is important to identify which organizational data is relevant. In order to achieve this, we set a measurement tool based on the metrics in order to evaluate organizational data that relate to the organizational goals.

The application process of the GOAL-Framework is based on two stages: planning and operational. These stages will allow the flexibility of the framework. Based on these two stages, we develop five-steps during the application process. The steps will provide a systematic approach on how the organizational goals will be identified, the dependency relationship between organizational data and organizational goals, and how the metrics will be defined to evaluate the organizational data to assist the decision-making process in relation to the organizational goals.

Planning stage is to test the flexibility and applicability of the framework. At this stage, domain experts and entrepreneurs can customize the framework to identify the organizational goals together with it sub-goals and variables. At the same time, it is a stage to develop the dependency relationship between organizational data and organizational goals in order to identify which organizational data are relates to the organizational goals. Therefore, we can define the metrics to evaluate this organizational data.

Operational stage is a stage to execute the application of the framework. This stage is about identifying the measurement data and making effectiveness results to assist decision-making process in relation to the organizational goals. This means we need to identify the weight of analysed data based on the actual implementation. Operational stage is the process covering the evaluation of the framework in order to identify the value from the populated data. Based on this value, domain experts and entrepreneurs can identify to what extend the organizational goals might been achieved. Based on the planning and operational stages, we describe the five-steps of the application process as follows:

Planning stage:
• Step 1: Identify the organizational goals.
• Step 2: Identify the sub-goals and variables.
• Step 3: Identify the dependency relationship.
• Step 4: Identify the metrics.

Operational stage:
• Step 5: Analysis and feedback.

The first four steps define the organizational goals and how the organizational goals relate to each other. The last step defines the data to be measured to assist the decision-making process. This process identifies the right metrics to make sure the dependency organizational data will be evaluated in relation to the organizational goals. Even though the discussion is elaborate in general, the aim is to see how these steps can be proven to be flexible and applicable when the framework is tested in different domains.

*1) Tool design and implementation*

This tool is presented as an instruction for domain experts to follow from Step 1 to Step 5. The steps include how to identify the goals, the organizational dataset and how domain experts evaluate the goals. After we identified the goals, we populate the data to the dataset and evaluate this data to assist the decision-making process. The implementation of the tool is based on the application process of the GOAL-Framework, in which from the planning stage to the operational stage.

**Planning stage**

The steps involve the process to identify the main goals and the metrics without populating any data to the main goals.

Step 1: Identify the organizational goals
- Domain experts identify the set of goals in the organization.
- They identify the goal they want to evaluate.
- They have the flexibility to identify and select the main goal.

Step 2: Identify the sub-goals and variables
- Domain experts identify the possible sub-goals and variables that relate to the main goal.
- They have the flexibility to identify these sub-goals and variables.

Step 3: Identify the dependency relationship
- Domain experts identify the dependency relationship between the goals and sub-goals.
- Domain experts identify the dependency relationship of data that they want to evaluate to the goals.

Step 4: Identify the metrics
- Domain experts define the metrics based on the dependency relationship they identified in Step 3.
- They define the metrics based on their evaluation requirement. For example, they can evaluate the data based on the frequency, rank and percentage.
- They select or remove data from dataset that they want to evaluate and analyse in relation to the main goals.
- Domain experts have the flexibility to change how they want to define the metrics based on how they define the main goals.

**Operational stage**

This stage is about how data is populated from the datasets and how this data will be analysed based on the metrics in order to assist decision-making process in relation to the goal.

Step 5: Analysis and feedback
- Domain experts assign the value to the dataset and dataset is populated.
- The populated data is analysed based on the metrics.
- Final results will be shown in the dashboard to evaluate the level of the goals achievement.

- Using the framework, the evaluation process for the final results is flexible with the change of the value in the dataset.

The process discussed in this section explains how we use the tool to identify the main goals and sub-goals from the dataset and how we can define the metrics to evaluate the data that relate to the goals from Step 1 to Step 5 in the planning stage and operational stage.

The tool embedded in the framework allows the five steps to be applied with any organizational goals and organizational data. We presented some examples to illustrate how this tool supports the application of the steps. This section discusses how domain experts implement the framework based on the five steps in order to evaluate the level of organizational goal achievement. Based on the tool discussed in this section, we summarise the benefits of the framework as follows:

- Domain experts have the flexibility to identify and select the main goal.
- Domain experts have the flexibility to identify the sub-goals and variables.
- Domain experts are able to develop the dependency relationship between the goals and sub-goals.
- Domain experts have the flexibility to change how they want to define the metrics based on how they define the main goals.
- The evaluation process for the final results is flexible with changes in the values in the dataset.

