A risk management based training decision framework: improving training outcomes

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A Risk Management Based Training Decision Framework:

Improving Training Outcomes

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Certificate of Authorship

I, Barry M Horton, declare that this thesis, submitted in fulfilment of the requirements for the award of Doctor of Philosophy, in the Sydney Business School, University of Wollongong, is wholly my own work unless otherwise referenced or acknowledged. The document has not been submitted for qualifications at any other academic institution.

Signed

Date 29-08-2016
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Abstract

This research reports the outcomes of a study into developing and validating a risk management based methodology for improving training decision making when developing and implementing training. The methodology was developed by the researcher by applying risk management theory to the logical processes of training decision making.

The research introduces and tests an innovative training decision making methodology - called the Risk Management of Training Decision Framework (RMTDF) that uses risk management theory as the basis for improved training decision making.

The research design and methodology was guided by a central research question. This central research question asked: ‘Can a Risk Management Training Decision Framework Improve Training Decision Making and Provide More Effective Training Decision Outcomes?’

To answer the central research question a three phased mixed method research design developed and utilised a number of second level research questions. These second level questions were used to test the acceptance of specific aspects of the RMTDF by obtaining responses from research samples of NSW TAFE vocational training practitioners – essentially by testing their perceptions as to whether the RMTDF based methodology improved training decision making in categories aligned to their professional responsibilities.

The second level questions were developed following an extensive review of current literature and were primarily derived from a sequence of key training effectiveness questions first posed by prominent training researcher Eduardo Salas. The Salas et al.’s (2012, p. 94) question series focused on training decision making areas such as: training methods, resourcing training, prioritising training and evaluating training.
The research design obtained responses from samples of five different categories of NSW TAFE Training Managers and Trainers, who were selected from different levels of responsibility for developing, approving and delivering training. Five NSW TAFE’s participated in the research, representing 50% of the NSW TAFE population. High response rates (particularly at senior training decision making levels) were considered indicative of a genuine interest in the research topic and a willingness to consider an innovative training decision framework that had not previously been used by NSW TAFE training decision makers. The strong question response rate enabled high quality and reliable data to be gathered to test and verify the research question(s).

The research findings, indicating training decision making effectiveness can indeed be improved using the RMTDF, in turn led to a broader research conclusion that the RMTDF is a training decision framework that can significantly improve the way organisational training is managed. A further significant indication of the intrinsic value of the RMTDF was the recognition by Intellectual Property Australia (IPA) in awarding an Australian Innovation Patent to the RMTDF as an item of intellectual property, gained during the time period needed for this research.

It is considered the RMTDF has the potential to make significant improvements to the way organisations make training decisions and manage their training implementation. The incorporation of the RMTDF as a standard organisational training management practice is considered an obvious outcome from this research.

Chapter 1: Introduction

This thesis reports the findings of a study into the benefits and/or problems of applying risk management theory to the decision making processes of training managers and trainers as they create education and training experiences. The study researched whether applying a recommended sequence of decisions using risk management based logic, gave perceived benefits and improvements in the training product or educational outcomes, as reported by a selected range of training professionals at NSW TAFE Institutes.

The impetus for this research came from the researcher’s extensive experience as an adult educator in both public and private training organisations large and small. This experience has highlighted to the researcher that although there are many different approaches to education and training in Australia, little attention is given to either the effectiveness of this training and/or the means by which education and training decisions are made by organisations.

The research introduces and tests the user acceptability of an innovative training decision making methodology that uses risk management theory for its conceptual basis. The decision making framework introduced and tested by this research is an original intellectual contribution to our knowledge of effective training decision making, which is a field of enquiry that has so far received only limited investigation by training theorists and researchers (Salas et al. 2012; Smith et al. 2008).

Australian industry spends billions of training dollars annually (ABS 2002). Despite this huge investment in time and money, the reviewed literature indicates limited research and focus has been applied to the decision making methods used by organisations to ensure training approaches they use are well targeted and provide effective training outcomes (Salas et al. 2012, pp. 93-95; Smith et al. 2008, p. 4).
The lack of research into training decision making effectiveness means a knowledge gap exists in our understanding of the effectiveness of training decision making methodologies. This provides an opportunity to develop new training decision ideas that can be used by organisations to improve the effectiveness of their training provision.

The originality of the decision making framework offered by this research comes from specifying the higher order knowledge derived from the application of risk management decision rules to each step of the training decision making process. Risk management is a decision making approach that has gained increased acceptability in the past 10 years and is widely understood and utilised by organisations across the world (Knight 2011, p. 2). However, despite the global acceptance of risk management as a powerful and reliable decision making tool, a review of current literature indicates organisations do not specifically apply risk management to their training decision making requirements (Blanchard and Thacker 2013, Salas et al. 2012, Smith, 2008).

Using risk management for training decision making in the Australian training context was first developed in Horton’s (2001) Master’s Thesis. Horton’s initial research broadly linked existing risk management theory (identified in Australian Standard 4360:2001) to a number of training decision making situations at the Australian Broadcasting Corporation (ABC). Horton’s initial work provided supporting evidence that training managers would accept and apply a conceptual approach to training that could consider training decision making from a risk perspective, and that a training decision framework could potentially be linked to a risk management decision process.

This current research builds on Horton’s (2001) initial ideas and codifies and improves a training decision making framework that is based on managing risk. The research
identifies and explains the core intellectual constructs of the training decision framework and then tests that framework in a NSW TAFE training environment. The training decision framework described and tested in the research is premised on three basic assumptions, which are now expressed as propositions below;

- Proposition one is: ‘That all organisational training requirements can be assessed within a continuum of high to low risk. This proposition means that the process steps specified in the International Standard for Risk Management (ISO 31000:2009) are relevant and can be applied once a paradigm of risk has been established and accepted within a training environment.’

- Proposition two is: ‘When risk management is applied to training it becomes possible to categorise and identify different approaches to organisational training methodologies on the basis of the level of risk they represent for training outcomes.’ (For example, these training methodologies would include a range of training decision options, such as, selecting from a spectrum of choice with at one extreme include low risk outcome related training choices with deliberate non activity and non-testing formats - through to the other extreme of training decision options based on high risk outcomes which deliberately result in training choices based on closely detailed education and training programs with strict outcome testing).

- Proposition three is: ‘That different levels of risk assessed outcomes can be recognised and deliberately adopted as the bases for each training decision.'
This approach then provides a positive improvement result that demonstrates a risk based training decision framework can be used as an organisational management approach to achieve the effective training outcomes required for different organisational training programs.'

The research was undertaken within a field of enquiry that has grown considerable in the past 50 years. In that period many training theories have been developed and knowledge of how to train effectively has grown (Salas et al. 2012, p. 78). Despite this growth in knowledge, there has been limited research focus in the area of effective training decision making, and the processes used by organisations to decide on appropriate training strategies (Salas et al. 2012; Smith et al. 2008). This lack of existing research, combined with the researcher’s real world experience of ineffective organisational training decision making, are the primary factors for researching the potential decision making benefits of a Risk Management Training Decision Framework (RMTDF).

To guide the research process, a central research question was developed. The central research question asked was: ‘\textbf{Can a Risk Management Training Decision Framework Improve Training Decision Making and Provide More Effective Training Decision Outcomes?}’

The research design used to answer the central research question adopted a three phased mixed method approach which developed and utilised a number of ‘second level’ research questions - each of which tested the acceptance by training practitioners of one particular aspect of adopting a risk management based training decision sequence.

The background to the research, including overview of existing training theories and rationale for research question (s) development is now detailed below.
1.1 Background of the Research

In today’s current training environment, training practitioners have at their disposal a wealth of knowledge from the training and learning theories that have been developed over the past 50 years. These theories have contributed to the design and delivery of training systems in a diverse range of organisations including the military, aviation and public/private corporations. Training theories abound and provide practical pathways to the design and implementation of training (Salas et al. 2012, p. 78).

From as early as the 1960’s training researchers and theorists began considering what factors were important in influencing the skill and knowledge development of adult employees in corporate training environments. Training and learning theories developed during this period included; Robert Mager’s performance based objectives (Comlab 2014, p. 1), Malcom Knowles and his concept that adults learn differently to children (Knowles 1990), and Don Kirkpatrick’s model for measuring and evaluating the outcomes of training (Kirkpatrick 1994).

Training theory development continued throughout the 1970’s and 1980’s and was significantly influenced by the global move away from industrialised economies to information based economies (Dawe 2003, p. 24). Theories from this period included the concept of Learning Organisation’s, first proposed by Peter Senge (Senge 1990). Senge’s Learning Organisation’s theory proposed that organisations adopt a systems thinking approach to learning. The systems thinking approach focused on linking individuals’ training to the overall constituent parts of a corporate system, rather than on the individuals own specific learning needs (Senge 1990).

Other training theories developed in the 1980’s included learning transfer processes (Gick & Holyoak 1983), identifying training needs (Goldstien 1986) and individual differences (Noe 1986). The emergence of these theories (and subsequent training theories developed over a 25 year period) have been described by prominent
academic Eduardo Salas as the emergence of a new science, which he identified and categorized as; *The Science of Training* (Salas et al. 2012, p. 75).

Throughout the 1980’s and 1990s the continued expansion of training knowledge and theory began moving organisations away from techniques that involved separate stand-alone training events, to ensuring training is a fully integrated strategic component of organisational management (Salas and Bowers 2001, p. 472). Organisations adopted new training theories and approaches, including; action learning, just in time training, mentoring, coaching and managing skill portfolios (Salas and Bowers 2001, p. 472).

Technological advances in the 1990’s - 2000’s further reshaped the theories and methods organisations used to undertake training. In a fast developing world, E-learning technologies, such as computer generated training packages, multiplayer games and virtual world simulators are now being used by organisations to ensure workers acquire and practice new skills (Salas et al. 2012, p. 95). E-Learning introduced a new way of thinking about organisational training, offering flexibility for both employers and employees (Nagy 2005, p. 80). The acceptance and use of E-learning for organisational training has been exceptional. In the period from 1995 to 2011 the number of USA corporations using E-learning grew from 4% to 77%, with the amount spent on E-Learning growing to over US $56 billion per annum by 2011 (Gutierrez 2012, p. 1).

It can be argued that the usage of E-learning technologies in current organisational training situations has moved practice ahead of theory. According to Salas et al. (2012, p. 95), more research is required into how workers acquire and transfer skills from “neutral” and “flat” technological settings to the multidimensional real world settings in which skills are required.
The summary of training theories above demonstrate a vast array of training knowledge and theory has been developed in the past 50 years. Despite this wealth of information, research into the effectiveness of training decision making is limited (Salas et al. 2012; Smith 2008; Blanchard and Thacker 2013). This provides opportunities for new training ideas to be developed and researched.

1.1.2 Training investment

As organisational training theories and methodologies developed and evolved in the period from the 1960’s little attention was given to the link between training investment and business outcomes. In a period up until the 1990’s very few organisations assessed the full cost of training activities and were unable to evaluate training benefits (Buckley and Caple 2007, pp. 14-15). Training in many organisations was seen as a cost to the organisation rather than a benefit with ad hoc strategies lacking appropriate investment logic (Buckley and Caple 2007, pp. 14-15). Blanchard and Thacker (2004, p. 4) summarised this situation in the following way;

‘Up until the mid-1990’s most [North American] training managers primarily relied on faith that investing in training would produce an improvement in an organisation’s financial results.’

Changes to our understanding of training investment came in 1998 when seminal studies by Bassi and McMurrer found preliminary evidence indicating that higher company investments in training and development lead to more successful and profitable company outcomes (Frauenheim 2009, pp. 1-3). Further research by Bassi and McMurrer (2004) into publically listed US companies indicated a strong link between training expenditures and the company’s stock market performance (Bassi et al. 2004, p. 1).

In Australia there has been limited consideration and research into the link between company performance and training investments (Smith et al. 2008, p. 6; AIM 2013 p.
Evidence that is available indicates Australian organisations use a wide variety of training approaches, however the extent that these approaches use deliberate, transparent and defendable methods of deciding how and why to train, and justify decisions about resource allocation is not fully understood (Smith et al. 2008, pp. 9-11).

1.1.3 Current Organisational Training Expenditure

The level of current organisational training expenditure in Australia is difficult to quantify. The most reliable source of information for training cost data in Australia is the Australian Bureau of Statistics (ABS). The ABS has not surveyed companies in relation to training costs for over a decade, making it difficult to determine overall expenditure for Australian companies in 2015. The most recent data collection by the ABS was undertaken in 2002 and indicated Australian companies spent $3.5 billion on training at that time. Without contemporaneous data to use as evidence, current training expenditures by Australian companies can only be estimated. It is clear that due to inflationary pressures over a 13 year period, Australian organisations' training costs will be well in excess of the $3.5 billion recorded in the 2002 ABS data.

More recent data collected by the Australian Chamber of Commerce and Industry (ACCI, 2010) in a report titled: Employers’ Commitment to Training, provided a guide of individual employee training costs impacting on Australian employers. These are listed below;

- 44% of employers spent an average of $500 per employee on staff training & professional development
- 22% employers spent between $500 and $999 per employee
- 22% employers spent over $1000 per employee
- 9% employers spent no money at all on employee training
As a comparison to the lack data available in Australia, multiple agencies in North America provide detailed and up to date research and information relating to training costs. For example the American Society for Training and Development (ASTD) in their *State of the Industry Report 2013*, indicated that US $164.2 billion was spent by North American organisations training their employees in 2012.

The lack of research and reporting of Australian organisational training expenditure limits the ability of this research to provide specific and up to date Australian organisational training costs. Evidence that is available from Australia and overseas, suggest organisational training budgets are significant and therefore important considerations in operational and strategic organisational decision making. Despite the difficulties in accurately quantifying training expenditure in Australian organisations, it is considered the RMTDF tested by this research is intrinsically valuable to organisational training decision makers. The RMTDF provides training decision makers with a valid and relevant approach to training expenditure decisions. This approach enables difficult and potentially contentious training decisions to be clearly justified and explained to relevant training stakeholders (funding providers, trainers, organisational management and employees).

**1.1.4 Changing Vocational Educational Training Investment & Funding Models**

Questions asked in this research focus on training decision makers in NSW TAFE organisations. NSW TAFE, as a vocational education training provider, operates within the Australian Vocational Education and Training (VET) framework.

In the current era, political decisions at both Federal and State level have led to significant changes in the way Australian Vocational Education and Training investment and funding is undertaken. Changes to funding arrangements now mean VET organisations are required to provide services within a business funding and operational framework (Simpson 2014, p. 7). Under such a framework, competition
for training dollars has increased and state run entities such NSW TAFE will now be required to compete with private training companies for students (Needham 2014, p.36).

The new VET funding arrangements require training organisations to provide high quality training outcomes to gain recurrent funding and remain viable (Simpson 2014, p. 7; TAFE Commission 2013, p. 2). As the VET sector moves into a paradigm of increased choice and ‘market’ driven training provision, the need for effective training decision making in areas such as; appropriate training methodologies, optimisation of training outcomes and allocation of training resources becomes increasingly important to the training providers who are making training decisions. In this type of training environment, the RMTDF offers a sophisticated decision making framework that will help organisations decide on training approaches that best fit the outcome requirements of VET governing bodies.

1.1.5 Skill Development and Organisational Alignment

In a globalised economic climate, based on knowledge and information, organisational success depends on skilled workforces and a culture of enterprise (Dawe 2003, p. 23). To operate and survive in globalised environment in the 21st century organisations must ensure employee skills are developed to match changing trends and business operating imperatives.

There is little evidence to suggest that Australian organisations’ have traditionally used effective methods to plan ahead for skill development requirements. Research by the Australian Industry Group (AIG) (2008) indicated the major driving force for organisational training activities in Australian companies is when they are confronted by operating pressures caused by skills shortages. These skill shortages result in reactive moves to either find skilled workers from outside the organisation (potentially
from overseas) or develop reactive programs to upskill existing workers (AIG 2008, pp. 6-7).

Smith, Hill & Oczkowski (2009, p. 9) believe that a more sophisticated approach is required by Australian employers to invest in, train, and upskill their workers. In their research: *Why Australian Employers Train Their Workers* (2009) they make the following findings;

‘The need for skills – including specific skills for business and raising the overall level of workforce – is the major factor driving Australian organisations in the types of training required for their employees … Employers need to take a more strategic approach to skills in enhancing their competitiveness, and as a consequence, place training in a more central position in their strategic planning.’

To remain competitive in a globalised economy Salas et al. (2012 p. 75) identified three domains that are required by organisations to maintain a competitive advantage, these are: ‘finance, products/markets and human capital (or their workforce).’ Salas et al. argued that the first two of these domains, finance and products/markets, provided equally difficult or easy opportunities for organisations, due to similar worldwide financial cycles and the ability to sell products through the internet. Therefore, the third domain, ‘building and maintaining a more capable and better trained workforce’ was the key to gaining sustainable advantage and organisational success (Salas et al 2012 p. 75).

Supporting Salas et al. argument are studies undertaken Delaney and Huselid (2006) and Aguinis and Kraiger (2009). For example, Delaney and Huselid (2006) found that effective training practices relating to staffing and training were positively related to perceived organisational performance. Also, Aguinis and Kraiger (2009) showed
through multiple studies in European countries that training practices and policies were linked to organisational effectiveness.

If it is accepted that workforce training is the key to maintaining organisational competitive advantage, then it follows that an effective and strategic organisational training decision making approach is required to decide on ‘how’ and ‘why’ organisational training should be implemented. Strategic organisational training decision making is a key focus of this research. Chapter two reviews strategic organisational decision making (strategic alignment), and research questions were developed to demonstrate the strategic decision making effectiveness of the RMTDF when compared to existing NSW TAFE personnel training decision approaches.

1.2 Research Question Development

The proposition that risk management decision rules can be applied to each step of a training decision process is an original idea that has not previously been proposed or tested by training theorists and researchers, and as already reported was introduced and tested by Horton (2001).

The rationale for developing and testing a Risk Management Training Decision Framework (RMTDF) is based on the researcher’s experience as an organisational trainer/coordinator. Working in a number of organisations, over a period of many years, the researcher observed many organisations did not use effective training decision making approaches. This lack of effective training decision making was evident in a number of specific training decision categories, including: training investment/evaluation, training methodologies/content and alignment of worker skills with organisational goals. The lack of effective decision making approaches in these important training categories led the researcher to consider that risk management, an accepted effective managerial decision making system (Knight 2011, p. 2), could be used to improve training decision making.
The categories of training concern initially identified by the researcher were expanded in the final research design to ultimately embrace seven 'significant training decision categories' (explained in detail below). The identified significant training decision categories were considered common to most organisational training decision making situations and were also justified by the relevant literature reviews as presented in chapter two.

The research used these proposed significant training decision categories as the bases for the research design, which has already been identified as using a three phase mixed mode approach, and in the development of the first phase research questions. When developed, the first phase questions were used to measure the user acceptability of the RMTDF when compared to existing training decision approaches used by NSW TAFE training professionals.

The seven significant training decision categories - from which the first phase research questions were developed, were derived by extensively reviewing training issues discussed by academics and practitioners in existing training literature. As already noted, the past 25 years has witnessed a huge expansion of knowledge in the training domain, with the growth of training theoretical models and practices constantly expanding our understanding of the requirement of effective training (Salas 2012, p. 78). According to Salas et al. the expansion in training research and knowledge has clearly shown two things: (a) that training works, and (b) the way training is designed, delivered and implemented matters.

In their review of the Science of Training literature, Salas et al. (2012, p. 78) cited the development of training effectiveness models as evidence of how our understanding to best train individuals and collectives more effectively has improved. Such effectiveness models are inclusive of: learning transfer processes (Gick and Holyoak 1983), performance measurement (Cannon Bowers 1997), individual differences
(Noe 1986) and learner control strategies (Ford 1998). According to Salas et al. (2012, p. 79) the growth in training effectiveness models has expanded our view on training as a ‘system’ and provided practical outcomes for designing and delivering effective training in areas such as aviation, the military and private/public industry. Despite this expansion of training effectiveness models and theory, Salas et al. (2012, p. 94) indicated that a number of training effectiveness areas remain problematic and are worthy of further attention. Some of these areas include but are not limited to;

- Difficulties in deciding on appropriate training investment (Salas 2012 et al.; Buckley and Caple 2007; Frauenheim 2009)
- Difficulties in deciding on most appropriate training methods for skill development, (Smith, Hill & Oczkowski 2009)
- Difficulties in transferring knowledge from training to the workplace (Ford and Weissbein 1997; Salas et al. 2012).