## V. Case Study

The aim of this case study is to demonstrate the application of the GOAL-Framework with an illustrative example and to demonstrate its applicability. We start the case study with an overview of the case study background and its goals, including how data are collected and analysed. GOAL-Framework will be tested based on the five-steps of the application tool. This tool will acts as a problem solution and demonstrates the flexibility of the framework to define which goals the users want to evaluate. In this case study, the GOAL-Framework will acts as a solution to the problem and the flexibility of the framework is demonstrated in a real-world situation.

### A. Background

The case study used in this research aims to evaluate the level of student satisfaction in the La Trobe Student Support Services at La Trobe University, Melbourne Australia. To achieve this aim, data published in the La Trobe University Student Support Services Experiment Report in 2011 (http://www.latrobe.edu.au/student-services/student%20surv ey/index.html) is examined. The aim of the La Trobe University Support Services is to improve the students' university experience by providing services that encourage students to socialize and become involved in things other than academic activities. This case study is important as it provides a way to test the GOAL-Framework to evaluate the extent to

which the data are relevant to the decision-making process in terms of achieving the case study goals.

A survey was conducted online and the students were invited to participate by completing an anonymous questionnaire, as guaranteed confidentiality helps ensure that the true concerns of the students are identified. The survey firstly asked students to provide some demographic information regarding the La Trobe University Services which were considered critical to the satisfaction of students. Students were asked to indicate whether:

- they had not used the services but were aware of them.
- they had used the services but believed the services could be improved.

In this case study, a value is assigned to each La Trobe Student Support Service to identify the degree of student satisfaction of the student support services and to identify which service was considered the most important in increasing student satisfaction.

### B. Application process of GOAL-Framework

In this case study, we applied dataset from La Trobe University Student Support Services Experiment Report. In this dataset, we select 11 different services provided by La Trobe University. It is important to note that we do not mean to imply that the entire services are not important but we suggest that these numbers of services are enough to test the flexibility of the framework with respect to the La Trobe University Student Support Services.

However, before we evaluate this data, we have to identify the main goal in this case study. In this section, we will test the framework in order to identify the goal, it dependencies relationship, define the metrics based on this dependency relationship, apply the dataset and evaluate this data together with decision-making process.

Based on the 2011 La Trobe University Student Support Services Experiment Report, the primary objective of the case study is to provide La Trobe University with a means to identify key student concerns which include:

- To identify, prioritise and manage the key issues affecting students.
- To measure the usage of student services offered.
- To provide students with the opportunity to communicate openly and honestly with the management team of the La Trobe Student Support Services.

In order to achieve this aim and to assist decision-making regarding these concerns, we attempt to test the framework based on the planning and operational stages together with the five steps in evaluating the degree to which the goals in this case study have been achieved. Therefore, decision-making can be undertaken to address these key student concerns.

### 1) Planning stage

In the planning stage, we define the concept of the GOAL-Framework for this case study. The process looks at the goals in the case study and how data relate to these case study goals. The process includes the dependency relationship between the case study goal elements and the dependency relationship between the data and the case study goals. After we define the goals for this case study, we define the metrics in order to evaluate the dependency data that relate to the case study goals.

- *Step 1: Identify the organizational goals*

In Step 1, we identify the main goal of this case study. The experiment in this case study is discussed to evaluate the level of student satisfaction in the Student Support Services at La Trobe University. Student satisfaction is the main goal in this case study. We aim to look at the level of student satisfaction to assess to what degree students believe the services at La Trobe University have been of benefit to them.

Goal: Identify the level of student satisfaction

- *Step 2: Identify the sub-goals and variables*

In this step, we identify the possible sub-goals and variables in relation to the main goal. The experiment aims to identify the main goal and examine the dependency relationship between different backgrounds of the students who used the particular service and their level of satisfaction in the La Trobe Student Support Services. In Step 1, we define that the goal of the case study is to determine the level of satisfaction of students who have used the services. Therefore, in order to achieve this goal, the evaluation is based on the service satisfaction and service popularity as we defined these two variables as sub-goals. Service satisfaction shows the number of students who were satisfied with the service. Service popularity shows the level of usage of the services. We identify the sub-goals in this case study as follows:

Sub-goal: Level of service satisfaction
Sub-goal: Level of service popularity

We want to evaluate the satisfaction of the students in the La Trobe Student Support Services, using different background represent the variables as follows:

- Faculty consists of:
  (Education, Health Science, Humanities and Social Science, Law and Management, Science, Technology and Engineering)
- Campus consists of:
  (Albury Wodonga, Bendigo, Bundoora, City, Mildura, Shepparton)
- Study level consists of:
  (Undergraduate, Postgraduate)
- Study mode consists of:
  (Full-time, Part-time)

The evaluation of student satisfaction will take into consideration different student backgrounds and will examine selected services to identify the student's level of satisfaction and the level of popularity of the service among the students. The final results will compare the evaluation of the level of service satisfaction and service popularity.

- *Step 3: Identify the dependency relationship*

In this section, we identify different classes as shown under the class hierarchy. These classes are the elements of the case study. We apply Protégé OntoGraf to develop the ontology for the case study.

As shown in Figure 4, we identify the classes and relationships for the case study. For example, the figure shows that Student Support Service has a goal which is to evaluate the level of student satisfaction. Based on the identification of these classes and relationships, we develop the ontology, as shown in Figure 5. Figure 5 shows the ontology for the case study with the relationships that show the dependency between the case study elements.

We identify the main goal and sub-goals together with their variables in Step 1 and Step 2. In Step 3, we build the dependency relationship to show the relationship between the goals and sub-goals, as shown in Figure 5.
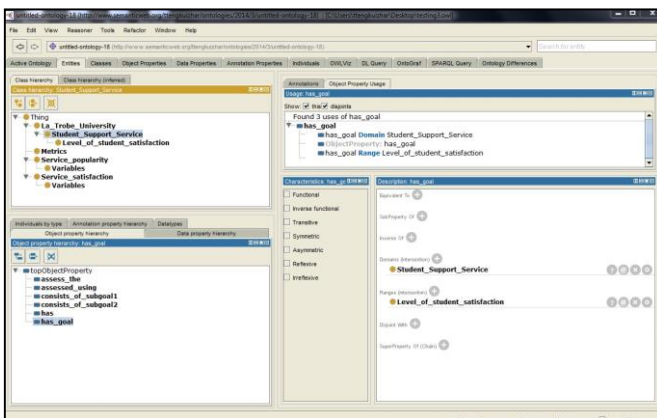


**Figure 4.** Classes and relationships for La Trobe University.

After we identify the classes for the case study, we then identify the relationship between the classes, as shown in Figure 4. In this case study, we identify five different relationships to show the dependency relationship between the goals. The relationships are:

- has
- has_goal
- assessed_using
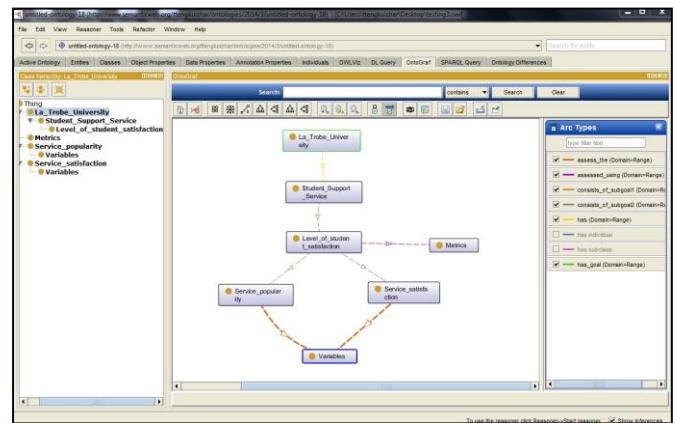- assess_the
- consists_of_sub-goals



**Figure 5.** Ontology for La Trobe University using Protégé OntoGraf.

Figure 5 structures the knowledge obtained through the process of assigning weights to the dependencies to measure the degree of student satisfaction in the La Trobe Student Support Services by looking at service satisfaction and service popularity.

- Step 4: Identify the metrics

In this step we define the metrics. This section identifies the different weights, which were assigned to the dependency variables to measure the level of student satisfaction in the La Trobe Student Support Services based on service satisfaction and service popularity by student background. The experiment only includes data from the students who have used the particular services because our aim is to apply a case study to test the flexibility of the proposed framework to assist the decision-making process in relation to student satisfaction. It is important to note that we do not mean to imply that the students who have not used the services are not important.

The case study used in this experiment provides a step-by-step approach to show how the data relating to the case study goal can be analysed. However, we are mindful of the fact that domain experts and entrepreneurs might want to analyse data in a different way to the way we have undertaken the analysis in this case study, which would require a different approach to define the metrics.

In this case study, the level of student satisfaction is evaluated by student background to: 1) determine the frequency number of students who have used the services and who believe that these services can be improved; 2) rank all the services from most highly valued to least valued; and 3) calculate the overall student satisfaction for those students who have used the services.

- The frequency of students

The students used in the case study comprise the set of students who have used the 11 identified student support services and who believe these services can be improved. For example, the total frequency of students on the Bundoora campus who have used the identified services and who believe the services can potentially improve is 4002, as shown in Table 3.

- Ranking the service according to the number of students who used the services

We use ranking to represent the popularity of the services among the students. This refers to the frequency usage of these services. The report shows the number of students who used the services and we rank this number to evaluate the overall satisfaction of students.