A recent summary of the key training effectiveness issues confronting organisations has been specified by Salas et al. (2012, p. 94) through the technique of posing a series of key training questions. Despite the growth of knowledge relating to training effectiveness models, Salas et al. consider that key organisational training stakeholders (Chief Executive, Human Resource Managers, Trainers) should be able to also answer these key questions to ensure effective training outcomes can be achieved. The key Salas et al. questions relate primarily to the factors of ‘how’ training will be undertaken and ‘why’ specific methods can be used to achieve the most effective organisational training outcomes.

This research has therefore selected seven significant training decision categories from the Salas et al. questions. It is these significant training decision categories that became the bases of the phase 1 quantitative question development (38 in total). The phase 1 quantitative questions compared and measured the NSW TAFE
respondents’ confidence levels when their existing training decision approaches were compared to the RMTDF approach.

The training effectiveness questions proposed by Salas et al. (2012, p. 94) are provided below in table 1. These are in turn followed by the table 2 listing categories developed by the researcher that are considered significant training decision categories - see table 2- which were then used as the basis for testing in phase 1 of the research design.

<table>
<thead>
<tr>
<th>Key Decision Questions</th>
<th>For training in general throughout the organisation or business unit-</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Have we invested sufficiently and wisely in training and learning activities in our organisation? - How do we know?</td>
<td></td>
</tr>
<tr>
<td>• How have we determined and prioritised our most important training needs?</td>
<td></td>
</tr>
<tr>
<td>• How clear are we about the competencies we will need in order to compete successfully? How clear are we about where the gaps exist?</td>
<td></td>
</tr>
<tr>
<td>• What have we done to diagnose our organisation’s learning environment? What are we doing to make our organisation more conducive to learning?</td>
<td></td>
</tr>
<tr>
<td>• What do you need me to do to send the right signals to our employees about the importance of training and learning in our organisation?</td>
<td></td>
</tr>
<tr>
<td>• How will we know that our overall efforts in training and development have an impact? What evidence do we expect to see?</td>
<td></td>
</tr>
</tbody>
</table>

- For a specific training program

| • What type of training needs analysis have we conducted to ensure we will be training the right things in the optimal way? |
| • What training strategy will be employed? How are we incorporating effective instructional design elements (information, demonstration, practice and feedback)? How clear are the learning objectives? |
| • What are we doing to ensure we adequately engage, motivate and challenge the trainees (and not simply ensure they are happy)? |
| • What are we going to do before and after this training to ensure trainees can and will use what they learn/ What are we doing to prepare trainees, remove obstacles on the job, and reinforce and sustain learning? |
| • How is any training technology that we plan to use going to enhance learning and help trainees perform their job better and not just look cool? |
| • Should we be evaluating this training program? If so, for what purpose (e.g. to make adjustments or decide whether to continue it) and how? |

Table 1: Series of Key Decision Question Areas for Training Stakeholders (Salas et al. 2012, p. 94).

Using the Salas et al. question categories in table 1 above, seven significant training decision categories have been developed by this research design and are proposed as the testing categories in phase 1 of this research. They are presented in table 2 below.
Table 2: Significant Training Decision Categories Developed as Basis for Phase 1 Correlational Testing (Developed by Researcher).

These developed significant training decision categories focus primarily on the key issues of: training prioritization, training investment, training methods and training evaluation. Due to practical limitations, including ensuring a realistic scope of the research process, several training questions identified by Salas et al. (2012, p. 94) were not selected to be included as a bases for research question development. These omitted areas whilst important, were judged by the researcher to have a lower level of impact on the effectiveness of decision outcomes than the categories that have been selected. The question areas that have been omitted are listed below:-

- What motivational strategies are used for learner training?
- How do we send the right signals to employees about the importance of training and learning in our organisation?
- What are we doing to prepare trainees, remove obstacles on the job, and reinforce and sustain learning?

The lack of question development on these three training issues, which were deliberately omitted, is acknowledged as a research limitation.
It is evident that the key decision categories listed by Salas et al. (2012, p. 94) in table 1 mix many lower level issues within each statement. Therefore, the next stage of the research question development process required the linking of the selected significant training decision categories in table 2 to two categories requiring more specific expansion questions: (a) the specific decision needed to be made for effective training, and (b) the specific training decision making responsibilities of the research participants. These categories were selected so as to ensure the effectiveness issues indicated through the Salas et al.'s questions were appropriately aligned with the responsibilities of the training decision makers participating in the research, and these more precise sub categories enabled the development of valid single issue phase 1 research questions.

1.2.1 Developing the Research Sample

To enable the development of the specific expansion questions discussed above, there was first a requirement to identify an appropriate sample of training decision makers and highlight their specific training decision making responsibilities. Initially, the research planning considered using a sample selected from multiple industry settings, including Health, Chemical Production and Engineering.

This initial planning was based on the assumption that the RMTFD would effectively influence training decision making in wide range of organisations and should not be limited in its potential applications. However, as the research planning further developed, and the research design became focused on a mixed method research strategy, it was decided sampling from a single corporate entity would provide the most focused and effective research outcomes working within the reality of the time available for a doctoral study.

This decision to focus the research sample more narrowly was based on practical issues relating to factors including: the reality of gaining simultaneous agreements
from at least three separate organisations to enable access for data gathering, the volume of qualitative data requiring analyses, and the reliance of the qualitative approach as the primary data validation process. Therefore NSW TAFE, a significant and important organisation, central to the vocational training needs of NSW Industry (Department Education and Communities, 2013) was selected as the single corporate entity from which the research sample was selected.

To decide on the most appropriate sampling approach to use in the NSW TAFE corporate environment a review of the NSW TAFE training decision making structure was undertaken. This review identified 5 levels of training decision makers in the NSW TAFE organisational hierarchy (Department Education and Communities, 2013). Those decision makers were:

- Institute Director
- Finance Manager
- Human Resource Manager
- Course Coordinator
- Course Trainer

When the appropriate hierarchy of NSW TAFE training of decision making personnel had been identified, their decision making responsibilities were then aligned to the significant decision categories through scrutiny of relevant NSW TAFE job descriptions. For example, a NSW TAFE Trainer job description lists responsibilities of; ‘participating in appropriate training instruction and assessment.’ Therefore the significant training decision categories of *knowledge development, training method and evaluation* (difficult areas 1 and 4 in table 2 above) can be linked to the Trainer role. The result of this matching is shown in Table 3 below, along with the alignment of the range of significant training decision categories linked to the other NSW TAFE research participants’ decision making responsibilities.
<table>
<thead>
<tr>
<th>Decision Making Level</th>
<th>Area of training decision making responsibility/difficult decision categories</th>
</tr>
</thead>
<tbody>
<tr>
<td>Institute Director</td>
<td>Legal/Corporate/Policy/ Strategic alignment train resource</td>
</tr>
<tr>
<td>Finance Manager</td>
<td>Resource allocation/Train Prioritisation /Return on Train invest</td>
</tr>
<tr>
<td>Human Res Manager</td>
<td>Workforce skill development/align corporate HR strategies with training</td>
</tr>
<tr>
<td>Training Coordinator</td>
<td>Course planning/ types of training strategy &amp; approach</td>
</tr>
<tr>
<td>Course Trainer</td>
<td>Knowledge requirement/ train methods/assessment &amp; evaluation</td>
</tr>
</tbody>
</table>

Table 3: Linking of Research Participant Training Decision Responsibilities to Significant Training Decision Areas.

The final stage of the Phase 1 question development process was to design a number of specific single factor questions on which to both test only one aspect of training decision making and to measure the variance in decision making confidence (i.e. comparing responses from the same question probing one specific aspect of training when decisions were made both with and without the RMTDF). This approach also involved the alignment of each significant training decision category to the appropriate level of organisational decision maker. In total, this process resulted in 38 single factor questions which were developed for correlational analyses purposes. The example of questions developed for the NSW TAFE Institute Director are shown in the table 4 below.

<table>
<thead>
<tr>
<th>Phase 1 questions</th>
</tr>
</thead>
</table>
| Institute Director | Does your org have an effective method of ranking level of training required?  
|  | Does your org have effective methods of aligning skill development with key org strategies?  
|  | Does your org have effective methods to defend training decisions at law?  
|  | Does your org effectively prioritise training decisions to meet org requirements?  
|  | Does your org training decision making enable a logical process for auditing requirements?  
|  | Does org effectively make decisions on allocation of resources?  
|  | Does org have effective processes to predict training outcomes?                                                                                                                                                                                                                     |

Table 4: Developed Closed Single Factor Questions used for Phase 1 Correlational Analyses at Institute Director Level (full list of question development for NSW TAFE decision makers listed in appendix A of thesis).
When developed, the single factor questions are described as providing the bases of the quantitative phase 1 data gathering component of the mixed method research design. As will now be shown under the next heading, the phase 1 questions were followed up by a second phase development of qualitative questions, used to explain and validate what the pattern of responses obtained from phase 1 data analyses actually meant.

1.3 Research Design

This research has been designed using a three stage mixed method approach. Mixed methods are a relatively new methodology in research and it can be argued that ‘mixing’ or blending of data provides a stronger understanding of a research problem or question than standalone quantitative or qualitative methods (Creswell 2014, p. 218). Several typologies for classifying mixed method strategies are discussed by Creswell (2014, p. 219) and he nominates three basic mixed method designs. They are;

- Convergent Parallel Mixed Methods Design
- Explanatory Sequential Mixed Methods Design
- Exploratory Sequential Mixed Method Design.

When Creswell’s (2014, p. 218) three basic designs were considered, it was decided the ‘Explanatory Sequential Mixed Method Approach’ would be the most appropriate to address the research question (s) developed for this research. This design was utilised to develop a more complete understanding of the research problem. The explanatory sequential approach enabled results from the phase 1 quantitative question analyses to be followed up and explained in more detail by the second phase qualitative question analyses (Creswell, 2014, p. 218). Also, due to limitations of sample size (explained below), the three stage explanatory sequential research design enabled the limitations of the first stage quantitative data to be verified more
effectively by using the second stage qualitative methods. The mixed method research design developed for this study, when implemented, consisted of three distinct research phases. These phases are explained below.

**Phase 1**

Phase 1 was designed to determine if the RMTDF would provide a higher level of training decision making user acceptability by measuring and analysing variations in confidence levels between existing NSW TAFE training decision processes and the recommended RMTDF based processes. Research participants were therefore asked to rate their decision making confidence levels with and without the RMTDF using the single factor questions described above (phase 1 questions).

Included in part one was a pilot study, which was a validation trial of the developed single factor phase 1 questions. This pilot study trial was undertaken with a group of public health training professionals who were selected due to availability (convenience of access) and because the initial research design planned to study at least two service sector agencies. As such, it was assumed that the training decision making responsibilities and significant training decision categories of public health training professionals aligned equally with main research participants (TAFE NSW training decision makers). The pilot study trial of the questions enabled the single factor questions and measurement scale (Likert scale 1-4) to be tested for internal reliability and consistency (Cronbach’s Coefficient Alpha and Spearman’s Correlation Bivariate).

**Phase 2 and 3**

Phase 2 of the research used qualitative questions developed by the researcher when trends from phase 1 questions had been analysed. These phase 2 questions were given to both a NSW TAFE sample and also to a specialist NSW TAFE panel (i.e. expert panel) to explore the patterns of responses from the phase 1 data in greater
detail. This approach was taken so as to build a more detailed picture as to why the RMTDF provided research participants with higher (or lower) levels of decision making confidence.

The final part of the research design (phase 3) was used as a platform to validate the combined evidence from phase 1 and phase 2, and demonstrated how the RMTDF influenced effective training decision outcomes in the seven significant training decision categories tested by the research. Phase 3 combined the evidence from the quantitative trending patterns in phase 1 with the qualitative evidence from phase 2 (including follow up sample responses and expert panel responses). This combined data was then used to demonstrate if evidence was available to indicate whether the RMTDF effectively influenced training decision making outcomes in the seven significant training decision categories that were tested.

Chapter three provides a detailed description of the research design and justifies fully the research methods and data analyses techniques selected to answer the proposed research question(s).

1.3.1 Limitations of the Research Design

A fundamental limitation of the research design was the small population of training decision makers from which data was gathered, especially for the quantitative aspects of the research design. This limitation was unavoidable because appropriate training decision makers were selected according to the design logic of the alignment of their training decision making responsibilities to the identified difficult training decision categories. Also the small number of NSW TAFE institutes (10) limited the number of training decision makers’ available to participate in the research, especially at the management levels of the research sample (i.e. only one Director per NSW TAFE Institute).
This small population number was a very significant factor in determining the final research design, and it led to a deliberate triangulation approach involving both quantitative and qualitative approaches.

For example, decisions relating to training legal considerations, auditing of training and aligning of staff skills with organisational strategies are responsibilities clearly linked to a NSW TAFE Institute Director. Therefore, using the Institute Director in the sampling process limited the potential numbers from which a research population or research sample can be obtained (i.e. only 10 NSW TAFE Institute Directors are available as the research population).

With this limitation identified, the advice from the Wollongong University Statistics Unit was to use the first phase of quantitative questions to assess summative trends and data patterns only. Once this trending data was obtained, the second phase data gathering then used a qualitative validation approach to verify the effects of the RMTDF on the confidence levels of the research participants.

A further limitation of the research was the inability to determine a truly randomised sample. After responses were received as to whether NSW TAFE Institutes had agreed to participate in the study, it was only possible to gain access to half of the population of NSW TAFE training decision makers (i.e. only 5 out of 10 TAFE institutes agreed to participate). In that practical sense, the participating NSW TAFE’s Institutes were purposely self-selected. This non-random approach violated the usual quantitative research design assumptions of the statistical inference testing used by the research (Wilcoxon matched pair testing) (Pallant 2012, p. 222). It is also acknowledged that assumptions relating to sample confidence intervals and sample margin of error percentages (Creswell 2014, p. 159) are not met.

Due to the limitations of the sample available, the analyses of the data gathered from phase 1 questions is not claimed to provide normative statistical outcomes. However,
the phase 1 data is used to provide an indicative trending bases from which to develop the second phase research questions and subsequent (mainly) qualitative based validation.

Despite the statistical limitations outlined above, it should be noted that the research was successful in obtaining a high participation rate from NSW TAFE. This was considered a significant achievement as the research was undertaken in a time of massive structural reform within NSW TAFE Institutions (Department Education and Communities, 2013). Part of this reform involved many internal surveys and questionnaires leading to claims that NSW TAFE personnel were suffering ‘survey fatigue.’ In such an environment, a 50% participation rate for the RMTDF research clearly indicated NSW TAFE management interest and support of the research issue. Allied to the overall high participation rate were exceptional response rates to the research questions when asked. The phase 1 quantitative questions obtained a 100% response rate (senior management level questions), and the phase 2 qualitative questions achieved a 75% response rate (at senior management levels). The high participation rate combined with a strong question response rate enabled the gathering of high quality reliable data

1.4 Research Contributions

This research makes the following original contributions to the organisational training and learning field;

1. Identification of the proposition that risk management theory can be applied to all steps of organisational training decision making.

2. Development of a risk management decision making framework (RMTDF) that can be used by all organisational personnel involved in training decision making.
3. Development of risk management decision making matrix tables to practically support training personnel in organisational training decision making.
4. Demonstration that the RMTDF can be considered as part of an improved organisational management ‘systems’ approach to training decision making.
5. Demonstration of the user acceptability of the developed RMTDF in the NSW TAFE training sector.
6. Demonstration that RMTDF can improve training decision making effectiveness.
7. Identification of key RMTDF decision making factors that are considered to have advantages over existing NSW TAFE training decision making approaches.

1.5 Outline of Thesis

The thesis comprises of five chapters, beginning with the current chapter. The current chapter has introduced and contextualised the research by explaining the background to the research question (s), setting out the research aims and justifying the design and methods used in the research process.

Chapter two moves forward by introducing and explaining the RMTDF developed for the research. The three part framework uses risk management standard ISO 31000: 2009 as its supporting theory and introduces a set of training decision rules that can be used for effective training decision making. An extensive literature review is also undertaken in chapter two. The literature review justifies the use of RMTDF decision rules when comparisons are made with existing training systems and theories.

Chapter three outlines and explains the basis for selecting a mixed method strategy for data collection, interpretation/ analyses (phases 1 and 2), as well as addressing research ethical issues.
Chapter four presents the research findings and outcomes of the phase 1 and phase 2 analyses (questionnaire responses, open ended follow up question responses).

Chapter five uses the combined evidence outcomes from phase 1 and phase 2 to demonstrate the level of evidence available that indicated the RMTDF improved the effectiveness of training decision making outcomes in the seven significant training decision categories that were the basis of the research questions (phase 3).

1.6 Delimitations

The primary limitation to the research is the lack of up to date literature, research and statistics relating to training costs and training decision making effectiveness approaches and theories. The lack of current literature in this area is particularly evident in the Australian organisational training context. As noted in the introduction, the most recent Australian Bureau of Statistics data regarding Australian training costs was collected in 2002, far too old for direct comparisons in a study finalised in 2015. In addition, training journals and contemporary training magazines which provide good sources of information for current and recurrent training issues are of limited availability in Australia. Consequently the research sources this type of data and literature from the USA corporate training environment (where available), to support the propositions and research concepts discussed in the paper.

Limitations to the research design have already been acknowledged by the selection of a pilot study sample from an organisation (Public Health) that differed from the main research sample (NSW TAFE). Also acknowledged were design limitations caused by the main studies’ small sample size (at management levels) and the inability to determine a truly randomised sample because not all NSW TAFEs were willing to participate in the research process.

The research focused on the decision making of training providers. As a consequence, the research sample did not include vocational educational students.
Therefore, it is acknowledged that the scope selected for this study is limited in at least this way, and does not assist in developing a direct response based understanding of students’ perspective of the consequences of adopting the RMTDF. In addition, the thesis also does not explore the potential benefits it may have for them in the changing NSW VET sector - where issues of student access and equity are being questioned (SMH, 2015, p.1). This is an acknowledged limitation of this study and the need to further address this area of concern is listed as one of the recommendations for further research provided at the end of this thesis.

A further limitation to the research design was the exclusion of several Salas et al. (2012, p. 94) key training effectiveness questions. It was considered unrealistic to include all of the Salas et al. effectiveness categories because of size and scope limitations of the research process.

The final limitation of the research relates to the role of risk management in the Australian workforce. Risk management is not a new management concept and it is deeply imbedded in the consciousness of many Australian managers and employees (Knight 2011, p.2). This presents a bias issue for the research related to the decision making functions of risk management. Traditionally, risk management is considered as a workplace management function applying to high risk areas such as health and safety management, terrorism or financial risk management (RiskCover 2011, p. 1). An important part the research design was to ensure research participants could apply the RMTDF to all aspects of training decision making and not be limited in their thinking to the traditional risk management decision functions.

1.7 Conclusion

This chapter sets out the reasons for undertaking research into organisational training effectiveness and why opportunities exist for new ideas and improved thinking processes to be considered alongside existing knowledge and theory. A foundation
for improved training decision making has been established for the thesis by this introductory chapter’s preview of the research design, which is based on the identification that risk can be used as a decision making factor at each stage of a training decision making process. The research problem was identified by describing user reactions to current training issues, and a basis for an improved training decision model – called the RMTDF – has been described. A research strategy that most effectively addressed the research problem of testing whether the recommended RMTDF model could in fact improve training effectiveness has also been explained.

An overview of the thesis structure has been provided with five chapters used to introduce, discuss, analyse and present research issues/outcomes. Chapter one also acknowledged the delimitations of the research strategy.

The RMTDF developed and tested by this research is considered to be an innovative training decision approach that can provide real benefits to training decision makers. Training decision areas such as resource allocation, training methods, training prioritisation and evaluation can all be undertaken more effectively using the RMTDF.

To justify the RMTDF approach, chapter two now provides an explanation of the theoretical risk management principles that support the RMTDF, and also reviews the other selected theory bases underlying the research design. Once described, the theoretical bases underlying the RMTDF decision approach are then compared to current training theories and research to demonstrate how using a RMTDF can improve training decision making effectiveness.

Following chapter two’s explanation of why there is a need for a more effective training decision framework such as the RMTDF, chapter three then describes in detail the research methodology developed to test and verify the effectiveness of RMTDF as a decision making approach, based on responses obtained from a research sample selected from the population of training decision makers at NSW
TAFE. Chapter four in turn presents the findings and analyses of the mixed method research strategy. Chapter five then summarizes the research outcomes and discusses the implications of the RMTDF for NSW TAFE training decision makers and for organisational training decision makers in a broader context.
Chapter 2: The RMTDF and Review of Current Literature

2.1 Introduction

Chapter one established the importance of making effective organisational training decisions. The chapter provided evidence to support the claim that effective organisational training decision making leads to effective training outcomes, in turn enabling the development of a well trained workforce. A well trained human workforce is an important key to organisational success (Salas et al. 2012, p. 75).