For example, the frequency of students who expressed satisfaction in a particular student support service was summed in order to rank the services offered on each campus in relation to overall student satisfaction.

If two or more services received the same ranking, this would affect the rank of the subsequent service. For example, if two services are ranked 4, then the next service will be ranked 6 not 5.

- Metrics of the student satisfaction

The metrics of the student satisfaction is calculated based on service satisfaction and service popularity referring to the following metrics:

$$\text{metrics (student satisfactio} = \left( \frac{\text{Total Frequency}}{\text{Frequency} \times \text{Rank}} \times 100 \right)$$

In the case study, we evaluate data on students who have used the services which means these services are considered popular. Metrics is applied to evaluate the level of service satisfaction from the total number of students who have used the services. For example, in Table 3, we evaluate the level of service satisfaction of students on the Bundoora campus. The evaluation shows that the level of service satisfaction is 32% of the total number of students who used the services. Therefore, the level of service popularity is 68%. The results show that even if the popularity of the services is high among the students, this does not mean that the students are satisfied with the services.

As an explanation of how the metrics for student satisfaction of is calculated, consider the following example using the data from the Bundoora campus shown in Table 3 in the appendix, the frequency of students who used the service *career events* is 441 which gives this service a rank of 3, hence the value for this rank is [441(3)]. Then, the rank of the next service listed in the table, *career information and resources,* is calculated in a similar fashion, [464(2)]. This process continues until all the services in the list have been assigned a value, hence the service satisfaction of students from the Bundoora campus can be calculated as follows:

$$\text{metrics} = \text{count(Bundoora campus)} \left( \frac{4002}{441(3) + 464(2), \dots ,1656(1)} \times 100 \right)$$

*1) Operational stage*

After we identified the goals and metrics for this case study, we applied an actual value from the populated datasets. We then analysed these data to evaluate the level of student satisfaction and provide feedback to assist domain experts and entrepreneurs with the decision-making process.

- Step 5: Analysis and feedback

In this case study, data are evaluated in an effort to identify the level of student satisfaction in the La Trobe University Student Support Services. The results show the evaluation of service satisfaction and service popularity among students who used the services by student background. We summarize the results to assist the decision-making process to evaluate the level of student satisfaction.

Figure 6 summarizes the student satisfaction by campus based on service satisfaction and service popularity. For the service popularity we can see that student from the Albury-Wodonga campus have the highest percentage at 70%. The results show that even though student from this campus used the services but their satisfaction of the services are only at 30%. The results in Table 3 also show the popularity of services among student from the Bundoora campus is at 68% but their satisfaction of these services only at 38%, followed by the service popularity from the students from the Bendigo campus at 67% but their satisfaction only at 33%. Service popularity among student from Mildura campus is 66% and their satisfaction only 34%. At the same time, student from the Shepparton campus have 63% for service popularity and 37% for service satisfaction, followed by student from the City campus with only 59% of the service popularity and 41% for the service satisfaction.

Figure 6 also shows the relative importance of each service, as ranked by the students who have used each service. For example, the *faculty office* is ranked first by students from every campus while *childcare* is ranked last by students from the Bundoora campus, Bendigo campus, Shepparton campus and the City campus. However, the students from Albury-Wodonga ranked *discrimination and harassment support services* in the last place. The results show that several student support services are ranked equally. For example, *chaplaincy and religious services* and *discrimination and harassment support services* are ranked last by the students from the Mildura campus.
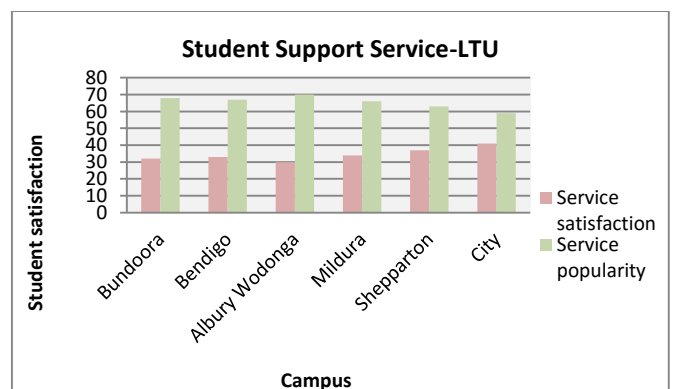


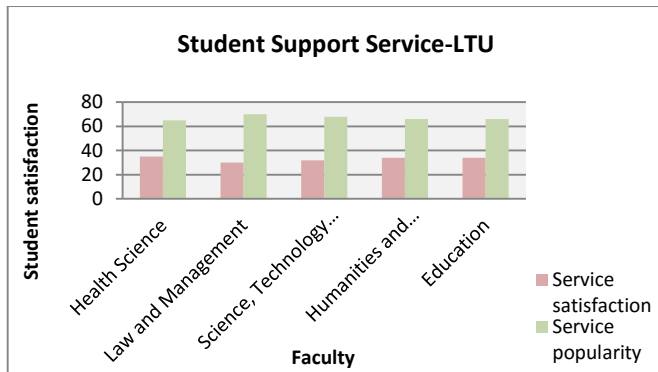**Figure 6.** Level of student satisfaction by campus.

**Figure 7.** Level of student satisfaction by faculty.

The results in Figure 7 summarize the student satisfaction in the La Trobe University Student Support Services by faculty. The results show that the service popularity of student from the Faculty of Law and Management is 70% with only 30% satisfied with the services. This followed by student from the Faculty of Science, Technology and Engineering with 68% for service popularity and only 38% of the student satisfied with the services. The results show that student from the Faculty of Humanities and Social Science and Education have equal value with 66% for service popularity and only 34% of them satisfied with the services. Student from the Faculty of Health Science is 65% for service popularity and 35% are satisfied with the services.

The results in Figure 7 show that students from every faculty are satisfied with the *faculty office* as this service is ranked first. Students from the Faculty of Health Science, Law and Management, and Education ranked *childcare* in the last place, however, students from the Faculty of Science, Technology & Engineering, and students from the Faculty of Humanities and Social Science ranked *discrimination and harassment support services* last, as shown in appendix in Table 7. The results in this table also show that several student support services are ranked equally. For example, *career events* and *career information and resources* are ranked second by the students from the Faculty of Science, Technology & Engineering.
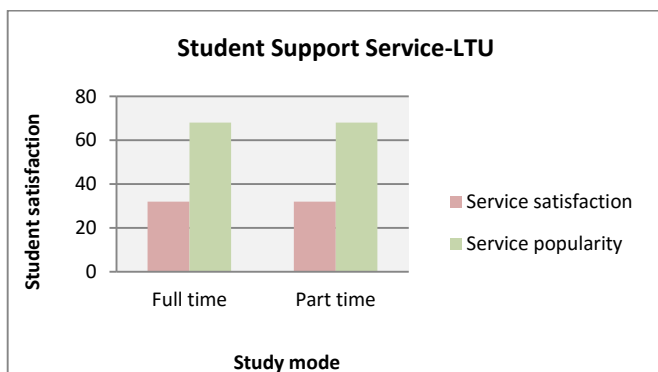


**Figure 8.** Level of student satisfaction by study mode.

Table 3. Level of student satisfaction by study mode.

| Services/ Study mode | Student satisfaction | | | |
|---|---|---|---|---|
| | Full-time | Rank | Part-time | Rank |
| Career events | 594 | 3 | 56 | 3 |
| Career information and resources | 677 | 2 | 56 | 3 |
| Career planning and advice | 408 | 6 | 46 | 6 |
| Chaplaincy and religious services | 172 | 8 | 15 | 9 |
| Childcare | 35 | 11 | 16 | 8 |
| Clubs, collectives & societies | 527 | 4 | 50 | 5 |
| Counselling | 418 | 5 | 64 | 2 |
| Disability support | 104 | 9 | 38 | 7 |
| Discrimination and harassment support services | 43 | 10 | 6 | 11 |
| English language support | 201 | 7 | 10 | 10 |
| Faculty office | 2120 | 1 | 270 | 1 |
| FREQUENCY NUMBER/ TOTAL RANK | 5299 | 16436 | 627 | 1955 |
| Level of service satisfaction | 32 | | 32 | |
| Level of service popularity | 68 | | 68 | |

The results in Table 3 summarize the student satisfaction in the La Trobe University Student Support Services by study mode (either full-time or part-time). For example, the results show the service popularity of both full-time and part-time students is 68% but only 32% satisfied with the services, with both groups of students ranking the *faculty office* first. The results also indicate that part-time students ranked *career events* and *career information and resources* third and *discrimination and harassment support services* is ranked last, but full-time students ranked *childcare* in the last place.

Table 4. Level of student satisfaction by study level.

| Services/ Study level | Student satisfaction | | | |
|---|---|---|---|---|
| | Undergraduate | Rank | Postgraduate | Rank |
| Career events | 534 | 3 | 117 | 3 |
| Career information and resources | 605 | 2 | 125 | 2 |
| Career planning and advice | 359 | 6 | 94 | 5 |
| Chaplaincy and religious services | 148 | 7 | 39 | 8 |
| Childcare | 33 | 11 | 18 | 10 |
| Clubs, collectives & societies | 494 | 4 | 84 | 6 |
| Counselling | 379 | 5 | 104 | 4 |
| Disability support | 118 | 9 | 23 | 9 |
| Discrimination and harassment support services | 38 | 10 | 11 | 11 |
| English language support | 133 | 8 | 78 | 7 |
| Faculty office | 1944 | 1 | 445 | 1 |
| FREQUENCY NUMBER/ TOTAL RANK | 4785 | 14686 | 1138 | 3802 |