This chapter will begin by describing the settings from which it can be demonstrated that applying risk management principles and ideas to training decision making can lead to improved training. It will be demonstrated how these principles can be incorporated into the recommended decision making framework - the RMTDF - that was developed by this thesis and tested at NSW TAFE Institutions. The advantages of the RMTDF will then be justified through a literature review that links the supporting propositions of the RMTDF (already previewed in chapter one) to existing training theories. The major concepts developed through the literature review will in turn provide the literature base from which the detailed research design of the thesis was developed (as will be described in chapter three).

Initially this chapter will define what is meant by ‘risk’ and provide a generalised view of how risk is perceived in our modern society, and also identify the way (s) in which acceptance or avoidance of risk can impact on decision makers in training. The chapter will then review risk management theory, training process theory, systems management theory and decision making theory - to demonstrate how a paradigm of risk can be established as a necessary requirement within an organisational training system. The range of theories and literature that have been reviewed in chapter two included: Risk Management (ISO 31000:2009), Training Process (Blanchard and
Thacker 2013), Systems Thinking (Checkland 1999; Senge 1990), Decision making and Judgement Heuristics (Kahneman 2011; Patel 2005) and Training Evaluation (Kirkpatrick 1994). Also included in the literature review are training theories and effectiveness models from the research domain referred to as the Science of Training (Salas et al. 2012, p. 59). The Science of Training is a recent and growing research area - which continues to evolve as workplaces change and worker skill and knowledge outcomes require increasingly flexible and sophisticated training approaches (Salas et al. 2012, p. 94). The review of the Science of Training literature includes the related theories of training effectiveness, return on training investment and training evaluation.

The literature review continues by detailing the regulatory compliance issues impacting on NSW TAFE training decision makers and the advantages which the proposed RMTDF can provide when training regulatory and compliance issues are considered. The review highlights that this RMTDF based research was undertaken during a period of significant regulatory reform in the Vocational and Educational Training sector (VET). The current VET reforms place more emphasis on a ‘market approach’ to VET funding and planning - meaning NSW TAFE training decision makers will have to adopt different management approaches their training decision making (NSW TAFE Commission 2013). Consequently, the advantages of using an improved training decision framework such as the RMTDF in the reformed VET sector, are also detailed and justified in the literature review.

This chapter also explains why two significant areas of research into organisational managerial training and systems application were initially considered but then excluded from the literature review. These two areas of research, the Karpin report (2005) & the Technology Acceptance Model (TAM) (Davis 1986) were considered dated and less relevant to the scope of RMTDF research than the theories that were reviewed and then selected for use in the literature review.
The final section of chapter two is used to establish the literature bases for the research design and identifies the researcher’s philosophical mindset that guided research decisions related to research design, approach and methodology. These design considerations are subsequently explained and developed in full detail in chapter three.

2.2 What Do We Mean By Risk?

There is now an internationally agreed meaning for this term, through the work of the International Standards Organisation (ISO).

The International Risk Management Standard (ISO 31000:2009) defines risk as ‘an effect of uncertainty on objects.’ In this definition, an effect is considered a deviation from the expected – which can be positive and/or negative.

In broader terms, the term risk is usually associated with actions or measures taken in avoidance of catastrophic events and associated impacts that have the potential to disrupt normal social and economic conditions. Risk is commonly discussed or analysed in multifarious settings – ranging from industry to science and technology, and is now considered part of our modern society’s cultural mindset (Jarvis 2007, p.1).

Ulrich Beck, a foremost sociologist of the last few decades, has led the drive to understand the concepts of risk in our contemporary society. His ground breaking thesis – World Risk Society (1999), proposed that many scientific and technological advances may well be increasing societal risks rather than decreasing them.

Beck’s thesis explored a number of contemporary societal issues including; degradation of global ecology, global health pandemics, international terrorism, health consequences of technologies and industrial toxins and pollutants. Beck’s
thesis is underscored by the principle of modern industrial society's absolute success and its mastery over nature (Jarvis 2007, p.1).

The increased awareness of risk in our modern society has led to the proliferation of the use of ‘risk management systems’ by public and private organisations. These risk management systems are aimed at minimising negative organisational outcomes through the development of systematic policies and practices that; assess, analyse, evaluate and control identified risks (Lozier 2011, p.1).

Whilst risk management systems’ vary in scope and application from organisation to organisation, a standard metric is used to measure or quantify risk levels so that effective risk control measures can be implemented. This metric is based on comparing the severity/magnitude of a risk event to the likelihood/probability of such an event actually happening (Lozier 2011, p.1).

The common method used by organisations to measure and quantify the risk severity – likelihood metric is through the use of risk matrix tables. Risk matrix tables provide organisations with opportunities to develop a hierarchy of organisational risks based on a rating scale of high risk to low risk. Ordering risk in this way means organisations can then develop decision making systems that use identified risk levels to decide on appropriate risk control requirements (i.e. high level risk = high level of control needed) (Lozier 2011, p.1). A standard approach to risk matrix table development is described by Lozier (2011, p.2) and is shown below.
The RMTDF research is proposing that risk can be used as a basis for training decision making. Training may be an activity that exists within a sub category of the broader societal issues described by Beck (1999), however it is often considered that training has an important role to play in the way people and organisations shape their future. Modern organisations, operating in the current global market place, need increasingly more sophisticated workforce training solutions to confront the socio economic risks that Beck has described.

The RMTDF developed and tested by this research is offered as a credible way for organisations to develop sophisticated and nuanced training approaches as they confront challenges in the World Risk Society. By using the improved methodology derived from the internationally acclaimed international risk management standard ISO 31000:2009, training decision making can be undertaken on a basis that places risk at the centre of all decision making. This then enables effective decision making across a whole spectrum of issues that may impact on an organisations training provision, including political, cultural and social issues - essentially by sensitizing decision makers to make their training decisions in a more considered, logical and methodical way – based on their analyses of the risks associated with each step of their decision making.

<table>
<thead>
<tr>
<th>Likelihood</th>
<th>Severity</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Low</td>
</tr>
<tr>
<td>High</td>
<td>Medium Risk</td>
</tr>
<tr>
<td>Medium</td>
<td>Low Risk</td>
</tr>
<tr>
<td>Low</td>
<td>Low Risk</td>
</tr>
</tbody>
</table>

Figure 1: Example of Basic Risk Management Matrix Table (Lozier 2011, p.2).
Who Is At Risk in a VET Training Environment?

When risk based training decision making is considered, it is important to consider who is at risk. It is clear at a general level there are risks for governments who fund and implement VET training policy (e.g. do policy settings achieve skills and training outcomes expected by society). There are also risks for the suppliers who manage and undertake training (e.g. TAFE management and teachers), and risks to the consumers who are engaged in training (e.g. students and those who employ them).

This research, undertaken within the NSW Vocational Education Sector, was primarily aimed at improving training decision making so that NSW TAFE student training outcomes are maximised.

This approach evolved into using a paradigm of risk for training decision making, and accepting this approach means there are risks for both students (access to appropriate training, quality of training, effective knowledge transfer methods), and risk for the training providers (ensuring training effectiveness, cost effectiveness, compliance with government policies).

These risks are especially highlighted in the current era whereby a number of NSW VET reforms have led to market based approaches to training (NSW TAFE Commission, 2013). In some instances, the market approach in NSW VET has led to increased student fees and costs for students, low quality courses, lack of choice and provider collapse (SMH, 2015, p.1).

This research design tests the effectiveness of the RMTDF by asking NSW TAFE training personnel to report on the effectiveness of using risk as a basis for training decisions. It is recognised and acknowledged there is a ‘risk’ of bias in asking only the training providers and not the training recipients (students) what their perceived benefits of an RMTDF approach might be. To reduce (but not eliminate this bias), questions were asked across the full range of NSW TAFE training decision making
personnel – Institute Directors to Trainers, thus ensuring a comprehensive sample of NSW TAFE personnel was included in the data gathering (detailed in chapters 1 and 3). This comprehensive sample, including NSW TAFE Trainers, provided opportunities to understand how the RMTDF could be used to improve specific teaching and training methods that directly influence student learning experiences.

Consequently, adoption of this approach, combined with the practical limitations of what can be realistically achieved within the scope of a doctoral research project, meant that including students in the research sample and then asking students to report on the perceived effectiveness of the RMTDF, was considered outside of the scope of this research project.

It is therefore acknowledged, that further studies testing of the effectiveness of the RMTDF, using student satisfaction levels and learning outcomes resulting from RMTDF based training programs, would be worthwhile and probably necessary follow up to this research.

Having now described the broader view of risk, the model of risk management theory as selected and used by this research - and how it is linked to the RMTDF - is now described below.

### 2.3 Risk Management Theory

Risk management is an accepted management practice that is integral to successful business operation both in Australia and overseas (Knight 2011, p. 2). The Australian Standard for Risk Management (2004, p.5) provided the following definition of risk management;

> ‘Risk management is the term applied to a logical and systematic method of establishing the context, identifying, analysing, evaluating, treating,
monitoring and communicating risks associated with any activity, function or process in a way that will enable organisations to minimise losses and maximise opportunities. Risk management is as much about identifying opportunities as avoiding or mitigating loss’ (AS/NZ 4360:2004, p. 5).

Risk management is not about encouraging organisations to be risk adverse. It is about providing organisational decision makers with a framework that establishes an acceptable balance between level of risk and level of reward, ensuring organisations can work towards operational goals effectively (RiskCover 2011, p. 2). Risk management is considered central to reliable and effective organisational decision making. Risk management provides organisations with a structured, systematic decision making process that demonstrates the due diligence required in all organisational decision making processes (Paynter et al. 2012, pp. 5-6). The relationship between risk and opportunity in all business activities means organisations must be able identify, measure and manage risks in order to capitalise on opportunities and achieve goals and objectives (RiskCover 2011, p. 1).

2.3.1 Background and Development of Risk Management Standards

The full description and conceptual framework that embodies risk management is identified through a series of Australian Standards. Australian Standards are published documents developed and approved by a national body, setting out procedures and specifications in a common language to ensure reliable and safe use of products and services (Standards Australia 2014, p. 1).

A risk management standard was first developed in Australia 1995. Following several updates and iterations (1999 and 2004), an International Risk Management Standard (ISO Standard) was developed using the original Australian Risk Management Standard as its basis (Knight 2011, p. 2). The current International Risk Management Standard is titled: ISO 31000:2009 Risk Management – Principles and Guidelines.
The ISO 31000:2009 risk management standard is considered significant because it has been adopted by the majority of G8 and G20 groups of major world economies, as well as the BRIC (Brazil, Russia, India and China) group of emerging economies (Knight 2011, p. 2). The strengths of the ISO 31000:2009 risk management framework identified by Knight et al. (2011, p. 2) include;

- Providing of objective ways of assessing how important control systems of any process are to organisations
- Providing a model for which auditors can build a normative model, and the principles against which an auditor can test the performance of the risk management process.
- Providing processes that are simple and scalable – and easily explained.
- Providing processes that are objective – and provide independence from subjective matter.
- Providing an ability to address any risk at any level, and on any subject within an organisation.
- Providing organisations around the world with an internationally agreed ‘risk vocabulary.’
- Facilitating improved communication within organisational management hierarchies.

The generic approach described by the ISO 31000:2009 risk management standard is intended to provide organisational managers with principles and guidelines for managing any form of risk in a systematic, transparent and credible manner. The table below summarises specific advantages of using risk management as detailed in ISO 31000:2009.
1. Increase likelihood of achieving objectives
2. Encourages proactive management
3. Awareness of identification and treatment of organisation risks
4. Improve the identification opportunities and threats
5. Compatibility between organisations & nations
6. Compliance with legal and regulatory requirements
7. Improve financial reporting
8. Improve governance
9. Improve stakeholder confidence & trust
10. Establish a reliable basis for decision making
11. Improve controls
12. Effectively allocate and use resources for risk treatment
13. Improve operational effectiveness
14. Improve operational effectiveness
15. Enhance health and safety performance
16. Improve loss prevention
17. Minimize losses
18. Improve organisational learning
19. Improve organisational resilience

Table 5: Advantages of using risk management (from ISO 31000:2009 p. 5).

To achieve the advantages detailed in the table above, organisations should ensure designated individuals are aware of the risks, tasks and controls for which they are accountable. These accountabilities can then be expressed as part of explicit performance goals (both individual and organisational) which can be measured as part of an organisations’ overall performance and assessment measuring system (ISO 31000:2009, p. 22).

The ISO 31000:2009 risk management standard places an emphasis on continual improvement in risk management through measurement and review of performance outcomes, and the subsequent modification of processes, systems, resources, capability and skills. Enhanced risk management includes ongoing communications with external and internal stakeholders, and should be a two way process so that properly informed decisions can be made about the level of risk and the need for risk treatment against properly established and comprehensive risk criteria (ISO 31000:2009, p. 22).

2.3.2 Risk Management Process

To enable risk management be integrated into organisational decision making, ISO 31000:2009 has developed a decision making process with a number of steps. These steps are identified in a flowchart and are reproduced below.
Having identified the risk management decision making steps, ISO 31000:2009 then provides a comprehensive description of each step and what actions are required by managers to ensure effective decision making.

The process steps identified by ISO 31000:2009 are important and are the bases of the RMTDF to be explained later in this chapter. A summarised description of the eight process steps contained in ISO 31000:2009 is provided below;
1. **Communication and consultation** - communication and consultation with internal and external stakeholders should take place during all stages of the risk management process. Effective external and internal communication and consultation should take place to ensure those accountable for implementing risk management process and stakeholders understand the basis on which decisions are made. A consultative approach will help establish the risk context appropriately.

2. **Establishing the context** - by establishing the context, the organisation articulates its objectives, defines the external and internal parameters to be taken into account when managing risks, and sets the scope and risk criteria for the remaining process. The external context includes, but is not limited to; social, political, legal, economic, regulatory, financial natural and competitive environments. The external context is also concerned with key drivers and trends that impact on the organisation. The internal context is the internal environment in which the organisation seeks to achieve objectives it has influence over. Factors considered part of the internal context include, but not limited to; governance, organisational structure, information systems, defining responsibilities in risk management systems, defining risk assessment methodologies, identifying and specifying decisions that have to be made, and identifying relationships between process and activities within the organisation.

3. **Risk Identification – Defining Risk criteria** – the organisation should define the criteria to be used to evaluate the significance of risk. When defining risk criteria, factors to be considered include; the nature and type of consequences that can occur and how they will be measured, how likelihood will be defined, the timeframes of the likelihood and/or consequences, how the level of risk will be determined, the views of stakeholders and the level at which risk becomes acceptable of tolerable.
4. **Risk Identification - Risk assessment** – Risk assessment is the overall process of risk identification, risk analysis and risk evaluation. The organisation should apply risk assessment tools and techniques that are suited to its objectives and capabilities, and to the risks faced. Relevant and up to date information is important in identifying risks. This should include appropriate background knowledge where possible. People with appropriate knowledge should be involved in identifying risks and undertaking risk assessments.

5. **Risk analysis** – risk analysis involves developing understanding of the risk. Risk analysis provides an input to risk evaluation and to decisions on whether risks need to be treated, and on the most appropriate risk treatment strategies and methods. Risk analysis can also provide an input into decision making where choices must be made and the options involve different types and levels of risk. Factors that affect consequences and likelihood should be considered in the risk analysis phase. Risk analysis can be undertaken in varying degrees of detail, depending on the risk, the purpose of the analysis, and the information, data and resources available. Analysis can be qualitative, semi quantitative, or quantitative, or a combination of these depending on the circumstances. Risk consequences can be expressed in terms of tangible and intangible impacts. In some cases, more than one numerical value or descriptor is required to specify consequences and their likelihood at different times, places, groups or situations.

6. **Risk evaluation** - risk evaluation involves comparing the risk level found during the analysis process with the risk criteria established when the context was considered. Based on this comparison, the need for treatment can be considered. Decisions should take account of the wider context of the risk and include consideration of the tolerance of the risks
borne by other parties other than the organisation that benefits from the risk. Decisions must be made in accordance with legal, regulatory and other requirements. In some circumstances, the risk evaluation can lead to a decision to undertake further analysis. The risk evaluation can also lead to a decision not to treat risk in any way other than to maintain existing controls.

7. **Risk treatment** - risk treatment involves selecting one or more options for modifying risks, and implementing those options. Once implemented, treatments provide or modify the risk controls. Risk treatment involves a cyclical process of; assessing risk treatment, deciding whether residual risk levels are tolerable, if not tolerable, generating a new risk treatment and assessing the effectiveness of that treatment. Selecting the most appropriate risk treatment option involves balancing the costs and the efforts of implementation against the benefits derived, with regard to legal, regulatory, and other requirements such as social responsibility and protection of natural environment. Decisions should also take into account risks which can warrant risk treatment that is not justifiable on economic grounds, e.g. severe (high negative consequence) but rare (low likelihood) risks.

8. **Monitor and review** – both monitor and review should be a planned part of the risk management process and involve regular checking or surveillance. It can be periodic or *ad hoc*. An organisation’s monitoring and review processes should encompass all aspects of the risk management process for the purposes of; ensuring controls are effective and efficient in both design and operation, obtaining further information to improve risk assessment, analysing and learning lessons from events including successes and failures, detecting changes in external and
internal context requiring revision of risk treatments and identifying emerging risks.

The summary above identifies ISO 31000:2009 as a highly structured decision making framework used by organisations to ensure the quality and effectiveness of decision making is of the highest order. Risk management theory is widely used by organisations in Australia and overseas, and represents a highly sophisticated and successful approach to organisational decision making (Knight et al. 2011, p. 2).

2.3.3 Risk Management Matrix

As has already discussed in section 2.2, the means by which organisations incorporate risk management theory into their decision making processes is through the development of risk management decision matrixes. These matrixes convert the highly detailed risk management process steps into a simpler decision making tool that can be used as a decision making aid at all levels of organisational management hierarchies (Lozier 2011, p. 1). The developed risk management decision matrixes vary from organisation to organisation, some being more complex than others. However, all risk management decision matrixes are based on the same methodology of developing a scale that matches two metrics, risk severity (or consequences) and risk frequency (or likelihood) (Lozier 2011, p. 1). Taking the metrics into account, it is possible to develop a scale to measure risk and identify suitably scaled risk controls depending on the identified risk level (i.e. high risk = high control – low risk = low control) (Lozier 2011, p. 2). Examples of two developed risk matrixes from different organisations are provided below to demonstrate how risk management theory is practically implemented by using a decision making matrix.
Example 1: Risk matrix for whole of organisation risk management approach

<table>
<thead>
<tr>
<th>Level of Risk</th>
<th>Criteria for management of risk</th>
<th>Reporting To</th>
<th>Who is responsible</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-3</td>
<td>Acceptable</td>
<td>Annual reporting to Audit and RM Committee</td>
<td>Risk Owner</td>
</tr>
<tr>
<td>4-5 (excluding risk of consequence of 4 or 5)</td>
<td>Low</td>
<td>Annual reporting to Audit and RM Committee</td>
<td>Risk Owner</td>
</tr>
<tr>
<td>6-9 (excluding risk with consequence of 4 or 5)</td>
<td>Moderate</td>
<td>Quarterly reporting Audit and RM Committee/Director</td>
<td>Director if not already Risk Owner</td>
</tr>
<tr>
<td>10-14 (including any risk with consequence of 4 or 5)</td>
<td>Significant</td>
<td>Quarterly reporting Audit and RM Committee/Executive</td>
<td>Executive Director</td>
</tr>
<tr>
<td>15-25</td>
<td>Critical</td>
<td>Immediate Reporting to Executive &amp; Director General</td>
<td>Executive Director</td>
</tr>
</tbody>
</table>

1 = low risk level, 25 = High risk level

Figure 3: Example risk matrix (from WA Government Guidelines 2011, p. 17).
Example 2: Risk matrix used specifically for Health and Safety Risk management

<table>
<thead>
<tr>
<th>Consequences (Severity)</th>
<th>Likelihood (Frequency)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Very Likely</td>
</tr>
<tr>
<td>Fatality</td>
<td>High Risk</td>
</tr>
<tr>
<td>Catastrophic operational event</td>
<td></td>
</tr>
<tr>
<td>Major Injuries</td>
<td>High Risk</td>
</tr>
<tr>
<td>Serious operational event</td>
<td></td>
</tr>
<tr>
<td>Minor Injuries</td>
<td>High Risk</td>
</tr>
<tr>
<td>Moderate operational event</td>
<td></td>
</tr>
<tr>
<td>Negligible Injuries</td>
<td>Medium Risk</td>
</tr>
<tr>
<td>Minor operational event</td>
<td></td>
</tr>
</tbody>
</table>

Figure 4: Example risk matrix (from Comcare WHS guidelines 2004, p.7).