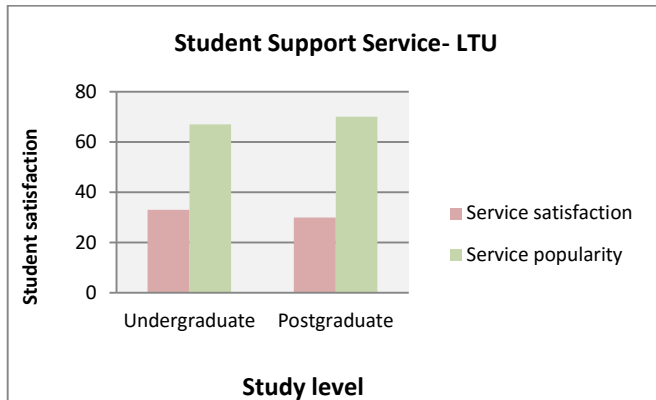| Level of service satisfaction | 33 | 30 |
|---|---|---|
| Level of service popularity | 67 | 70 |



**Figure 9.** Level of student satisfaction by study level.

The results in Table 4 summarize the student satisfaction in the La Trobe University Student Support Services by study level. The results show that the service popularity of postgraduate student is 70% but only 30% satisfied with services and service popularity of undergraduate students is 67 % and 33% satisfied with the services.

The results in Table 4 also show which service is considered important by the students who have used the services by study level. The results show that the *faculty office* is ranked 1 by both undergraduate and postgraduate students. However, *childcare* is ranked last by undergraduate students but *discrimination and harassment support services* is ranked last by postgraduate students. Based on the evaluation in this case study, we can make a decision that even the popularity of the services is high among the student but student satisfaction of the services is still low.

Step 5 helps the decision to evaluate the level of the goal achievement by presenting the results in the graphical way. Users can make a comparison based on these results and come out with the final decision to ensure the organization have the competitive edge to improve their productivity in relation to the organizational goals.

## VI. Discussion

In this real life test case, we were able to successfully test the application of the GOAL-Framework to evaluate the level of the goal achievement. The application tool of the framework proved the flexibility to identify the main goal and how we want to evaluate this goal. The presented case study proved this flexibility to develop the relationship between the data and the main goal that allow us to evaluate this data in relation to the goal. Therefore, decision-making can be put into perspective by comparing the results which allow us to evaluate the level of the goals that we identified in the case study.

In contrast to the previous methodologies on the organizational goals [5, 7, 34], we propose an ontology to show the dependency relationship between the organizational

goals and also to show the dependency relationship between the organizational data elements and organizational goals.

The results from previous studies on organizational ontology have different outcomes to our case study. For example, Rao et al. [7] proposed a methodology using an ontology as a tool for identifying the cause of the inefficiencies and inconsistencies of organizational processes. The results in their study showed that building an ontology based on knowledge maps helps to automatically identify the causes of the inefficiencies and inconsistencies. In Sharma & Osei-Bryson [5], the authors developed an organization-ontology-based framework to implement the business understanding for data mining. The outcome of this study showed that an organization-ontology-based framework incorporates the applicable of the tools and techniques to present the output of business activities in implementing data mining projects. Fox et al. [34] developed an organizational ontology for enterprise modelling. The results of this study developed the concept for organizational modelling in evaluating the activities, agents, roles, goals and authority.

In our case study, the framework was successfully used to identify the dependency relationship between the case study goal and its variables. It also enhances our understanding on how to define the main goal. It is important to note that other domain experts and entrepreneurs might want to define the goal in this case study differently from the way we have defined it. The framework aims to provide this flexibility as to how the goal can be defined. The metrics was defined to evaluate the data to identify the level of student satisfaction in the La Trobe University Student Support Services, based on how domain experts and entrepreneurs want to identify the goal in the case study. The metrics is defined so it can be applied to evaluate the data from the datasets using different values. For example, in Table 6, the metrics was defined to identify the overall level of student satisfaction by campus, but in Table 7, the metrics was defined by faculty, as shown in the appendix.

### A. Contribution

The analysis and evaluation of the data assisted our decision-making process in evaluating the level of student satisfaction based on service satisfaction and service popularity. Using an ontology in the framework assisted the process of selecting the services that we consider important in evaluating the final results. The case study was implemented and proves the applicability of the framework. In contrast to Rao et al. [7], Fox et al. [34] and Sharma & Osei-Bryson [5], the final results of the framework achieved the aim of being flexible and applicable in assisting decision-making in relation to the organizational goals.