The matrixes above represent the practical decision making application of risk management theory in the workplace. They provide a guide for risk assessment, using quantitative and repeatable metrics to ensure a consistent method of determining risk (Lozier 2011, p. 3). The consequences and likelihood comparisons provide a simple but powerful decision making tool when risk management process steps are incorporated into decision making thinking.

Using risk management matrix tables to assist training decision making is a significant intellectual focus of this research. A series of training decision matrixes have been developed by the researcher to facilitate effective risk management training decisions. The matrixes were developed as the third part of the RMTDF which is now explained below.
2.4 Development of a Risk Management Training Decision Framework

As described in chapter one, three basic propositions are used as the supporting bases that risk management theory can be used within a training decision making framework.

The first proposition is that all organisational training requirements can be assessed within a continuum of high to low risk, meaning that the process steps discussed in ISO 31000:2009 are all relevant once a paradigm of risk has been established within a training environment.

Secondly, when risk management is applied to training it becomes possible to categorise and identify different approaches to organisational training methodologies on the basis of risk they represent for the training outcomes. These methodologies could range from deliberate non activity and non- testing formats to closely detailed education and training programs with strict outcome testing.

The third proposition is that different levels of risk assessed outcomes can be recognised and deliberately adopted as the bases for each training decision. This provides a positive improvement result that demonstrates a risk based decision framework can be used as an organisational management approach to achieve the effective outcomes required for different organisational training programs.

Using these propositions as guidance, and drawing from the theory and process identified in ISO 31000:2009, an organisational training decision making framework has been developed for this research. The framework is in three parts and is shown below.
1. Training decision making framework part one: Training program risk assessment priorities.

**Step 1**
Curriculum/Course Content

Initial risk assessment must consider relevance and validity of knowledge items to be included in course or curriculum content.

**Step 2**
Training Delivery & Assessment Method

Requires risk assessment of most appropriate training and teaching method and associated assessment techniques.

**Step 3**
Training/Assessment Frequency

Requires risk assessment of how often training & assessment is required.

Knowledge items risk assessed and evaluated in context of what knowledge is relevant and important to organisation in current and forward thinking. Decisions must rank order knowledge content so that content can be included or excluded according to risk level.

Training methods need to be risk assessed in context of complexity and level of knowledge required to ensure training outcomes match organisational performance expectations. Decisions required on range of methods from formal classroom with stringent assessment to informal provision of knowledge.

Frequency of training courses need to be risk assessed to ensure training methods, assessment techniques and knowledge items are implemented at frequencies that ensure staff knowledge levels are optimised in context of organisation risk environment.

**Step 4**
Training Evaluation

Training evaluation undertaken using risk assessment approach. Existing and planned training can be risk assessed with content, method and frequency evaluated and aligned with the existing organisational risk context. Outcomes of evaluation can be defined on a risk management scale of high chance of success – low chance of success.

Figure 5: Risk management training decision making framework part one (developed by researcher).
2. **Training decision making framework part two: Risk management training decision making process.**

![Organisational Risk Management Training Decision Making Process]

1. **Core decision requirements to align with organisation strategic goals**
   1.1. Why train – decisions required on what knowledge is relevant to org and prioritise what knowledge training is required and what isn’t
   1.2. How / If to train – Decisions required on effective teaching and assessment methodologies
   1.3. When / If to train – decisions required on training frequencies and org skill development and strategic alignment requirements

2. **Apply Risk Management Theory**
   2.1. Identify organisational risks to use as bases for developing/identifying training needs
   2.2. Use developed risk ranking systems of using/not using staff knowledge and skill requirements (high to low)
   2.3. Rank strategic org goals on risk bases & align training priorities according to risk (high to low)
   2.4. Match ranked knowledge levels to risk assessed training priorities to decide on most effective training priorities
   2.5. Evaluate training decisions on the basis of risk & use framework as a method of communication for org training requirements

3. **Developed Matrix tables to assist in RM Decision making sequence and prioritisation of training risk levels**

4. **Apply as a system to all organisational training requirements**

**Figure 6:** Risk management training decision framework part two – training decision process (developed by researcher).
3. Training decision making framework part three: Series of training decision matrixes using risk management as bases.

<table>
<thead>
<tr>
<th>Required employee Knowledge levels</th>
<th>Evaluation of training requirements in organisational risk context</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Level 1 Essential knowledge/skill</td>
<td>High Risk</td>
<td>Medium Risk</td>
</tr>
<tr>
<td>Level 2 Important knowledge/skill</td>
<td>Highly structured training</td>
<td>Highly structured training</td>
</tr>
<tr>
<td>Level 3 Basic knowledge/skill</td>
<td>Medium Structured training</td>
<td>Medium Structured training</td>
</tr>
<tr>
<td>Level 4 Associated knowledge/skill</td>
<td>Low Structured training</td>
<td>Unstructured training</td>
</tr>
</tbody>
</table>

1. Highly Structured training: Rigorous test at instruction & follow up rigorous test/assess at regular intervals.
2. Medium Structure training: Rigorous testing at instruction. Sample follow up testing.
3. Low Structure training: General testing at instruction- sample follow up assessment only
4. Unstructured training: No testing at instruction- general assessment and sample follow up

Figure 7: Training decision making matrix using risk management to match skill level outcomes and organisation risk considerations to make decisions on appropriate training structures (developed by researcher).

<table>
<thead>
<tr>
<th>Expected outcomes</th>
<th>Level of training structure</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Level1 Essential knowledge acquisition</td>
<td>Highly Structured training</td>
<td>Medium structured training</td>
</tr>
<tr>
<td>Level 2 Important knowledge acquisition</td>
<td>Effective outcome highly likely</td>
<td>Effective outcome possible</td>
</tr>
<tr>
<td>Level 3 Basic knowledge acquisition</td>
<td>Effective outcome highly likely</td>
<td>Effective outcome likely</td>
</tr>
<tr>
<td>Level 4 Associated knowledge acquisition</td>
<td>Effective outcome unlikely</td>
<td>Effective outcome possible</td>
</tr>
</tbody>
</table>

Knowledge level hierarchy will depend on organisation type, mission and strategic goals

Figure 8: Training decision matrix using risk management to match knowledge levels to training structures (developed by researcher).
### Evaluation of training requirements in organisation risk context

<table>
<thead>
<tr>
<th>Level of training structure</th>
<th>High risk</th>
<th>Medium risk</th>
<th>Low risk</th>
<th>Negligible risk</th>
</tr>
</thead>
<tbody>
<tr>
<td>Level 1 Highly structured</td>
<td>High dollar cost-</td>
<td>High dollar cost-</td>
<td>High dollar cost-</td>
<td>High dollar cost-</td>
</tr>
<tr>
<td></td>
<td>Low financial risk</td>
<td>Medium fin risk</td>
<td>High Fin risk</td>
<td>Very High Fin risk</td>
</tr>
<tr>
<td>Level 2 Medium Structured</td>
<td>Medium Dollar cost</td>
<td>Medium dollar cost</td>
<td>Med dollar cost</td>
<td>Med dollar cost</td>
</tr>
<tr>
<td></td>
<td>Medium Fin risk</td>
<td>Medium fin risk</td>
<td>Med fin risk</td>
<td>High fin risk</td>
</tr>
<tr>
<td>Level 3 Low Structured</td>
<td>Low dollar cost</td>
<td>Low dollar cost</td>
<td>Low dollar cost</td>
<td>Low dollar cost</td>
</tr>
<tr>
<td></td>
<td>High Financial risk</td>
<td>Medium fin risk</td>
<td>Low fin risk</td>
<td>Low fin risk</td>
</tr>
<tr>
<td>Level 4 Unstructured</td>
<td>Very Low dollar cost</td>
<td>Very low dollar cost</td>
<td>Very low dollar cost</td>
<td>Very low dollar cost</td>
</tr>
<tr>
<td></td>
<td>Very High Fin risk</td>
<td>Medium fin risk</td>
<td>Med Fin risk</td>
<td>Very low fin risk</td>
</tr>
</tbody>
</table>

Figure 9: Decision matrix for considering cost of training when training structures are compared to organisation risk environment (developed by researcher).

### 2.4.1 Discussion of Risk Management Training Decision Making Framework

The three part framework identified above demonstrates how training decision making can be undertaken using risk management. Part one of the framework identifies four key elements of a training program: content, delivery, assessment and evaluation. The risk management approach means that these key training elements can be risk assessed and prioritised on the basis of risk (high risk – low risk), enabling objective decision making that links with the principles and strengths of the outlined in ISO 31000:2009

Part two of the framework provides a detailed training decision making process, translating the key training elements from part one into the categories of why train, when to train and how to train. The defined risk management training process also provides a step by step decision making guideline approach, indicating how training decisions can be ordered and linked to the overall risk management considerations of an organisation.
Part three of the framework identifies three decision making matrixes that provide organisational training decision makers with a decision making tool that can be applied practically to their everyday training decision making functions.

As discussed in chapter one, the research tests the user acceptability of the RMTDF in a NSW TAFE training environment. Phase 1 of the research asked NSW TAFE training decision making personnel to compare and rate their existing training decision making processes to the decision making steps that are shown above in the RMTDF.

The user acceptability of the RMTDF was then judged by measuring variances in decision making confidence levels using 38 single factor questions (phase 1 analyses). The single factor questions linked difficult training decision areas to the specific decision making responsibilities of personnel in the NSW TAFE sample. Phase 2 of the research then used a qualitative approach to verify the trending data from phase 1, and explain why the NSW TAFE sample considered the RMTDF would improve the effectiveness training decision making.

The decision making attributes of the RMTDF will now be compared and justified with existing training system theory and training decision making approaches.

2.5 Training Systems

A system is described by Buckley (1968) as a ‘whole that functions as a whole by virtue of the interdependence of its parts.’ Systems have a purpose and structure, are influenced by environments and have an expressed function. An organisation as a whole can be described in systems terms, or its component parts, including functions such as training, can be identified as sub sets of the overall system (Buckley & Caple 2009, p.22). Systems models are described in terms of either; ‘open systems’ or ‘closed systems.’ Open systems have dynamic relationship with their environment; closed systems do not (Blanchard and Thacker 2013, p. 22). Organisations
undertaking business functions must interact with commercial realities and business environments, meaning most organisational systems are open models.

A distinction between a systems approach and a systematic approach to training is made by Atkins (1983, p. 20). He defines a systems approach as a function that can be applied at an organisational level to examine the broader issues of the aim, function and appropriateness of the training. However, a systematic approach is applicable directly to the day to day functioning of training departments (Buckley & Caple 2009, p. 25).

A basic model of a systematic approach to training is shown below.

Figure 10: A basic model of a systematic approach to training (from Buckley and Caple 2009, p. 25).
Buckley and Caple (2009, p. 27) contend that when training is seen as the best way of overcoming an organisation performance problem a systematic approach to training is required. In these circumstances they expand the simple systematic model above into a fourteen stage approach. These stages are listed in the table below.

<table>
<thead>
<tr>
<th>Stage 1: Establish terms of reference</th>
<th>Stage 8: Consider principles of learning and motivation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stage 2: Further Investigation</td>
<td>Stage 9: Consider and select training methods</td>
</tr>
<tr>
<td>Stage 3: Knowledge, Skills and attitudes (KSA) analysis</td>
<td>Stage 10: Design and pilot training</td>
</tr>
<tr>
<td>Stage 4: Analysis of target population</td>
<td>Stage 11: Deliver the training</td>
</tr>
<tr>
<td>Stage 5: Training needs and content analysis</td>
<td>Stage 12: Internal Validation</td>
</tr>
<tr>
<td>Stage 6: Develop criterion measures</td>
<td>Stage 13: Application of training</td>
</tr>
<tr>
<td>Stage 7: Prepare training objectives</td>
<td>Stage 14: External evaluation of training</td>
</tr>
</tbody>
</table>

Table 6: Stages in systematic approach to training (Buckley & Caple, 2009 pp. 27-33).

To implement the stages nominated by Buckley and Caple (2009) above a number of decision rules are required. For example, decisions are required on how to establish terms of reference, what training needs and content are required, and what are the best training methods.

The three part risk management training decision framework developed for this research provides a sequence of decision rules that can be logically linked to the Buckley and Caple systems’ stages above. Using the RMTDF, training terms of reference can be established (RMTDF part 1) and decisions on training needs and methods can be supported and justified by part 2 (RMTDF process), and part 3 (RMTDF matrix tables). The RMTDF enables stages in a training system to be decided upon using the common factor of risk. This provides an opportunity for a more
A sophisticated approach to training decision making because training requirements can be aligned overall organisational risk management priorities.

### 2.6 Training Process

A basic business open system works on a model of providing goods and services (output), for which it receives financial and goodwill credits (input). Businesses rely on the inputs for operational success (Blanchard and Thacker 2013, pp. 22-23). In this context, business must provide sufficient value to its operational environment, so that the environment will continue to supply it with appropriate inputs to allow an open system to replenish itself (Blanchard and Thacker 2013, pp. 22-23).

Within a business organisation’s open system, a number of open subsystems will operate (Blanchard and Thacker 2013, p. 23). For example accounts, human resources and advertising functions all have specific departments with specific systems. Training is also categorised as a subset system within an overall open system. Inputs in the training system include: organisational mission, strategic direction and resources. Training system outputs are: improved worker knowledge, skills and job performance. The means of creating requisite worker knowledge outputs from organisation inputs is developed through a training process (Blanchard and Thacker 2013, p. 23).

The role of the training process model is described by Blanchard and Thacker (2013, pp. 23-24) below;

> ‘Effective training is not just running a lot of people through a lot of training programs. To view training in this way is short sighted, instead training should be viewed as a set of integrated processes in which organisational needs and employee capabilities are analysed and responded to in a rational, logical and strategic manner. When training is conducted this way, both the employees’ and organisations performance will improve.’
The focus above on organisational systems and integration of training processes is provided because the RMTDF being tested by this research comprises decision rules that rely on the process steps described in ISO 31000:2009. These risk management process steps can be aligned with steps from existing training models (Blanchard and Thacker 2013, p. 25), demonstrating how a RMTDF provides the same opportunities for strategic planning as established training process models. Decision making in areas such as deciding on levels of knowledge for training programs, types of assessment strategies required, types of course structure and training investments can all be considered using the risk a management approach. Risk management provides a fully integrated decision making process, enabling logical and strategic organisational decisions to be made within the continuum of perceived risks to organisation (High Risk – Low Risk).

The table below identifies how the risk management process can be aligned and compared with Blanchard and Thacker training process model. Aligning the risk management approach with the Blanchard and Thacker model indicates how the RMTDF can be used as an effective training planning approach.

<table>
<thead>
<tr>
<th>Blanchard and Thacker Training Process Model</th>
<th>Risk Management Process Model</th>
</tr>
</thead>
<tbody>
<tr>
<td>2. Design Phase.</td>
<td>2. Identify/Analyse Training Risks.</td>
</tr>
<tr>
<td>3. Development Phase.</td>
<td>3. Treat Training Risks.</td>
</tr>
<tr>
<td>4. Implementation Phase.</td>
<td>4. Prepare and Implement Training Plans Based on Risk Assessment.</td>
</tr>
<tr>
<td>5. Evaluation Phase.</td>
<td>5. Evaluate programs Using Risk Treatment Outcomes.</td>
</tr>
</tbody>
</table>

2.7 Systems Thinking

The interrelationship between organisational systems and training systems has been described above. Systems are not standalone constructs, they require a *systems thinking* approach so that decisions regarding appropriate systems design and implementation can be made effectively (Grimsley 2014, p. 1). Consideration of systems thinking is relevant to this research because the RMTDF testing undertaken at NSW TAFE’s compared existing NSW TAFE practitioner training decision making methods (inclusive of existing systems thinking) to a method using risk management decision rules for training decisions (risk as bases for systems thinking).

Systems thinking is a process of seeing overall structures, patterns and cycles in systems, rather than seeing only the specific events in the system. It is a method of critical thinking that analyses the relationship between the systems parts in order to understand a situation for better decision making Grimsley (2014, p. 1).

A variety of decision making approaches may be used within a systems thinking framework. Flood and Jackson (1991) identified eight distinctive system thinking approaches, including Soft Systems Methodology, Structured Modelling Techniques and Total Systems Interventions. Three of the most prominent and widely accepted systems thinking methodologies will be analysed below. This provides context and background to these methodologies and enables comparisons to be made with the RMTDF that is being tested by this research.

**2.7.1 Soft Systems Methodology**

Soft Systems Methodology was developed as a concept in the 1970’s. The leading proponent of the concept was Peter Checkland who set out to test whether the Systems Engineering (SE) approach, highly successful in technical areas, could be used by managers coping with the unfolding complexities of organisational life.
After trialling the Systems Engineering approach in several organisational settings Checkland concluded that a straightforward transfer of Systems Engineering to broader management situations was not possible. However, by using a combination of systems thinking, strongly linked to real world practice, an alternative approach was possible. The alternative approach developed by Checkland was described as Soft Systems Methodology (SSM) (Checkland 1999, p. 5).

The SSM developed by Checkland and his collaborators makes important distinctions between hard and soft systems. Hard systems are typified by those dealt with by engineers across a spectrum of technical complexity. These range from developing systems for maintaining aircraft flight patterns to running building maintenance systems. Such systems can be rigorously defined and specified as physical entities (Wastel 2012, p. 1). Their design and optimisation is assisted by formal methods, ranging from mathematics and operations research, with choices usually made on the basis of defined technical criteria. Hard systems are deterministic, relying on fixed inputs, known outputs and being concerned with the ‘how’ of a system - meaning how to best achieve and test the selected option of development and analyses (Christopher 2005, p. 1). Hard Systems do not easily take into account unquantifiable variables such as opinions, culture and politics. Hard Systems may treat people as being passive rather than having complex motivations (Christopher 2005, p. 1).

Conversely, Soft Systems were defined for use where issues cannot be easily quantified, especially those involving people interacting with each other or with “systems” (Christopher 2005, p. 1). Soft Systems consider the ‘what’ of the system, and what analyses is required to achieve improvement outcomes. Soft Systems develop conceptual models based on human activities, clarification of problems, examination and learning (Christopher 2005, p. 2).
Hard system analysis addresses the parts of organisations that have tangible forms, using techniques to address identified problems. These techniques may include identifying costs/savings, improving systems methods and developing user requirements. In contrast, soft systems analysis attempts to understand complexity, promote learning, identify weaknesses and understand relationships (Christopher 2005, p. 2).

Central to the SSM philosophy is that in all real world management problems there are people interested in taking purposeful action Checkland (1999, p. 7). Checkland’s Human Activity System (HAS) defined a concept where a web of human activities are linked together such that the whole set accomplishes some defined goal. Soft Systems Methodologies are assumed to exist in a fluid social world, which is constantly socially created and constantly changing Checkland (1999, p. 7).

The principles that support SSM as defined by Checkland (1999, p. 9) are:

- Exist in a real world; complexity of relationships
- Relationships explored via models of purposeful activity based on explicit world views
- Inquiry structured by questioning perceived situation using the models as a source of questions
- Action to improve based on finding accommodations (versions of the situation which conflicting interests can live with)
- Inquiry in principle never ending; best conducted with wide range of interested parties; give the process away to people in the situation

Checkland’s SSM is considered to be one of the most significant and influential contributions to the field of systems thinking in the past thirty years (Galliers & Currie 2011, p. 1).
Another significant and influential addition to the knowledge and application of Systems Thinking Methodologies was developed by Peter Senge in the 1980’s (Wastell 2012, p. 6). Senge developed the notion that organisations should be ‘Learning Organisations’, and he identified five component technologies that are ‘vital ingredients in building organisations that can truly learn’ (Senge 1990, p. 7).

The first four component technologies identified by Senge were:

1. Personal Mastery
2. Mental Models
3. Building Shared Vision
4. Team Learning

Senge discusses these elements in detail and they are all important and relevant to the functioning of a Learning Organisation. It is considered though, the vital fifth element is required to integrate and fuse together the initial four components of a Learning Organisation (Wastell 2012, p. 6). The fifth component identified by Senge is ‘systems thinking.’

According to Senge (1990, pp. 68-9);

‘The discipline for seeing wholes ...........today we need systems thinking more than ever because we are being overwhelmed by complexity ...........
Systems thinking is a discipline for seeing structures that underlie complex situations.’