In this case study, we test the flexibility of the framework. We test the GOAL-Framework based on the five steps in order to define the goal, sub-goals, data that relate to the goal, metrics to measure the data and using the framework to assist decision-making process. It is fairly easy to implement the framework in the case study, since we developed five steps to be followed.

- *Flexible to identify the organizational goals*

In this framework, we explained in detail how to define the organizational goals. The usage of ontology assists the

flexibility to define the organizational goals. In this paper, organizational goals can be defined in many ways. Therefore, by using methodology, the process to identify the set of the organizational goals becomes flexible. The results in the case study proved the flexibility how we want to define the main goal.

- *Flexible to identify the dependency relationship*

The framework developed the dependency relationship between organizational data and organizational goals. We explained how to identify organizational data from organizational datasets that relate to the organizational goals. The framework provides this flexibility to develop this dependency. We proved this flexibility in the case study in which we developed the dependency relationship between data and case study goals. This flexibility assists the process to identify which data to be consider relevant to the organizational goals.

- *Flexible to define the metrics after the main goals are identified*

We then test the flexibility to define the metrics. In this paper, the framework gives domain experts and entrepreneurs the flexibility on how they want to define the metrics after they identified the main goals. Domain experts and entrepreneurs have this flexibility on how they want to evaluate organizational data that relate to the organizational goals. This flexibility was tested in the case study. This prove that the framework assist the process to define the metrics in different way after we identified the goals that we want to evaluate.

- *The framework assists the decision-making and provide feedback in relation to the organizational goals*

The main objective of data analysis is to evaluate organizational data from the vast amount of the organizational datasets. In this framework, data analysis is important to identify the value of organizational data that relevant to the organizational goals to support decision-making process in relation to the organizational goals [3].

After we analyse the organizational data based on the metrics, the values of this analysis are presented to evaluate the level of the organizational goals achievement. The framework aims to provide a platform to analyse this value and assist domain experts and entrepreneurs to evaluate this value. Therefore, they can evaluate the level of the organizational goals achievement.

Table 5. GOAL-Framework achievement level.

| Application of the GOAL-Framework | Achieved |
|---|---|
| GOAL-Framework is flexible in identifying the main goals. | / |
| GOAL-Framework is flexible in identifying the sub-goals that relate to the main goals. | / |
| GOAL-Framework drives the process to identify the dependency relationship between case study goals and dependency relationship between data and case study goals. | / |
| GOAL-Framework enables the identification of relevant data from datasets in relation to the case study goals. | / |
| GOAL-Framework includes metrics, which is a flexible measurement tool to measure the data in the case study. | / |
| GOAL-Framework assists the decision-making process in relation to the goals. | / |

The contribution of the case study shows how the framework is evaluated in a real-world situation. The steps covered in the framework are tested in this case study. The case study discusses in detail how the goal is defined, the possible sub-goals and variables that relate to the goal and how to evaluate the data in relation to the goal. The results from this evaluation are used as feedback to assist the decision-making process in evaluating the level of goal achievement. We summarize the GOAL-Framework in the case study as follows:

- The goal in the case study is identified. The goal is to identify the level of student satisfaction in the La Trobe Student Support Services.
- The sub-goals are the level of service satisfaction and service popularity as these sub-goals relate to the student satisfaction of La Trobe Student Support Services.
- Student background is identified as the variables using an ontology.
- Data from the case study are selected in relation to the case study goals.
- We defined the metrics and analysed the dependency data based on the number of students who used the services in order to identify the level of service satisfaction and service popularity.
- The results are presented to evaluate the overall level of student satisfaction regarding the La Trobe University Student Support Services.
- The flexibility of the framework does not impact the overall La Trobe University Student Support Service because the main focus of the framework is the main goal presented in the case study.

Despite the success of the proposed framework and the validity of the overall approach, there are some limitations. A limitation of this case study was the small sample of convenience. The size of the sample limits the generalizability of this study. We only test this framework with the sub-goals. Even though we identified two sub-goals, the process to implement this framework to the main goals will be the same. Same approach could be done to evaluate many goals. In the future, it is important to apply this framework with many goals, in which in this case study the framework was unable to interact with the different goals. At the same time, we will extend the definition of metrics to analyse the data. In this case study, we defined the metrics based on the rank but in other cases, different metrics can be defined to analyse the organizational data that relate to the organizational goals.

# VII.  Conclusion

This paper explained in detail how the GOAL-Framework is tested, applied and implemented in a real world situation. Section I, Section II, Section III and Section IV covered the background, objectives and the framework. This included how the framework was proposed and how we can define the goal in different situations. The case study illustrated the process by which the goal was identified and how the data presented in the case study was evaluated in relation to the case study goal.