To help understand systems thinking in organisations Senge developed a tool called structural modelling (Wastell 2012, p. 7). Senge defined structure differently from the traditional static approaches that would be typically used to identify an organisational
hierarchical management structure. In systems thinking, structure refers to the pattern of dynamic relationships amongst key components (variables) of the organisation (Wastell 2012, p. 7). The concept underpinning Senge’s structural modelling is that structure is more important than individual behaviour. According to Senge ‘when people are placed in the same system, people, however different, tend to produce similar results’ (Senge 1990, p. 42).

The aim of systems thinking is first and foremost to attempt to grasp the complexity of organisational dynamics and to identify the presence of potential unintended consequences (Wastell 2012, p. 9). To provide a real world view of systems thinking, the following extract from a United Kingdom public sector review of child protection services is provided below;

‘A systems approach will help this review to avoid looking at parts of the child protection system in isolation, and to analyse how the system functions as a whole. Social workers accept many previous reforms were well intended but their interaction and cumulative effect on frontline practice have had unintended consequences. The review will use systems theory first to explain what has happened, providing a strong basis to build the Review’s understanding. Second, the intention is to use systems theory to look forward, helping design an improved approach’ (Munro 2011, p. 10).

Checkland and Senge’s systems thinking concepts support the proposition that risk management can be used in a training decision framework. The use of risk management for training decision making enables decisions to be undertaken on a systems bases, considering the needs and the requirements of the whole organisation. Training as a function would normally be a sub system operating with other sub systems within an overall organisational system (Blanchard and Thacker 2013, p. 23). Risk management provides an opportunity to integrate the training
function within an overall organisational management system. This means training
decision making can be adaptively linked to overall organisational goals and
objectives to ensure the most effective training outcomes are achieved.

2.7.3 Systems Thinking – Individuals

In systems thinking theory above, Senge highlights the importance of structural
modelling and the role of the system compared to the individual. In essence, Senge
is indicating that a good overall system will provide better outcomes than relying on
individual thinking of people within a system (Senge 1990, p. 42).

The RMTDF developed for testing by this research enables a systems thinking
approach for organisational training. The RMTDF is considered to be a system that
can function across an organisation as a whole. However, the effective functionality
of the RMTDF is also dependent on individual training decision makers understanding
and applying the RMTDF to their everyday training decision making. An important
aspect of the phase 1 & 2 questions asked by this research was to verify that research
participants’ understood and could apply the RMTDF in their areas of training
responsibility.

Kahneman (2011, p. 20) identifies two thinking systems that operate in the minds of
individuals. These systems are simply defined as thinking system 1 and thinking
system 2. Kahneman’s description of each system is provided below;

- **System 1** operates automatically and quickly, with little or no effort and no
  sense of voluntary control.

- **System 2** allocates attention to the effortful mental activities that demand it,
  including complex computations. The operations of system 2 are often
  associated with the subjective agency, choice and concentration.
Kahneman (2011, p.10) further develops his system thinking argument by indicating system 1 is the source of effortless originating impressions and feelings that lead to the explicit beliefs and deliberate choices of system 2. Kahneman (2011, p. 11) continues;

‘the automatic operations of System1 generate surprisingly complex patterns of ideas, but only the slower System 2 can construct thoughts in an orderly series of steps ……[there are]…… circumstances in which system 2 takes over, overruling the freewheeling impulses and associations of systems 1……… both systems can be viewed as agents with individual abilities, limitations and functions.’

The connection of Kahneman’s thinking system to the RMTDF is highlighted by the System 2 description ‘of constructing thoughts in an orderly set of steps.’ The bases of risk management theory is decision making using a well-defined step by step process as detailed in ISO 31000:2009 and this approach aligns closely with Kahneman’s Systems two thinking.

2.7.4 RMTDF – Hard or Soft System?

Systems thinking theory has been detailed in the sections above and aligned with the RMTDF tested at NSW TAFE. Consideration is now given as to how the RMTDF can be linked to Hard and Soft System methodologies, and what type of system it can be described as.

Hard Systems have been described as having fixed rules that are useful for problems that can be easily quantified (Christopher 2005, p. 2). Hard System decision making is usually based on statistical probability with fixed inputs and known outputs. Conversely Soft System methodologies are used where decision making is not easily quantified and involves people interacting with each other or with other systems. Soft System methodologies are useful for understanding motivations, viewpoints and
interactions but do not produce easily quantifiable answers (Christopher 2005, p. 2). In addition, soft system approaches are useful when the research and context does not permit concise measurement based data.

In overall terms Hard Systems look at the ‘how’ of achieving the best outcomes from selected decision options. Meanwhile Soft Systems methodology is more concerned with the ‘what’ of the system: what to do to achieve an improvement, which may include analysis before application or implementation (Christopher 2005, p. 2). The continuum below demonstrates the range between Hard and Soft Systems methodologies.

**Figure 11: Hard and Soft System Continuum (developed by researcher).**
The three part risk management training decision framework (described on pages 54-57) is based on the process steps identified by ISO 31000:2009. The risk management process is a highly prescriptive approach to decision making and the RMTDF is aligned closely with the **Hard System** section of the systems’ continuum for the following reasons;

- RMTDF can use statistical probability to identify training risk levels and outcome likelihoods.
- RMTDF is concerned with improving organisational training system outputs by understanding and controlling the potential risk involved with organisational training system inputs.
- RMTDF management can be used to specifically identify and make decisions on organisational training costs and effective training allocation.
- RMTDF management enables relationships between training stakeholders to be developed that are clear and predictable (using risk as the common factor).

Whilst the risk management approach may align closely with the Hard System methodology, some aspects can also be linked to components of the Soft System approach. In particular, aspects of risk management are useful for considering systems strengths and weakness, and the necessary activities required to address perceived weaknesses. The RMTDF does this through a process of identifying organisational risks and linking training decisions (methods, knowledge outcome requirements) to the level of risk of training or **not training**.

As already noted in the description of systems approach to training, a number of sub systems operate within an organisation’s overall operating system, (Blanchard and Thacker 2013, p. 23). The interrelation between sub systems/ overall systems and the people involved potentially creates complex situations (Buckley and Caple 2009, pp. 33-34). As such, a risk management system may be considered an appropriate
mechanism for dealing with complex interrelations between systems and people using such systems. Risk management provides a standard set of decision rules applicable to all parts of an organisation. This facilitates a consistency in decision making and a greater understanding across organisational systems (and people using these systems) of how and why decision outcomes have been reached.

The risk management approach also provides opportunities for communication links to be developed across organisational systems (Knight 2011, p. 2). A language of risk can be established and used as the basis and justification of decision making across a spectrum of systems and sub systems. For example, a trainer may indicate to a manager the preferred method of training for an upcoming course is face to face classroom instruction with strict outcome testing. The trainer may argue the risk of not using this approach would be too high. The use of risk as a language to justify the type of training (supported by the use of the RMTDF) provides a communication mechanism that is common and can be used for all training decision making from Chief Executive through to Course Trainers.

To understand just how effective the RMTDF can be in facilitating communication between organisational training decision makers this research has developed a number of phase 1 & 2 research questions that compare existing NSW TAFE training practitioners decision communication approaches to the RMTDF approach.

2.7.5 Disadvantages of Using Systems Theory for Analyses in Complex Public Sector Training Organisations.

It has been argued above that systems theory and scientific management can be used to create objective decision approaches that lead to effective training decision outcomes. Critics of scientific management vary, but the common theme is to argue that because systems’ approaches rely on ‘standardisation’, and the concept that there is only ‘one best way to deal with every issue’, the approach may create decision
bias and limit management effectiveness. The strongest critics of scientific management suggest that many human factors involved in systems based decision making are disregarded ‘and put into the background’ (Turan 2015, p.1).

This criticism is particularly relevant to the RMTDF research as the RMTDF is a ‘systems decision approach’ being tested in a complex public sector training organisation which has many ‘human factors’ to consider. NSW TAFE is the leading vocational training provider in NSW, and has undergone many years of change through the decision making of various state and federal governments (NSW Parliamentary Service 2014, p.6).

Issues such as funding for TAFE’s, staffing levels, staffing equity, quality of instruction, student equity and training competition are all issues that are keenly debated and receive a high degree of public scrutiny (NSW Parliamentary Service 2014, p.6).

Stakeholder groups that regularly seek to influence the directions taken by NSW TAFE include; state and federal political parties, employer groups and employee associations. There are also strong community expectations that NSW TAFE will provide appropriate pathways to education and training (NSW TAFE Commission 2013, p. 1).

In such a complex vocational training environment, it is inevitable that a number of training contradictions, paradoxes and ambiguities will arise, and these in turn can create conflicts of decision choice and outcomes when training policy settings and practices are implemented. Of particular concern in a market based training environment is that standardised training decision approaches (such as the RMTDF) could develop biases towards organisational efficiency and effectiveness considerations at the expense of opportunity and equity issues for the NSW VET students. It has already been discussed and acknowledged (in section 2.2), that in
some cases the market approach to NSW VET funding has diminished the quality of training outcomes for some NSW VET students (evidenced by high fees, limited choice and low quality courses)(SMH 2015, p.1).

Whilst the RMTDF does rely on standardised approaches, it is considered the risk management decision making processes imbedded in the RMTDF (shown in figure 2, p. 52) will ensure training decision making effectively follows an agreed and predictable sequence which deliberately considers the needs of both organisations and the students they are training.

An important step of the RMTDF training decision approach is to develop internal and external training context parameters. These training context parameters (supported by ISO 31000:2009, p.3) enable organisations to make training decisions that are objective and balanced, and can be defended as decisions which were made using a known, logical and defensible decision sequence. The training context parameters are listed below;

**Internal Context**

- Governance, organisational structure, roles and accountabilities.
- Policies, objectives, and the strategies that are in place to achieve them.
- The capabilities, understood in terms of resources and knowledge (e.g. capital, time, people, processes, systems and technologies).
- Information systems, information flows and decision making processes (both formal and informal).
- Relationships with, and perceptions and values of, internal stakeholders.
- The organisations culture.
- Standards, guidelines and models adopted by the organisation
- Form and extent of contractual relationships
External Context

- The cultural, social, political, regulatory, financial, technological, economic, natural and competitive environment (whether international, national, regional or local).
- Key drivers and trends having impact on the objectives of the organisation.
- Relationships with, and perceptions and values of external stakeholders.

Organisations that included the above context parameters in a structured training decision making framework (such as the RMTDF) would limit the inherent tendency towards training decision making biases.

For example, having established the appropriate context in which training decisions are to be made, the next steps of the RMTDF are to then undertake training risk assessments and appropriate training controls. These steps can be used to make objective training decisions because the context of risk has already been established, and the risk levels (high – low) can be easily decided upon when they are matched to context parameters linked to specific training decisions.

As has been discussed, NSW TAFE is complex training organisation which has the responsibility of meeting the training expectations of various stakeholders, including; NSW Government, NSW VET students and NSW industry. For example, NSW TAFE is guided by public policy and government decision making and employs a large number of highly trained managers’ and trainers’ (NSW TAFE Commission 2013, p. 1).

Inevitably, within such a large and complex training environment, there are many levels (and types) of training decisions required. In any usual training environment, these training decisions will be subjected to thorough scrutiny and questioned by motivated and passionate individual training managers and trainers. In addition,
various training policy settings/initiatives will be favoured and justified by different individuals or management groups.

In contrast to this ad hoc reality, the RMTDF provides a training decision approach that allows training policy directives/initiatives to be considered (and argued) on the basis of risk (applied within a standardised decision framework). This enables a transparent and objective training decision approach and a provides a mechanism for objective training decision making that is able to balance community expectations, industry expectations and NSW TAFE organisational economic/training objectives.

The RMTDF is a decision making process that can be used by both training individuals’ and training organisations’ to plan and deliver training. The success or otherwise of the RMTDF implementation will, in reality, be dependent on the degree of adoption and implementation of the RMTDF and the consequent effectiveness of the decision making of individual training decision makers. Considerations of decision making theory are now discussed below.

2.8 Decision Making Theory

Decision making is central to all human intellectual activity. Making decisions can be considered synonymous with thinking and has been an active subject of psychological inquiry since the beginning of experimental psychology (Patel et al. 2002, p. 53). There have been thousands of experiments, journal articles and theories trying to understand decision making and the decision making processes of both individuals and teams (Patel et al. 2002, p. 53). Decision making theory is inclusive of an array of humanistic considerations including, motivational factors, cognitive factors, rational and irrational approaches and behavioural factors (Patel et al. 2002, p. 53).

Effective training decision making is the major focus of this research. Due to the vast amount of decision making theory and literature that is available, careful selection of the most relevant theory to be reviewed is important. The RMTDF has been described
above as a systems approach to training decision making, relying on a developed set of risk based decision rules to make effective organisational training decisions. To justify the effectiveness of the risk management training decision approach, three decision making theory categories considered most relevant to the central research question - *does the RMTDF improve organisational training decision making effectiveness?* - have been selected for detailed analyses. They are: (1) judgement heuristics, (2) presentation format, and, (3) strategic alignment. These selected decision making theory categories are considered to be more relevant to this research than other categories of decision making theory for the following reasons;

1. **Judgement Heuristics** – the initial risk management of training research undertaken by Horton (2001) considered the risk management decision approach as being a heuristic method of decision making (i.e. simple and effective). With the RMTDF now fully developed and tested by this research it is important to understand what heuristic decision making means and if the RMTDF should be described in this way.

2. **Presentation Format** – presentation format is the study of information presentation and formatting and how such information is then effectively used. This area of research is particularly relevant to the RMTDF research because of the decision making matrixes that comprise part 3 of the RMTDF. The ability of training decision makers to be able to interpret information from the RMTDF training matrixes and make effective training decisions is a significant focus of this research.

3. **Strategic Alignment** – describes the actions of bringing an organization's business divisions and staff members into line with the organization's planned objectives. The RMTDF has been described so far in chapter two as a systems approach to training decision making and it is important to justify why
and how this systems approach can be used to strategically align training goals with corporate goals.

2.8.1 Judgement Heuristics

Humanistic approaches to decision making can be varied and diverse, however most individuals will use a process which ranges in a continuum of; rationalistic structured decision making to less structured intuitive decision making approaches (Patel et al. 2002, p. 55). Rational decision making processes consist of a sequence of steps designed to rationally develop a desired solution. Intuitive decision making is almost the opposite, being more instinctive, subjective and sub conscious in nature (Friefeld 2012, p.1). The differences in these decision making approaches align closely with Kahneman’s theory that two thinking systems operate in the human mind; system one operates quickly and automatically, whilst system two requires effortful mental activities and concentration Kahneman (2011, p. 21).

Assumptions are made that appropriately applied rational decision models will always produce the best organisational decision outcomes (Nutt 2008, pp. 604-22). This may not always be true. Humans live in a complex society and decisions made by individuals within organisations are influenced by a range of factors both from within the organisation and from outside. These influencing factors may not always have a rational basis and could potentially lead to poor individual decision making (Bazerman 2002, pp. 38-40). In some situations decisions are made with incomplete or insufficient information because organisational pressures require quick decisions and individual decision makers take short cuts for decision outcomes. It is in this context that a more intuitive approach to decision making is often used (Apex 2012, p. 1).

Even the most mechanistic of decision making approaches will involve an element of subjective judgement. The judgements will be influenced by factors including individual experiences, values, attitudes and emotions. Kahneman (2011) is a leading
proponent of the concept of ‘Judgement Heuristic Decision Making’, in which simple rules and approximate shortcuts are used to help individuals achieve decision outcomes. Judgement heuristics are defined by Kahneman (2011, p. 98) as: ‘simple procedures that help find adequate, though often imperfect, answers to difficult questions.’

The three main heuristics proposed by Kahneman are representativeness, availability, and anchoring/adjustment (Kahneman and Tversky 2011, pp. 420-440). Representativeness is the tendency to make judgements and predict outcomes on the basis of stereotypes and inferred representative characteristics. The availability heuristic is a process where judgements are built on information that is readily available, and gives higher probability to outcomes for things that are easier to recall. The availability heuristic skews decision making towards more recent memory patterns and away from older experiences or learning. The anchoring and adjustment heuristic is the tendency for people to make estimates by starting at an initial value (the anchor) and then making insufficient adjustment to the anchor value when presented with the need to adjust. Adjustment may be in the right direction but too small to significantly correct the error.

Heuristics, whilst described as simple and imperfect are important because they work. Gigerenzer and Gaissmaier (2011) advocate that when heuristic decision making models are used appropriately they provide an approach that is equal to rational decision making. Heuristics allow for fast and frugal decisions and can be more accurate than complex procedures (Gigerenzer and Brighton 2009, pp. 109-110). According to Gigerenzer & Brighton (2009, p. 110) heuristics can lead to more accurate inferences due to the ‘less is more effect.’ This is explained by the proposition that more information or computation decreases accuracy in the human mind and heuristics provide the opportunity for simple and accurate strategies that can make decision making more effective.
With the factors involving intuitive, rational and heuristic decision making summarised above, the positioning of the RMTDF within these decision approaches can be determined. Initial consideration of the three part RMTDF would identify the approach as a rational and logical process requiring effortful mental activities to make good decisions. The process is inclusive of decision rules that must be followed to ensure effective decisions are made. Considering the RMTDF in this way closely aligns it with Kahneman’s System 2 thinking approach (2011, p. 11), which is mechanistic and process driven. In this context, the RMTDF would be closer to a rational decision making approach than the intuitive system 1 example described by Kahneman (2011, p. 11) and would not be identified as a heuristic approach.

Whilst the RMTDF provides a rational structured decision making approach, the full extent of the framework may not always be utilised by training decision makers. In practical terms, the decision matrixes developed as part 3 of the RMTDF provide ‘structured decision shortcut approaches.’ The decision matrixes are inclusive of the risk management decision rules required for effective decision outcomes. Therefore, the practical use of the training decision matrixes may be considered as being closer to the heuristic end of the mechanistic - heuristic decision making continuum.

In summary, the risk management of training framework can be described as a rational decision making process, consisting of a sequence of steps to rationally develop a desired decision outcome.

**2.8.2 Presentation Format**

Ghani et al. (2009, p. 183) indicated that human decision making effectiveness is limited due to a range of factors, including; biases that interfere with rational decision making, oversensitivity to some decision variables over others, and irrational increases in decision confidence levels when greater levels of information are processed. A potential solution that addresses limitations of human information
processing and improves decision making is the use of presentation format (Ghani et al. 2009, p. 184).

Presentation format is a field of research that examines the ways in which information is presented and used for decision making. In the past presentation format studies focused mainly on information content, however a growing number of studies are focusing on the importance of the way content is constructed and formatted (Ghani et al. 2009, p. 184). Presentation format can affect decision maker’s behaviour in areas of; search behaviour, affective responses, decision accuracy, cognitive effort, functional fixation, persuasion and recall. Numerous studies have indicated the way information is presented can minimise human processing limitations and improve ways of thinking (Ghani et al. 2009, p. 184).

The RMTDF decision matrixes approach tested by this research are common types of presentation format. Research by Sollner et al. (2013) analysed the effect of presentation format in a matrix approach, focusing on the ease of information acquisition and its influence on information integration processes. Using a probabilistic inference task, Sollner’s et al. (2013) research compared a standard decision matrix to a newly created presentation format map. Sollner’s team found that a strong presentation format effect emerged from their experiments, with automatic decision making more prevalent in the matrix approach. They concluded that if information is accessible with minimal need for information search, information integration is likely to proceed in a perception like, holistic manner (Sollner et al. 2013, p. 278).

Research by Kleinmuntz and Schkade (1993, p. 221) also indicated decision making effectiveness can be improved by constructing decision making displays in matrix forms. According to Kleinmuntz and Schkade (1993, p. 222) careful design and display of information encourages decision makers to use good decision processes.
They indicated decision makers respond adaptively to variations in information displays and use different decision processes depending on the particular arrangement of the form, organisation and sequence.

The risk management training matrixes tested by this research have been developed to enable training decision makers to make decisions on effective training methodologies for organisational situations. The matrixes form, organisation and sequence enable training decision makers to link organisational training requirements to steps in a risk management process. The use of this process can enable optimal organisational training outcomes that are based on assessed risk levels and appropriate risk controls.

2.8.3 Strategic Alignment

Strategic alignment is the term applied to the process of bringing the actions of an organization's business divisions and staff members into line with the organization's planned objectives (Andolsen, 2007, p. 35). Most businesses benefit from strategic alignment because it assures that its divisions and employees are jointly working toward the company's stated goals (Andolsen, 2007, p. 35). Michael (2007, p. 33), indicated the best organisational decision making is undertaken when organisational decisions are aligned with the strategic intent of the organisation and developments in the markets that support the organisations ability to perform.