In a nutshell, we suggest the GOAL-Framework is important for domain experts and entrepreneurs to evaluate which organizational data are relevant to the organizational goals and the framework is able to deal with inconsistencies, changes and gaps in evaluating the relevant organizational data to the organizational goals. This is because different organizations have different organizational data and organizational goals. It is important that the organization acknowledges the importance of identifying relevant organizational data to achieve the organizational goals and address the issue of identifying which data are relevant from the vast amount of data collection. We suggest that the framework presented in this paper is useful to be implemented in order to evaluate the level of the organizational goals achievement.

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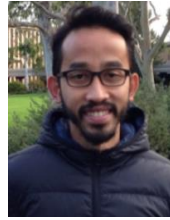
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# Appendices

Table 6. Level of student satisfaction by campus.

| Services/ Campuses | Student satisfaction | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Bundoora | Rank | Bendigo | Rank | Albury Wodonga | Rank | Mildura | Rank | Shepparton | Rank | City | Rank |
| Career events | 441 | 3 | 138 | 4 | 46 | 2 | 9 | 5 | 9 | 5 | 4 | 2 |
| Career information and resources | 464 | 2 | 189 | 2 | 36 | 5 | 20 | 2 | 16 | 2 | 2 | 5 |
| Career planning and advice | 315 | 5 | 91 | 6 | 18 | 6 | 12 | 3 | 12 | 3 | 3 | 3 |
| Chaplaincy and religious services | 139 | 8 | 34 | 8 | 9 | 7 | 2 | 10 | 0 | 9 | 1 | 8 |
| Childcare | 32 | 11 | 7 | 11 | 8 | 8 | 4 | 7 | 0 | 9 | 0 | 11 |
| Clubs, collectives & societies | 366 | 4 | 167 | 3 | 37 | 4 | 3 | 8 | 4 | 6 | 2 | 5 |
| Counselling | 296 | 6 | 120 | 5 | 43 | 3 | 11 | 4 | 11 | 4 | 2 | 5 |
| Disability support | 91 | 9 | 37 | 7 | 7 | 9 | 3 | 8 | 3 | 8 | 1 | 8 |
| Discrimination and harassment support services | 33 | 10 | 11 | 10 | 1 | 11 | 2 | 10 | 0 | 9 | 1 | 8 |
| English language support | 169 | 7 | 25 | 9 | 6 | 10 | 5 | 6 | 4 | 6 | 3 | 3 |
| Faculty office | 1656 | 1 | 517 | 1 | 93 | 1 | 54 | 1 | 41 | 1 | 24 | 1 |
| FREQUENCY NUMBER/TOTAL RANK | 4002 | 12512 | 1336 | 4037 | 304 | 1011 | 125 | 365 | 100 | 270 | 43 | 104 |
| Level of service satisfaction | 32 | | 33 | | 30 | | 34 | | 37 | | 41 | |
| Level of service popularity | 68 | | 67 | | 70 | | 66 | | 63 | | 59 | |

Table 7. Level of student satisfaction by faculty.

| Services/ Faculties | Student satisfaction | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Health Science | Rank | Law and Management | Rank | Science, Technology & Engineering | Rank | Humanities and Social Science | Rank | Education | Rank |
| Career events | 169 | 3 | 191 | 2 | 159 | 2 | 87 | 4 | 39 | 5 |
| Career information and resources | 233 | 2 | 165 | 3 | 159 | 2 | 77 | 6 | 90 | 2 |
| Career planning and advice | 98 | 6 | 149 | 4 | 91 | 6 | 79 | 5 | 32 | 6 |
| Chaplaincy and religious services | 50 | 8 | 33 | 8 | 49 | 7 | 33 | 8 | 20 | 7 |
| Childcare | 10 | 11 | 13 | 11 | 13 | 10 | 11 | 10 | 4 | 11 |
| Clubs, collectives & societies | 133 | 4 | 112 | 5 | 129 | 4 | 148 | 2 | 56 | 3 |
| Counselling | 122 | 5 | 93 | 6 | 100 | 5 | 113 | 3 | 54 | 4 |
| Disability support | 32 | 9 | 22 | 9 | 40 | 8 | 36 | 7 | 12 | 9 |
| Discrimination and harassment support services | 11 | 10 | 14 | 10 | 11 | 11 | 7 | 11 | 11 | 10 |
| English language support | 51 | 7 | 83 | 7 | 37 | 9 | 24 | 9 | 17 | 8 |
| Faculty office | 733 | 1 | 451 | 1 | 471 | 1 | 475 | 1 | 250 | 1 |
| FREQUENCY NUMBER/ TOTAL RANK | 1642 | 4701 | 1326 | 4368 | 1259 | 3916 | 1090 | 3234 | 585 | 1739 |
| Level of service satisfaction | 35 | | 30 | | 32 | | 34 | | 34 | |
| Level of service popularity | 65 | | 70 | | 68 | | 66 | | 66 | |