To make good decisions and to align those decisions with organisational strategy, decision making should be concerned with being clear about what decisions really matter, followed by prompt effective action (Rogers and Blenko, p. 133). Research by Heavey et al. (2009) and Miller (2008) demonstrated that ‘comprehensiveness’ is the most fundamental aspect of strategic decision making. Kaplan and Norton (2004, p. 10) indicated effective organisation strategic planning and alignment should link to
common reference points, directing human, informational and organisational resources towards desired outcomes for customers and shareholders. Rauch (2007 p. 10) noted that sound criteria are needed to ensure decision objectivity. He suggested that no proven criteria for sound decision making has yet been determined by existing empirical research.

Strategic alignment has at its heart strategic decision making. Functions across an organisation such as human resource planning, performance appraisal, workers compensation and health and safety all have a direct impact on organisational effectiveness and as such should be aligned within a strategic plan (Blanchard and Thacker 2013, p.51). The training required for these functions should also be aligned strategically and the decisions about who, how and what to train should be undertaken using strategic criteria (Blanchard and Thacker 2013, p. 51).

In supporting the idea of developing strategic decision making approaches to training Blanchard and Thacker (2013, p. 51) provide the following example;

‘As a former Training and Development Manager of Towson University stated… I always ensure at least 75 percent of all training had a strategic connection …. Why? … to ensure funding ….second, evidence indicates that firms that do so will significantly improve their market value ….data collected from more than 2 400 firms show that when Human Resource systems achieve operational excellence and are aligned with the firms strategic goals, the market value of the firm increases by about 20 percent.’

Training is a function that is integral to the development of successful organisational strategic alignment approaches. Training provides a process and environment where employee skills and knowledge can be developed to meet long and short term strategic organisational goals (Blanchard and Thacker 2013, p. 46).
Buckley and Caple (2009, p.18) argued that training has the power to make a positive contribution to organisational strategy and training plans should be developed that closely relate to corporate goals. Buckley and Caple (2009, p. 19) also indicated training policies are required to align corporate strategy with organisational training needs. The assessment of training needs must be considered ‘from the top of the organisation downwards, rather than being a mainly individually orientated bottom upwards process’ (Buckley and Caple 2009, p. 19).

The RMTDF addresses the deficiencies in the quality and effectiveness of organisational decision making identified above. For example, by using risk decision making rules, criteria for decision making can be established using risk as the common factor. This addresses the concerns discussed by Rausch (2007, p. 10) because the RMTDF provides a simple but powerful bases that enables integrated and organisationally aligned decisions to be made. Secondly, it provides the common reference point identified by Kaplan and Norton (2004, p. 10), by directing human informational and organisational resources towards effectiveness goals which have a common basis in risk identification and management procedures.

2.9 Science of Training

The science of training describes a field of knowledge that draws on practical applications of general learning theory, and on theories and models endemic to industrial / organisational psychology, that place training in a broader organisational system (Salas et al. 2012, p. 75).

The past thirty years have seen an expansion of science based theories relating learning and training effectiveness and the science of training has expanded accordingly (Salas 2012, p. 75). The importance of using science based approaches for training is emphasised by Salas et al. (2012, p. 75) below;
'the advancements in training research can be attributed in part to the need for evidence based prescriptions for the design and delivery of training ..... the science has kept up with demand .... Meta analyses integrating a large number of empirical studies across various training topics and all forms of training consistently show that when training is designed systematically and based on the science of learning and training it yields positive results.'

As our knowledge of the science of training has expanded, a consistent theme has been the development of theories relating to training effectiveness models. These models include but are not limited to: training motivation, vertical transfer, performance management, individual differences and learner control. According to Salas et al. (2012, p. 78) all of these models have contributed to a greater understanding of how to best train individuals and collectives.

### 2.9.1 Training Effectiveness

When considering the effective implementation of organisational training models three simple but important questions need to be asked: they are: (a) why train? , (b) when to train? and, (c) how to train? The science of training literature indicated the first step in making these important decisions must be through the use of a Training Needs Analysis (TNA) (Salas et al. 2012, p. 80).

A training needs analysis provides a diagnostic technique that enables decisions to be undertaken on expected learning outcomes, training design and delivery, training evaluation and organizational factors that may influence training effectiveness. It is important to recognise that a training need analysis has the potential to indicate training may not be the preferred solution to an identified organisational issue, and that a non-training approach can be used instead (Salas et al. 2012, P. 81). The science of training literature identifies three main categories of training needs
analyses, they are; Job Task Analysis, Organisational Analysis and Person Analysis. These categories are discussed below.

**Job task analyses** target individual training requirements that relate to the knowledge, skills and abilities (KSA’s) that individuals' require to perform job tasks effectively. Whilst existing procedures for job task analysis exist, organisations often by pass this step and simply ask individuals to nominate what training they think they need (Salas et al. 2012, p. 81). Research by Baddeley and Longman (1978, pp. 627-635) indicated employees are often not able to articulate what training they really need and relying on this approach is not an effective strategy for planning organisational training.

Tannenbaum (2002, pp. 10-52) makes a distinction between knowledge content that employees ‘*need to know*’ as opposed to content they ‘*need to access*.’ This is an important distinction in the effectiveness of training discussion because humans do not have limitless cognitive ability (Cowan 2001, pp. 87-185). Prioritising appropriate knowledge content that can be retained and transferred to a work situation can be viewed as a critical indicator of successful training. Salas et al. (2012, p. 81) cautioned that training based on assumptions of ‘*need to know*’ will have the effect of lengthening the training unnecessarily, potentially diluting the knowledge retention of the individuals and hindering effectiveness.

Considerations of trainees needing to know, or needing to access knowledge are becoming increasingly important in the context of the information age we live in. As advancements in knowledge repositories, communities of practice and search technologies increase there will be increased opportunities to define training strategies that guide individuals to relevant information, rather than expect them to retain information from structured courses with outcome testing (Salas et al. 2012, p.81).
Deciding on the most important knowledge content to include in training and the most effective training methods to transfer this knowledge are key question categories explored by this research (significant training decision categories page 28). The RMTDF provides a decision making approach that enables knowledge content to be ranked on a continuum from essential knowledge to associated knowledge. This knowledge is then aligned with organisational risk considerations. Decisions can then be made to ensure required knowledge level requirements are matched to appropriate methods or training.

To practically demonstrate how risk based decision rules can be ordered to facilitate effective training decision making a decision matrix from the RMTDF is reproduced below. Training methods can be decided upon using the matrix. Questions of needing to know or access knowledge are placed on a scale beginning at Level 1 (essential knowledge/skill - structured training), and finishing at Level 4 (associated knowledge skill – low structured training). Using this model, accessing knowledge is linked with the unstructured training method category (low risk) where students are guided to relevant information but not formally instructed or assessed.

<table>
<thead>
<tr>
<th>Required employee knowledge levels</th>
<th>Evaluation of training requirements in organisational risk context</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>High Risk</td>
</tr>
<tr>
<td>Level 1 Essential knowledge/skill</td>
<td>Highly structured training</td>
</tr>
<tr>
<td>Level 2 Important knowledge/skill</td>
<td>Highly structured training</td>
</tr>
<tr>
<td>Level 3 Basic knowledge/skill</td>
<td>Medium structured training</td>
</tr>
<tr>
<td>Level 4 Associated knowledge/skill</td>
<td>Low structured training</td>
</tr>
</tbody>
</table>

1. **Highly Structured training**
   - Rigorous test at instruction & follow up rigorous test/assess at regular intervals.
2. **Medium Structure training**
   - Rigorous testing at instruction. Sample follow up testing.
3. **Low Structure training**
   - General testing at instruction- sample follow up assessment only
4. **Unstructured training**
   - No testing at instruction- general assessment and sample follow up
The second category of training needs analysis identified in the science of training literature is *organisational analysis*. The organisational analysis is concerned with strategic priorities and that the right training is being provided to match the organisational context and environment in which training is being conducted (Salas et al. 2012, p.81).

Organisational analysis is closely linked to strategic alignment theory (discussed in 2.8.3) and is a function concerned with making decisions about key organisational business objectives and challenges. Specifically related to training, organisational analyses identifies the jobs and functions that most influence organisational success and clarifies the most critical organisational competencies that are needed to establish overall strategic learning imperatives (Tannenbaum 2002, pp. 10-52). A strategic approach enables prioritisation of training needs and allocation of training resources so that the most pressing organisational needs will be addressed (Driscoll 2003, p. 48).

According to Salas et al. (2012, p. 83) training needs analyses incorporating strategic alignment are often overlooked, with specific training programs implemented due to existing mindsets or a lack of focus on the importance of planning training. Salas et al. (2012, p. 82) also indicated that it is important to periodically conduct strategic organisational assessments to ensure that training resources are allocated properly, so that training efforts are appropriately linked to organisational needs. Without a clear link between resource allocation and training efforts Salas et al. (2012, p. 83) suggested it is possible organisational personnel may view training as a frivolous expense, with organisational leadership and employee motivation to undertake training negatively impacted.
The decision making required when undertaking organisational training analyses has been examined in the phase 1 & 2 questions of this research. Question categories explore the link between risk management and strategic alignment of organisational training. Examples of these questions are: Can organisational goals and training goals be aligned through a risk management process? Can organisational training requirements be prioritised on a risk basis? Is risk management useful for allocating and justifying training resources? Can risk management provide a consistent communication medium that enables training decisions to be clearly understood across an organisation?

The final analyses category defined in the science of training literature is **Person Analysis**. A person analysis is a procedure to determine which individuals need training and what they need to be trained in (Tannenbaum and Yukl, 1992, pp. 474-483). Person analysis can be used effectively to ensure training is targeted appropriately by assessing individual characteristics and aptitudes and developing training accordingly.

An example of targeting specific training content and method can be cited when considering training and workforce age variables. Meta-analysis by Kubeck et al. (1996, pp. 92-107) suggested that age is positively correlated with training time and negatively correlated with training performance. Therefore an effective training approach would consider the best approaches to facilitate successful outcomes for the older workers including strategies such as, allowing more training time/self-pacing, using online tutorials and developing specific training materials (Salas et al. 2012, p. 83).

The RMTDF can be used to undertake a person analyses. Individual training needs can be risk assessed with appropriate training risk control strategies (training methods and content) developed. The RMTDF also provides the advantage of linking the
training needs of the organisations to the training needs of the individuals using the risk assessment methodology (decision making matrix above).

To summarise the role and importance of training needs analyses when linked to a science based approach to training the following comment by Salas et al. (2012, p. 83) is provided;

‘A training needs analysis is a must. It is the first and probably the most important step towards the design and delivery of any training ..... so always conduct a systematic and thorough training needs analysis.’

A significant research goal for this study is to understand if a RMTDF can improve the effectiveness of training needs analysis decisions and if those decisions can subsequently improve the effectiveness of organisational training outcomes.

**2.9.2 Adult Learning Theory**

The concept that adults learn differently to children has been understood by educationalist for a long time. However it was seminal work by Malcolm Knowles in the 1970’s that formally established a framework describing how adult learning characteristics differed from children (Smith 2002, p. 3).

Andragogy is a term used to describe the art and science of helping adults to learn (Knowles 1984, p. 6). Knowles model of andragogy is premised on five critical assumptions about adult learners. These are: (a) as a person matures his self-concept moves from being a dependent personality to one of being self-directed, (b) as a person matures he accumulates a growing reservoir of experience that becomes an important resource for learning, (c) as a person matures his readiness to learn becomes oriented increasingly to the developmental role of his social tasks , (d) as a person matures his orientation moves from subject centeredness to problem
centeredness, and (e) as a person matures the motivation to learn is internal (Smith 2002, p. 3).

According to Knowles (1984, p. 13) pedagogical models (teaching children) and andragogical models (teaching adults) require two different approaches to design and operation of education programs. The basic format for a pedagogical approach is to use a content plan, which requires the teacher to consider four basic questions: (1) what content needs to be covered? (2) How to organise content into manageable units, (3) What is the most logical sequence to present these units, and (4) what is the most efficient means of transmitting this content (Knowles 1984, p. 14). In contrast the andragogical approach is more concerned with a process plan which should be inclusive of the following seven elements:

- Climate setting – including a climate of mutual respect, collaborativeness, trust, supportiveness, openness and authenticity, pleasure and humanness.
- Involvement of learners in mutual planning.
- Involvement of participants in diagnosing their own needs for learning.
- Involving learners in formulating their learning objectives.
- Involvement of learners in designing learning plans.
- Helping learners carry out their learning plans.
- Involving learners in evaluation their learning.

A comparison of the assumptions of pedagogy and andragogy is shown in table 8 below.

<table>
<thead>
<tr>
<th></th>
<th>Pedagogy</th>
<th>Andragogy</th>
</tr>
</thead>
<tbody>
<tr>
<td>The learner</td>
<td>Dependent. Teacher directs what, when, how a subject is learned and tests that is been learned</td>
<td>Moves towards independence. Self-directing. Teacher encourages and nurtures this environment</td>
</tr>
</tbody>
</table>
The learners experience

<table>
<thead>
<tr>
<th></th>
<th>Of little worth. Hence teaching methods are didactic</th>
<th>A rich resource for learning. Hence teaching methods include discussion, problem solving, etc.</th>
</tr>
</thead>
</table>

Readiness to learn

<table>
<thead>
<tr>
<th></th>
<th>People learn what society expects them to. So curriculum is standardised</th>
<th>People learn what they need to know, so that learning is programmes organised around life application</th>
</tr>
</thead>
</table>

Orientation to learning

<table>
<thead>
<tr>
<th></th>
<th>Acquisition of subject matter. Curriculum organised by subjects</th>
<th>Learning experiences should be based around experiences, since people are performance centred in their learning</th>
</tr>
</thead>
</table>

Table 8: A comparison of assumptions of pedagogy and andragogy (from Jarvis 1985, p. 51).

The andragogical model is an accepted theory that has been widely adopted and used in a variety of programs including undergraduate programs, graduate education, continuing education and human resources development (Knowles 1984, p. 20). Critics of Knowles conception of andragogy suggest the framework is an attempt to build a comprehensive theory (or model) that is anchored in the characteristics of adult learners, potentially limiting the focus on an adult’s life situation or changes in consciousness (Merriam & Caffarella 1991, p. 249). Cross (1981, p. 227-228) takes this critique further;

‘Whether andragogy can serve as the foundation for a unifying theory of adult education remains to be seen. At the very least, it identifies some characteristics of adult learners that deserve attention. It has been far more successful than most theory in getting the attention of the practitioners and it has been moderately successful sparking debate; it has not been especially successful, however, in stimulating research to test the assumptions.’

Despite challenges to the assumptions in Knowles model, andragogical considerations continue to have an important role in planning, designing and implementation organisational training programs (Smith 2002, p. 6). Decisions on
training structure, method, content, testing and evaluation must all be undertaken in the context of the way adults learn, to ensure the most effective training outcomes can be achieved.

The RMTDF could potentially be viewed as a platform which supports andragogical (and other adult learning theory) decision making processes. For example, levels of risk can be established for Knowles assumptions in the table above (High risk if not applied – low risk if applied), enabling consistent and structured decisions on best training approaches.

### 2.9.3 Transfer of Training Theory

The assumptions inherent in Knowles andragogical model are relevant and transferable to other areas of adult training theory. As detailed in the introduction to this research (chapter one) a growing area of theory development for adult training is concerned with effectiveness of knowledge transfer from training to the workplace (Grossman & Salas 2011, p. 104). Transfer of training theory is defined as the application, generalization and maintenance of trained skills to a job situation (Ford & Weissbein 1997). Research into this area has grown exponentially in the past thirty years with an outpouring of both conceptual and empirical research all aiming to bridge the gap between training and work place performance (Grossman & Salas 2011, p. 104).

Numerous empirical studies, reviews and meta-analyses have provided vast amounts of information regarding transfer of training, however inconsistent findings and knowledge gaps make it difficult for organisations to pin point exactly what factors are most critical for training transfer (Grossman & Salas 2011, p.104). Cheng and Hampson (2008, p.334) indicated that: ‘inconsistent and unexpected findings have often disappointed researchers and training practitioners, despite the proliferation of transfer related studies in the past several decades.’ Also, Blume et al. (2010, p.
described training transfer literature as having remained ‘characterised by mixed findings and a lack of empirical synthesis.’

Grossman and Salas (2011, p. 105) argued that despite the inconsistent transfer research findings, enough evidence exists to support the proposition that many of the existing training theories do influence effective knowledge transfer. They contend that future research does not need to search for different theories, however more time and effort should be spent on investigating existing training transfer theories when searching for solutions to deficiencies in training transfer effectiveness.

Key theory factors demonstrating influence on training transfer are summarised in the table below. These theory factors are linked with Baldwin and Fords (1988, pp. 63-105) transfer process model where training inputs are considered crucial for learning, retention, generalization and maintenance of targeted skills (Grossman and Salas, 2011 p. 104). The training inputs are organised into three main categories: trainee characteristics (cognitive ability, self-efficacy, motivation and perceived utility of training), training design (behaviour modelling, error management and realistic training environments) and work environment (transfer climate, support, opportunity to perform and follow up) (Grossman and Salas 2011, p. 106).

<table>
<thead>
<tr>
<th>Theory Factor (inputs)</th>
<th>Summary</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trainee characteristics</td>
<td></td>
</tr>
<tr>
<td>Cognitive ability</td>
<td>Trainees higher in cognitive ability have more success in processing, retaining, and generalizing trained skills</td>
</tr>
<tr>
<td>Self- efficacy</td>
<td>Trainees higher in self efficacy have more confidence in their ability to learn and apply trained competencies, and are more likely to persist when performing difficult tasks</td>
</tr>
<tr>
<td>Motivation</td>
<td>Transfer is facilitated when trainees are motivated to learn and transfer throughout the training process</td>
</tr>
<tr>
<td>Perceived utility of training</td>
<td>Trainees who perceive training as useful and valuable are far more likely to apply competencies in the workplace</td>
</tr>
<tr>
<td>Training design</td>
<td></td>
</tr>
<tr>
<td>Behaviour modelling</td>
<td>Behaviour modelling facilitates transfer when both positive and negative models are used</td>
</tr>
</tbody>
</table>
Error Management

Error management promotes the transfer of training by allowing trainees to anticipate potential issues providing with knowledge on how to handle such problems and highlighting negative outcomes that can occur if training is not transfer.

Realistic Training

Conducting training and practice in environments that resemble the workplace increases the likelihood that trained competencies will transfer.

Work Environment

<table>
<thead>
<tr>
<th>Transfer Climate</th>
<th>Situation cues and consequences largely determine whether or not learned competencies are applied in the workplace</th>
</tr>
</thead>
<tbody>
<tr>
<td>Support</td>
<td>Both supervisor and peer support are critical for transfer of training</td>
</tr>
<tr>
<td>Opportunity to perform</td>
<td>For training to successfully transfer, trainees need resources and opportunities to apply their new skills and abilities to the workplace</td>
</tr>
<tr>
<td>Follow-up</td>
<td>To facilitate transfer, the formal training period should be followed by additional learning opportunities (eg after action reviews, feedback, job aids)</td>
</tr>
</tbody>
</table>

Table 9: Key Factors for Transfer of Learning (from Grossman and Salas 2011, p. 107).

2.9.4 Training Design

Training design is concerned with developing instructional strategies that create an environment where effective learning outcomes can be achieved. Instructional strategies include the tools, methods and context that are used as component parts of a training delivery approach. The planning, organisation and structure of training is a significant determinant of an effective training approach and it really matters (Salas et al. 2012, p. 85).

Noe and Colquitt (2002) identify the following characteristics of well-designed training that enhance learning and transfer;

- Trainees understand the objectives, purpose and intended outcomes of training
- Content is meaningful and examples, exercises, and assignments are relevant to the job
- Trainees are provided with learning aids to help them learn, organise and recall training content
- Trainees can practice in a relatively safe environment
Trainees receive feedback on learning from trainers, observers, piers or the task itself
Trainees can observe or interact with other trainees
Training programs are coordinated effectively

A thorough training strategy should convey information to trainees, demonstrate desired cognition and behaviours, create opportunities to practice KSA’s (knowledge, skills, abilities) that are learned, and provide adequate feedback to trainees so that progress can be monitored (Salas et al. 2012, p. 86). Research by Smith-Jentsch et al. (1996) demonstrated that training methods incorporating practice and trainee feedback strategies were more successful in terms of skill performance and outcomes than methods that simply relied on information provision and demonstration. There is evidence however, that industry most commonly prefers training strategies of information provision and instruction (using workbooks, lecture and videos) (Patel, 2010), potentially limiting training transfer outcomes and effectiveness.

Having identified training design as a key requirement for effective transfer of training, Salas et al. (2012, p. 86) also nominated a number of instructional elements that can enhance the learning value of training strategies. These elements include transfer appropriate processing where the training conditions are developed to match closely with the expected transfer conditions. This means that training methods and structure will be designed in a way that provides challenges to trainees, and trainer support is lessened as the trainee gathers mastery of skills and is able to demonstrate the transfer requirements application, generalization and maintenance of trained skills to a job situation.

The science of training literature provides a number of examples of training strategy theories and consideration of training methodologies. These have been reviewed because it is important to consider how the existing science of training theories can
be aligned to the RMTDF being researched. A major component of the RMTDF is the use of risk management thinking to decide on appropriate course content, structure and instruction method. These are significant training decision categories tested by the research. Questions asked of the NSW TAFE personnel focus on these significant training decision areas. Specifically the RMTDF developed for the research (incorporating decision matrixes), provides a decision making process that training personnel can use to make effective risk based training decisions. The framework can be used by training decision makers across an organisational hierarchy. Course Trainers can plan for the most effective knowledge inclusion and training techniques. Institute Directors can ensure that effective and strategically aligned training is taking place to maximise organisational training opportunities.

2.10 Training Evaluation

Training evaluation is a process of systematic data collection to answer questions on whether learning objectives are achieved and whether learning objectives result in enhanced on the job performance (Kraiger 2002, p. 331). Evaluation enables organisations to make decisions on what training is effective and should continue, and what training is ineffective and should be discontinued (Salas et al. 2012, p. 90).

Kraiger et al. (1993, pp. 311-28) indicated that learning is multidimensional and inclusive of behavioural, affective and cognitive components. Therefore the measurement of achievement of instructional objectives requires multiple measures of different types of outcomes. For example training evaluation can measure changes in declarative knowledge (trainees knowing more), changes in skill behaviour (trainees applying skills better) and changes in self-efficacy for transfer (evidence of positive affective change) (Salas et al. 2012, p. 90).

Instructional objectives and training outcomes are determined through the use of training needs analysis and can be defined as evaluation criteria within an evaluation
system (Goldstien and Ford, 2002). Evaluation criteria therefore provide the bases for the design of an evaluation system, defining what trainees are required to learn and providing measurable indicators as to the effectiveness of training approaches.

Historically, many organisations and training researchers have relied on Kirkpatrick’s (1994, p.21) hierarchal training evaluation framework as the theoretical basis for evaluation processes (Salas et al. 2012, p. 91). Kirkpatrick’s hierarchy identifies four sequenced ‘levels’ of training program evaluation. These levels are;

Level 1: Reaction – how well trainees liked the training.

Level 2: Learning - principles, facts, or skills learned.

Level 3: Behaviour - resulting behaviour in changes on the job

Level 4: Results – tangible outcomes of training, such as improved productivity.

Kirkpatrick’s framework is not universally accepted with critics including; Alliger and Janak (1989), Holton (1996) and Kraiger (2002). A summarised critique of the Kirkpatrick model is provided by Salas et al. (2012, p. 91) below;

‘the [Kirkpatrick] framework is antithetical to nearly forty years of research on human learning, leads to a checklist approach to evaluation (e.g. we are measuring Levels 1 and 2, so we need to measure Level 3), and, by ignoring the actual purpose for the evaluation, risks providing no information of value to stakeholders.’

Despite the potential weaknesses in the Kirkpatrick framework it is still the preferred basis for evaluation processes in many organisations. Research by Patel (2010) indicated that evaluation practices in USA companies continue to be undertaken using the Kirkpatrick four level approach with over with over 90% of companies
surveyed measuring trainee reactions, over 80% measuring trainee learning, over 50% measuring on the job behaviour and 40% measuring results.

### 2.10.1 Is Training Evaluation Effective?

In a study of 140 businesses of a varying size and type Bersin (2006, pp. 22-23) showed that the things organisations view as the most important outcomes of training are still not measured very often. Blanchard and Thacker (2013, p. 334) list several reasons given by training managers for failing to undertake effective training evaluation, they are:

- There is nothing to evaluate.
- No one really cares about it.
- Evaluation is a threat to my job.

As noted by Blanchard and Thacker (2013, p. 334) these are very poor reasons to not design and implement effective evaluation procedures. All organisational training that occurs has elements that need evaluating. Organisational time, money and resources are utilised to undertake training, and worker knowledge, skill and attitude change is expected. Therefore people within the organisation do care. It may however be unclear who is benefitting from the training or how the organisation is benefitting as a whole (Blanchard and Thacker 2013, p. 334).

Training managers’ concerns about their employment relate specifically to outcome evaluation (Blachard and Thacker 2013, p. 334). If an outcome evaluation demonstrates that time and money spent on a training program has not resulted in knowledge transfer, or improved performance, the training can be viewed as a failure and a ‘report card’ on the trainers and managers providing the training. This is an obvious de-motivational factor for the personnel involved in this type of training evaluation. Blanchard and Thacker (2013, p. 335) indicated that a more appropriate
evaluation approach is *process evaluation*, where the focus is shifted from final outcomes reporting to improvement feedback mechanisms designed into the training process.

Salas et al. (2012, p. 91) identified two primary strategies for increasing the impact of training evaluation practices. The first is to define a clear *purpose* for evaluation and then tailoring subsequent decisions about what and how to evaluate. By having a clear purpose evaluators can increase the likelihood that evaluation data will be meaningful to the organisation and be used effectively. Nickols (2005, pp. 121-134) suggested the lack of a clear evaluation purpose increased the *risk* that evaluation will fail to make effective contributions to organisation decision making because it does not address the interest or needs of organisational stakeholders.

The second strategy identified by Salas et al. (2012, p. 91) is to be more precise in how training outcomes are assessed. Traditional evaluation methods of using multiple choice tests or asking supervisors to rate trainees’ job performance can be overly generic and lacking the specificity required for effective measurement. Researchers and training practitioners are becoming increasingly aware of the need for multidimensional learning and the need for more precise and specific evaluation information (Salas et al. 2013 p.91). A method for specific measurement of learning outcomes are researched and discussed in detail by Kraiger et al. (1993, pp. 311-28). The full description of Kraiger et al. research is too broad to detail here, however the simple logic behind their research is that evaluation is more effective if evaluation measures are tailored to suit training content and not generically based.

### 2.10.2 Using the RMTDF For Evaluation

The risk management of training framework offers a new way of thinking about training evaluation. Using risk management for evaluating training approaches is an extension of the basic logic that organisational training requirements can be defined
through a risk assessment process (RMTDF described on pages 60-63). Having established a framework where training methods, structure and content can be identified and controlled in relation to overall organisational risk, it is then possible to create levels of risk assessed outcomes for the different outcomes required for an effective training program (example shown in matrix tables reproduced below).

Establishing risk levels enables training managers to have a bases on which evaluation can be measured and aligned to overall corporate objectives. For example, in the tables below the potential effectiveness outcomes of existing training courses can be evaluated by comparing the levels of existing training structure to the risk assessed level of knowledge required by the organisation. This provides two key advantages that link to the evaluation theories described by Salas et al. (2012) and Kraiger (2002). The advantages are, (1) the risk management approach provides a clear purpose for undertaking an evaluation (minimisation and alignment of organisational risks leading to enhanced performance), and (2) the process of risk assessment and control enables evaluation of specific and precise areas of organisational learning.

Whilst the RMTDF developed for this research has not specifically produced individual trainee or program evaluation tools, these would be a natural extension to the decision making matrix tables that have been developed and tested in the NSW TAFE environment. Training Managers, Coordinators and Course Trainers would be able to design and implement evaluation approaches that link to the risk management training concept, and enable all training decisions to be linked to a common purpose – risk minimisation.

In the science of training literature, Salas et al. (2012, p. 91) recommended that; ‘organisations should begin training evaluation efforts by clearly specifying one or
more purposes for the evaluation and should then link all subsequent decisions of what and how to measure to the stated purpose.'

The RMTDF provides an approach that enables the recommendations by Salas et al. to be conceptually and practically imbedded into organisation training evaluation and training decision making. A risk management decision making matrix table that can be used to evaluate training decision making is shown below.

<table>
<thead>
<tr>
<th>Expected outcomes</th>
<th>Level of training structure</th>
<th>Level 1 Essential knowledge acquisition</th>
<th>Level 2 Important knowledge acquisition</th>
<th>Level 3 Basic knowledge acquisition</th>
<th>Level 4 Associated knowledge acquisition</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Highly Structured training</td>
<td>Effective outcome highly likely</td>
<td>Effective outcome highly likely</td>
<td>Effective outcome likely</td>
<td>Effective outcome unlikely</td>
</tr>
<tr>
<td></td>
<td>Medium structured training</td>
<td>Effective outcome possible</td>
<td>Effective outcome highly likely</td>
<td>Effective outcome possible</td>
<td>Effective outcome possible</td>
</tr>
<tr>
<td></td>
<td>Low structured training</td>
<td>Effective outcome very unlikely</td>
<td>Effective outcome unlikely</td>
<td>Effective outcome possible</td>
<td>Effective outcome chance</td>
</tr>
<tr>
<td></td>
<td>Unstructured training</td>
<td>Effective outcome very unlikely</td>
<td>Effective outcome unlikely</td>
<td>Effective outcome possible</td>
<td>Effective outcome likely</td>
</tr>
</tbody>
</table>

Knowledge level hierarchy will depend on organisation type, mission and strategic goals

Figure 13: Training decision matrix using risk management to match knowledge levels to training structures - reproduced from page 62 (developed by researcher).

2.10.3 Evaluating Return on Training Investment

Bassi et al. (2000, p. 1) posed two simple and important questions: Do enterprises invest enough in job training? Do they invest too much? They concluded that firms probably do under invest in training, however because of outdated reporting and accounting methods it is difficult to obtain reliable data to substantiate these claims.

Under investment in training probably occurs because of the limited evidence based research indicating that training creates value for organisations (Bassi et al. 2000, p.2). Training managers may believe in the importance of developing skills and
investing in training, however many firms are unable to measure, report and evaluate key training investments (Bassi et al. 2000, p. 2). Research by Hansson et al. (2003) provided evidence that training investments do create changes in organisation productivity and profitability, however most research continues to focus on training outcomes and not the actual spending levels on training (Bassi & McMurer 2005, p.10).

Buckley and Caple (2009, p.255) suggested that trying to value training in monetary terms is a ‘forlorn enterprise’ and that ‘it is impossible or extremely difficult to isolate training costs and attach a monetary value to training results and effects.’ They indicated however, that despite the difficulties and obstacles in evaluating training costs and returns, in most cases ‘some attempt should be made to understand the bottom line’ (Buckley and Caple 2009, p. 255).

A model developed by Phillips (1997) showed that it is possible to examine training from a financial viewpoint and carry out a return on investment (ROI) appraisal through cost benefit or return on investment analysis (Buckley and Caple 2009, p.256). A cost benefit analysis involves comparing anticipated or actual training costs against the value of anticipated or actual training outcomes. The training outcomes should link directly or indirectly to the training objectives and analysis of training criteria (Buckley and Caple 2009, p.256). Phillip’s (1997) expressed a training cost benefit ratio in the form of a simple formula, shown below;

\[
\text{1. Cost Benefit Ratio} = \frac{\text{Training Benefits}}{\text{Training Costs}}
\]

Phillips (1997) indicated that an acceptable level of cost benefit ratio is difficult to quantify, and that a ratio of 1:1, where benefits equal cost, “is not likely to be regarded as satisfactory by most organisations” (Buckley and Caple 2009, p.256). A second
training evaluation formula proposed by Phillips (1997) linked net training benefits to training costs expressed in percentage terms. The second formula is shown below;

2. Return on Investment (ROI) (%) = \( \frac{\text{Net Training Benefits}}{\text{Training Costs}} \times 100 \)

Using the second formula, net training benefits are calculated by subtracting training costs from overall training benefits. As an example, calculating a ROI of 200 percent would indicate a training program had 'earned' its costs twice over. In common with Phillip's (1997) first formula, there are no agreed industry or training standards indicating what ROI percentage is deemed acceptable. A ROI ratio of 25 percent (higher than required for other forms of investment) is a level indicated as acceptable by some organisations (Buckley & Caple 2009, p.256).

In a report titled, ‘Learning and Development in the Public Sector’, the Australian Institute of Management (AIM 2013, p.4) indicated that Australian Public Service (APS) organisations’ tended to view training as a cost centre to be minimised rather than an investment to be managed. The report identified three central weaknesses in APS training investment strategies. Those were;

- Insufficient training planning aligned with agencies' strategies.
- Focussing on what is being spent on training rather than the relevance and effectiveness of training being undertaken (focus on inputs rather than outcomes).
- Insufficient data on the return on investment (ROI) of training accruing to either organisations or individuals and the value of training more broadly (AIM 2013, p.5).

The AIM report was the only literature reviewed by the researcher that linked risk management to training investment. The AIM report asked two simple training investment questions: (1) what are the benefits of investing in training?, and (2) what
are the risks of not investing? (AIM, p. 11). The report concluded that ineffective training had been linked to a number of poor APS organisational outcomes and that ‘training speaks to risk management as well as overall organisational performance’ (AIM, p.11).

The RMTDF provides a sophisticated process where effective training cost /benefit decision making can be undertaken on the basis of risk. As shown on the matrix table below, evaluation of training requirements can be undertaken according to identified and assessed overall organisational risks (i.e. financial, operational, strategic). Comparing the organisation risks to the types of training structure required to ensure skill transfer can occur (high structure – low structure), means a training evaluation guide based on risk can be developed. This approach enables training managers to justify training expenditures (i.e. high risk justifies high cost), and ensures training decisions are undertaken strategically because they align with the organisations overall goals of minimising corporate risks.

The matrix table below used in conjunction with the two other matrix tables in the RMTDF, enable training cost evaluation decisions to be undertaken prior to implementing a training program, and also to evaluate the potential effectiveness of established organisational programs.

<table>
<thead>
<tr>
<th>Level of training structure</th>
<th>Evaluation of training requirements in organisation risk context</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>High risk</td>
</tr>
<tr>
<td>Level 1 Highly structured</td>
<td>High dollar cost- Low financial risk</td>
</tr>
<tr>
<td>Level 3 Low Structured</td>
<td>Low dollar cost- High Financial risk</td>
</tr>
</tbody>
</table>
2.11 Training Regulation and Legal Considerations

Organisations conducting business in Australia do so in an environment of increasing regulation and legal compliance liabilities. Competition law, environmental law, tax law, equal opportunity law and work health and safety requirements are perhaps the most significant in term of penalties, however many other compliance areas exist (Baxt 2013, p.2). In a white paper titled: ‘Towards Better Regulation 2013’, the Australian Institute of Company Directors (AICD 2013, p. 7) showed that the number of Commonwealth Acts impacting on Australian business has grown exponentially in the 1990’s and that the trend continues. The AICD contend the growth in regulation and ‘red tape’ is impeding business growth in Australia as over-regulation encourages management boards to focus on ‘conformance over performance’ and ‘discourages business from taking measured risks in regards wealth generation’ (AICD, 2013, p.3).

Training decision making plays an important role in contributing to organisations compliance responsibilities because worker knowledge development and behaviour change resulting from training is a fundamental means of ensuring statutory compliance (Blanchard & Thacker 2013, p.32; Salas et al. 2012, p. 79). For example, compliance laws relating to Work Health and Safety impose strict obligations on organisations to train workers (Blanchard and Thacker 2013, p. 32). Failure to undertake this function appropriately can lead to fines in Australian jurisdictions of up to three million dollars for companies, and gaol terms of five years for company directors or company officers (NSW Work Health & Safety Act 2011).

Other examples where courts have decided company training programs did not meet legal compliance requirements include workforce issues related to sexual
harassment, workplace discrimination and environmental management. In these cases companies are fined and also ordered by the courts to develop improved training programs so that employee knowledge, skills and abilities (KSA’s) can change and improve the organisational culture (Blanchard and Thacker 2013, p. 32).

Training is clearly viewed by regulators as a significant means of ensuring organisational compliance and they continue to penalise organisations who fail to train their workforce effectively. In NSW alone, up to 100 successful prosecutions are undertaken annually by the NSW Workcover authority for breaches of the Work Health and Safety Act (Workcover NSW 2015). Many of these breaches relate directly to the failure of a company’s training programs to adequately ensure workers knowledge skills and attitudes (KSA’s) are adequate to undertake work tasks safely.

The strong focus on training by regulators is well justified. Effective workplace training has been demonstrated to reduce life-threatening errors in high risk environments (Salas 2012, p. 79). Senders and Moray (1991) estimated that between 30 percent and 80 percent of serious accidents in human – machine settings can be attributed to human error. Therefore training that that increases worker awareness, knowledge and skills should reduce errors and improve worker and public safety (Salas et al. 2012, p. 79).

Decision making relating to organisational compliance training responsibilities can be used as a simple example of how a RMTDF can be implemented. Using the RMTDF framework, organisations can consider the corporate risk of not undertaking Health and Safety training, and compare the potential risk of a three million dollar fine and gaol sentence to the severity outcomes of not training in other corporate areas where training is being considered. The RMTDF allows different training needs to be prioritised on the basis of assessed corporate risk level, enabling training structures and methods to be developed in relation to those identified risk levels. In the given
example, a lack of training, or ineffective Health and Safety training leading to a three million dollar fine would be reasonably defined as a **high corporate risk**. Therefore the risk management decision making matrixes guide managers towards **highly structured training with strict outcome testing** to ensure effective training outcomes (see figure 7, 8 & 9, pp. 62-63). This approach may be costly and resource intensive, however the risk management framework **justifies** resource allocation on the basis of assessed risk, offering a clear logic that can be strategically aligned throughout the organisation and used as a communication tool that can be understood by all organisational stakeholders.

Risk management is an integral component of operational and procedural approaches used by courts and compliance authorities. Typically court findings against organisations will list amongst other things company failures to comply with risk management processes (Workcover v Gregory Banks 2006, & Workcover v Conditionaire International Pty LTD 2006). In a tragic case of a young woman being killed whilst undertaking a NSW TAFE Certificate II course in agriculture, the coroner’s report reviewed the quality and accuracy of Western Sydney TAFE’s risk assessment procedures, making the following finding;

‘I am satisfied on balance that **no meaningful risk assessment** was carried out by TAFE NSW Western Sydney Institute with respect of the new means of delivery of the Horse Unit [2009 Horse unit course] to its students. Furthermore, if those who implemented the changes gave any consideration to the risk it was in a cursory and **ad hoc manner**’ (Freund 2011, p. 9).

Risk management is a well understood process and language used by many of Australian and international compliance and regulatory authorities. The concept underpinning risk management when incorporated into a coherent and logical training decision framework is that it can potentially: 1) improve compliance training
effectiveness and ensure relevant training is implemented at appropriate times and with appropriate methods, and, 2) provide a suitable method of training decision making that would withstand scrutiny from compliance agencies conducting audits either before an incident has occurred (insurance auditing, compliance auditing) or as part of a legal investigation after a negative event has happened.

2.12 The Australian Vocational Education and Training Sector

NSW TAFE institutions are government funded training organisations providing education and training services to students within the Australian Vocational Educational and Training (VET) sector.

The Australian VET sector consists of nearly 5000 registered training organisations responsible for training 1.9 million learners in a diverse range of learning environments, including TAFE institutes, schools, simulated work place environments, actual work place environments and online (NSSC 2013, p. 4). It is estimated that nationally 73 000 people are employed in Australian TAFE institutions with a further 150 000 other employees involved in vocational education and training delivery with non-TAFE providers (NSSC 2013, p. 4). The National Centre for Vocational Education Research (NCVER) estimates that in 2011, the Australian Government invested $2.22 billion in vocational education and training with state and territories investing a further $3.96 billion (NCVER 2012). Additional training investment is undertaken by the private sector; however the value of this investment has not been formally measured and is difficult to quantify (NSSC 2013, p. 4).

Vocational Education and Training is considered as having a critical role in providing the skills and education to increase workforce productivity, enhance living standards, provide improved economic opportunities and generally improve life outcomes (National Panel Economic Reform 2013). In a changing and evolving global marketplace, Australian businesses require a skilled workforce to meet the
challenges needed to embrace business and technological innovation and more complex job demands (NSSC 2013, p. 4).

The past twenty years has seen significant changes in vocational education and training as the sector tries to align more closely with industry requirements. There has been a move towards developing a vocational and education training ‘market place’, and creating diversification between vocational and educational providers (TAFE – Non TAFE) (NSSC 2013, p. 4). Also there has been growth in fee for service training delivery, changes in course delivery (aided by technological innovation) and the emergence of dual and multi sector providers (School and Higher Education sectors). All of these changes have been aimed at meeting industry needs of making training more flexible and being able to target individual industry sector requirements (NSSC 2013, p. 4).

Despite the changes in the VET sector since the 1990’s Australian industry is still pushing for more reform. In their report ‘Skills for Prosperity’, industry research analysts Skills Australia indicate that by 2025 Australia could have a shortfall of 2.8 million of individuals with the higher-skilled qualifications that industry will demand (Skills Australia, 2011). The gap between level of worker skill development and industry expectations has the potential to create significant distortions in the labour market and impact on the economic viability of organisations relying on a skilled workforce (NSSC 2013, p. 3).

2.12.1 NSW TAFE Training Decision Makers

Responding to industry challenges for further reform to the VET sector, the NSW State government published a survey in 2013 titled: ‘Let’s talk about TAFE’ to understand the strengths and weaknesses of existing NSW TAFE training provision. The outcomes of this survey led to the development of two strategic position papers; 1) ‘The Statement of Owner Expectations’ (TAFE Commission) and, 2) ‘Smart and
Skilled: NSW Quality Framework’ (Education and Communities). The reforms detailed in these papers are summarised below;

‘The TAFE NSW Statement of Owner Expectations is framed by NSW 2021: A plan to make NSW number one (NSW 2021) and the NSW Smart and Skilled policy reforms in the VET sector. These reforms will be implemented from July 2014 and competitive pressures on TAFE NSW will be increased along with the introduction of new funding and pricing arrangements for VET services’ (NSW TAFE Commission 2013, p. 1).

The reforms to NSW TAFE place a greater emphasis on operating training as a business model in a competitive VET training environment. NSW TAFE will be competing with private and community training providers for contestable government training funds and there is an expectation TAFE institutions will become more locally responsive, flexible and autonomous (NSW TAFE Commission 2013, p. 1). The reform agenda also includes NSW TAFE governance changes and a stronger focus on customer and communities by ‘devolving decision making closer to where services are being delivered’ (NSW TAFE Commission 2013, p. 1).

To innovate and prosper in the new VET environment the NSW TAFE Commission (2013) acknowledges that individual TAFE Institutes will require greater authority and control over business decisions. To accompany the enhanced local control a number of training ‘expectations’ will be placed on NSW TAFE Institutes (NSW TAFE Commission 2013, p. 1). These expectations are listed below;

- TAFE NSW will be expected to compete in a contestable market and deliver specialist training in industry and labour priority areas. TAFE NSW must also maximise learning opportunities by utilising world’s best practice training methodologies including, online, E-learning and other flexible approaches.
• TAFE NSW is required to plan and establish pathways between schools and
higher education programs appropriate to identified local need.

• TAFE NSW is expected to provide specialist and accessible training for people
who face disadvantage through community service obligation funding and
loading.

• TAFE NSW must work proactively with employers and industry to deliver on
State’s skill priorities. TAFE must also respond to emerging trends.

• TAFE NSW must be innovative in its response to individuals, enterprise and
community demands. TAFE should lead the field in provision of high quality
teaching learning and assessment.

• TAFE NSW must be an effective and efficient government owned business.
TAFE NSW must identify area where it can become more competitive and
remove barriers impeding productivity. TAFE NSW must improve business
processes and systems.

• TAFE NSW must continue to maintain high ethical values and standards and
to develop, utilise and recognise its work force capability in meeting emerging
business challenges.

The NSW government considers NSW TAFE will remain the backbone of VET in
NSW. TAFE is considered an essential training provider with the role of strengthening
the NSW skills base and supporting economic growth for NSW (NSW TAFE
Commission 2013, p. 1). As NSW TAFE moves forward in a period of change, making
effective decisions about training implementation will become increasingly important.
Therefore the research and testing of the RMTDF comes at a pivotal time for NSW
TAFE decision makers. The research outcomes have significant relevance to the way
in which NSW TAFE undertakes training decision making in the reformed VET sector
(including training for both NSW TAFE practitioners and student cohorts).
2.13 Guiding Research Philosophy

The literature review has so far described the theoretical attributes of the RMTDF and demonstrated why the RMTDF is a valid addition to existing training effectiveness theories and approaches used for organisational training decision making. The final section of the literature review will be used to describe the guiding philosophy that was used to develop the RMTDF research question (s) and how this philosophy influenced in the eventual research design (which is detailed in chapter three).

2.13.1 Philosophical Worldview Assumptions

Creswell (2014, p. 7) emphasised the importance of the world view philosophies a researcher brings to a research project. The term worldview implies a researcher will bring a ‘basic set of beliefs that guide action’ (Creswell, 2014, p. 6). Researcher worldview beliefs are influenced by a number of factors, including the subject discipline, researchers’ mentors/advisors, past research experiences and can often lead to individual researcher choosing a qualitative, quantitative or mixed method approach to their research (Creswell 2014, p. 6).

As already noted in chapter one, the researcher has a broad range of experience (over a period of many years) working as an organisational trainer. This experience has influenced the view of the researcher that organisational training decision making is generally ineffective and improved approaches to training decision making should be considered. The researcher subsequently developed and proposed a new training decision making approach – so called the RMTDF - and tested this approach by developing a central research question (and related second level questions - phase 1&2 questions) asked of NSW TAFE research participants. Therefore, the research design was guided by a worldview philosophy that was mainly focused on the researcher developing the most practical means of gathering valid and reliable data to answer the established research questions.
Creswell (2014, p. 6) identified four worldview beliefs which he categorised as: constructivism, post-positivism, transformative and pragmatism. A summary of these worldview beliefs is provided below, concluding with the explanation of why a **pragmatic** worldview philosophy was used by the researcher to guide the RMTDF research design.

The **constructivist** worldview is a type of interpretive social science that assumes abstract explanations can be derived though an empathetic understanding of meaningful social action, socially constructed meanings and value relativism (Nueman 2006, p. 89). Social constructivists believe that individuals seek understanding of their world and develop subjective meanings of their experiences which are directed towards certain things or objects (Creswell, 2014, p. 8). Constructivist research explores broad understandings from the complexity of human interactions and attempts to rely as much as possible on the participants’ views of the situation being studied (Creswell, 2014, p. 8).

Crotty (1998) identifies several assumptions that underpin a constructivist world view. He suggests human beings construct meanings as they engage in the world they are interpreting, they make sense of their world based on historical and social perspectives and the basic generation of meaning is always social arising from interaction with the human community. Social constructivist research is concerned with interpreting the meanings humans have on the world, and rather than beginning with a theory to research, inquirers inductively generate or develop a theory or patterns of meaning. Typically, social constructivist enquiry is considered a qualitative research approach (Creswell, 2014, p. 8).

**Postpositivist** worldview assumptions represent the traditional form of research where researchers use a deterministic philosophy to study causes for effects and outcomes (Creswell, 2014, p. 8). Postpositivism thinking has been generated from
the 19th worldview assumptions on positivism, in which scientific research methods and empirical study were considered to provide science based outcomes based on traditional understandings of absolute truth (Nueman 2006, p. 81). More recent thinking has challenged the assumptions of absolute scientific truth, and postpositivism reflects a widely held view that research is a measure of objective reality and absolute truth can never be found (Creswell, 2014, p. 8).

Postpositive researchers use careful observation and measurement to test laws and theories that are believed to govern the world (Creswell, 2014, p. 8). Research findings are typically explained using numeric measures of observations, and this type of empirical research is usually quantitative in nature, where data are in the form of numbers (Punch 1999, p. 31). Postpositive researchers usually start with a hypothesis and seek to collect information to explain situations or relationships. Evidence gathered in postpositive research is considered imperfect and fallible and therefore researchers do not state they prove a hypothesis, instead, they indicate a failure to reject the hypothesis (Creswell, 2014, p. 8).

**Transformative** worldview assumptions grew during a period of political and social reforms during the 1980’s when individuals felt traditional worldview philosophies did not adequately serve marginalized or disadvantaged groups in society (Creswell, 2014, p. 9). A uniform body of research defining a transformative worldview does not exist, but includes groups of action researchers and participatory researcher theorists such as; Marxists, feminists, racial and ethnic minorities, persons with disabilities and gay and lesbian communities (Creswell, 2014, p. 9).

Of central importance to transformative worldview researchers is how lives of diverse groups have been constrained by oppressors and the strategies used to resist such oppression (Mertens 2010). The transformative view links political and social power to perceived inequities in marginalised groups and seeks to answer questions on why
problems of oppression, domination and power relationships exist (Mertens 2010). Fundamentally a transformative philosophy attempts to engage research participants in a collaborative approach, giving them a voice and a degree of ownership in the research process, which may be more effective in raising awareness and driving change (Creswell, 2014, p. 9).

The final worldview paradigm to be defined in this section is that of the **pragmatist**. A pragmatic world view philosophy is one that is fundamentally concerned with applications, what works and what are the solutions to research problems (Patton 1990). Pragmatists are not limited by any one system of philosophy and reality, they believe pluralistically in both an external world independent of the mind and a constructed view of the world created within the mind (Creswell, 2014, p. 9).

The pragmatic approach offers researchers freedom of choice, it allows for multiple methods, different worldviews, different assumptions and different forms of data collection (Creswell, 2014, p. 9). A pragmatic approach enables researchers to apply several different approaches to research problems for collecting and analysing data, leading to mixed- method research strategies (Creswell, 2014, p. 9). Pragmatic researchers focus on the ‘what’ and ‘how’ of a research process, and base their research plans on intended consequences. If pragmatic researchers intend using mixed methods for their research, it is imperative that the purpose for mixing is established and a rationale is established justifying the reasons for combining research data collection and analysis techniques (Creswell, 2014, p.11).

It is considered by the researcher that his philosophical assumptions are closely aligned to the pragmatic world view assumptions described by Creswell. This pragmatic mindset meant the primary focus for the researcher was finding the most practical research approach to answer the research question – *can the RMTDF improve the effectiveness of training decision making?* After considering a range of
potential research approaches, the researcher eventually decided a mixed method research approach would provide the most effective means of testing the research question. Chapter three provides full detail of the research design and research methods that were developed and guided by the researcher’s pragmatic worldview philosophy.

2.14 Conclusion

This chapter began by describing the setting from which it can be demonstrated that applying risk management principles and ideas to training decision making can lead to improved training. Chapter two then reviewed current literature to establish the theoretical bases from which the RMTDF was justified as a higher order training decision approach when compared to existing training decision research and theory. The development of a literature base comparing the RMTDF with existing training was a significant factor in deciding on the eventual research design and chosen research methodology. This research design is detailed fully in chapter three.

Theories reviewed in chapter two included; Risk Management and the Implications for Training, Training Process (Blanchard and Thacker 2013), Systems Thinking (Checkland 1999; Senge 1990), Decision making and Judgement Heuristics (Kahneman 2011; Patel 2005) and Training Evaluation (Kirkpatrick 1994). Also included in the literature review are training theories and effectiveness models from the research domain referred to as the Science of Training (Salas et al. 2012, p. 59). These included; training design theories (Noe and Colquitt 2002), strategic alignment (Salas et al. 2012), presentation format, training needs analysis (TNA) (Salas et al. 2012) and transfer of training (Grossman and Salas 2011). It is considered that the RMTDF is a valid addition/extension to these and other existing theories and models in the training domain.
Because of changes to the VET sector, and the growing influence of regulatory and compliance factors on training decision making, chapter two also provided a summary of the Australian VET sectors’ move to a ‘market approach’ to vocational education, and the requirement of NSW VET training providers and compete for funding under the NSW ‘Smart and Skilled Quality Framework’ (NSW TAFE Commission 2013). These are regulatory changes that will significantly impact the way NSW TAFE training professionals make and justify their training decision making, and therefore make an RMTDF based approach more relevant and helpful in improving training.

Two areas of research that have been considered but are not included in the literature review (and subsequently did not influence the research design) are the Karpin report (1995) and the Technology Acceptance Model (Davis 1986). The 1995 Karpin report provided a comprehensive insight to the way Australia prepared its managers for work and leadership drawing attention to an enterprise culture, globalisation, lifelong learning and education institution best practice (IBSA 2011, p. 5). Davis’s Technology Acceptance Model (TAM) (1986) is a theoretical model that helps to explain and predict user behaviour of information technology systems (Legris et al. 2003). Whilst these two areas of research provide useful insights into the management of organisational training and how information technology systems can be applied and used in the workplace, they were considered less relevant than the theory and research that has been selected to justify and validate the use of the RMTDF as a higher level organisational training management framework.

Chapter two concluded by reviewing the philosophical considerations that influenced the researcher’s decisions on the research approach, design and methodology. When current research literature had been reviewed, the researcher indicated a ‘pragmatic worldview’ mindset was the predominant philosophy that guided the research design and implementation.
The RMTDF has been explained and justified in this chapter by comparing it to a number of key training decision theory areas, including; decision making theory, systems thinking theory and training effectiveness theory. Chapter three now builds on the review of current literature and theory, to detail the issues that were considered for the research design and justify why a three phased mixed method approach was finally selected as the most effective means of testing and verifying the perceived benefits of the RMTDF in the NSW TAFE training environment.
Chapter 3: Research Design

3.1 Introduction

Chapter two introduced an innovative risk management training decision framework that can be applied to organisational training decision making to achieve more effective training decision outcomes. By reviewing existing research and literature chapter two demonstrated how the RMTDF could be used for effective training decision making and improve on existing training decision approaches. With the theory based justification of the RMTDF established through the literature review, this chapter will now explain how the research was designed incorporating key outcomes from that review. The chapter will detail how existing literature influenced this study’s two phased research question development (based on the Salas et al. 2012 question series) and why the research design used a mixed method approach to gather, analyse and verify data.

3.2 Research Approaches

According to Creswell (2014, p. 3) research approaches are plans and procedures that reflect the process steps from initial concept phase of a research project through to the detailed methods of data collection, analysis and interpretation. Developing a research plan involves several decisions which are influenced by the philosophical assumptions the researcher brings to the study, intended procedures of inquiry and required measures of data collection, analysis and interpretation (Creswell 2014, p. 3). A research approach is also dependent on the nature of the research problem or issue to be addressed, the researcher’s personal experiences, and the audiences for the study (Creswell 2014, p. 3).

As indicated in Chapter two, the researcher was guided by a pragmatic world view philosophy when developing the research design. A pragmatic philosophy offers
researchers freedom of choice, allowing for a variety of research methods, different
worldviews, different assumptions and different forms of data collection (Creswell
2014, p. 9). Pragmatic researchers are concerned with what works and solutions to
problems, rather than focusing on methods (Creswell 2014, p. 9).

Guided by his pragmatic world view philosophy, the researcher essentially decided
don a mixed method research design because it provided the ability to draw on the
assumptions and advantages of both quantitative and qualitative research methods
to initially test the user acceptability of the RMTDF and then verify the outcomes of
that testing.

This chapter will now describe how these assumptions flowed through a logic
sequence based on sound literature, to explain the theory based decision choices
used to develop the research model and gather data from a deliberately selected
sample. The chapter will also describe how the research population was selected and
the sample was determined.

3.3 Research Design

Research designs are types of enquiries within a framework of qualitative, quantitative
or mixed method approaches that provide specific direction for procedures used to
understand a research problem (Creswell 2014, p. 12). Factors that need to be
considered in research design include strategies and framework used to collect data
and methods used to analyse data. Researchers may choose from a number of
research strategies including experiments, quasi experiments, correlational surveys,
case studies, ethnography, grounded theory, or a combination of approaches (Punch
1999, p. 66).

Experimental and correlational survey strategies are normally associated with
quantitative research design (Creswell 2014, p. 12). Experimental research
attempts to understand what happens if specific treatments are applied to one group
and withheld from others by developing scoring systems and comparing results between groups. Experiments include true experiments where treatment groups are selected randomly, and quasi-experiments where circumstances direct a non-randomised assignment of subjects to the treatment conditions. Included in quasi experiments are single subject designs (Creswell 2014; Keppel 1991). Correlational surveys are used to develop numeric descriptions of trends, attitudes or opinions by asking respondents the same questions and recording their answers. Survey research includes cross sectional and longitudinal studies using questionnaires or structured interviews for data collection with the intention of generalising sample responses to a generalised to a population (Creswell 2014; Fowler 2009).

Quantitative strategies rely on defining research variables and deciding how best to measure them for meaningful analysis. Quantitative data enable standardised, objective comparisons to be made in a systematic way. When considering quantitative strategies researchers must consider if particular situations can be measured appropriately and if the measurement will yield data that provides useful research comparisons (Punch 1999, p. 66).

Contrasting the quantitative research design is the qualitative research design. A qualitative research design emphasises meanings, experiences and descriptions. Raw data records exactly what respondents say or describes what has been observed (Coolican 1990, p. 36). A wide variety of strategies can be employed in a qualitative framework, inclusive of; narrative research, phenomenological research, grounded theory, ethnography and case studies (Creswell 2014, pp. 14-5). These approaches are briefly summarised below.

- Narrative research is a strategy where researchers study one or more individuals interpreting their life stories. The data is explored by combining participant life views to researchers views to form a collaborative narrative
• A phenomenological design of inquiry involves a researcher describing the lives of individuals as they relate to a determined experience or phenomenon. The researcher sets aside their own experience in order to understand the experiences of the research participants and usually involves interviews over extended periods on time.

• Grounded theory is a design of inquiry used to develop a general abstract theory that is grounded in the views of the participants. Grounded theory relies on a process involving multiple stages of data collection and the refinement and interrelationship of categories of information.

• Ethnography is a qualitative research approach emanating from the fields of anthropology and sociology where researchers’ study patterns of behaviours of cultural groups in their natural setting using observations and interviews.

• Case studies involve researchers developing an in depth analysis of an individual(s), program or events. Cases are bound by time and activity, and researchers collect detailed information by using a variety of data collection procedures over sustained periods.

A third research design consideration is the combination of quantitative and qualitative thinking into a mixed method research framework. Mixed method inquiry has its origins in the 1950’s when researchers began experimenting with different approaches because of the perceived limitations of existing qualitative and quantitative research designs. Combing the two approaches offered a potential way of neutralising the weaknesses of each form of data, establishing the logic of triangulation, and a means of seeking convergence across quantitative and qualitative methods (Creswell 2014, p. 14). During a period from the mid 1980’s through to the 1990’s major work was undertaken in developing mixed method approaches and the integration of different types of designs have now emerged
A summary of three primary mixed method design approaches is provided below.

- **Convergent parallel mixed methods** is a process where the researcher merges quantitative and qualitative data so as to provide a comprehensive analysis of the research problem. In this approach all data is typically collected at the same time and integrated into the interpretation of overall results.

- **Explanatory sequential mixed methods** is an approach where a researcher initially undertakes quantitative research, analyses the initial results then builds on the results to explain them in more details with qualitative research. This is termed a sequential approach because the initial quantitative phase is followed by the qualitative phase. The challenge of this approach is identifying the relevant quantitative results to further explore, and the unequal sample sizes for each phase of the study.

- **The exploratory sequential mixed method** uses a reverse sequence to the explanatory model described above. A qualitative research phase is entered into initially with the researcher exploring the views of the participants with this information then used to build a quantitative secondary phase. Challenges to this approach are focusing on the most appropriate qualitative findings to use for follow up and sample selection across both phases.

Having considered all design issues described above, the researcher’s initial reaction was that a mixed method research design would be best suited to addressing the RMTDF central research question. This was because of the weakness imposed by using a small population size of NSW TAFE senior training decision makers in the research and the limitations of quantitative approaches to verify the subsequent outcomes of planned phase 1 correlational testing.
With a mixed method design initially considered, there was then a requirement to justify a research method that could be used as part of that design to establish a sound platform on which to collect and analyse data, and report back on the research question being investigated. The strengths and weaknesses of three types of research methods are therefore compared below prior to the description of the actual RMTDF research design and method that was eventually selected and used in this research.

3.4 Research Methods

The research method describes a specific framework selected and justified by the researcher that details the processes for collecting, analysing and interpreting data (Creswell 2014, p. 16). Research methods can be quantitative, qualitative or a combination of the two (mixed methods).

Because this research ultimately adopts a mixed mode phased research design, it is important to understand the realities of simpler frameworks, e.g. all quantitative or all qualitative methodologies, and why a more sophisticated blended design was regarded as appropriate for this research.

Quantitative Research Methods

Quantitative research methods are essentially concerned with conducting surveys or testing hypotheses using experiments, and quantitative methods based experiments are particularly suited to studies involving large numbers of relatively identical subjects, and in testing predictions of behaviour (Punch 1999, p. 73).

A survey consists of asking a selected lot of people for information, with a particular emphasis on the sample characteristics, as the aim of the survey is usually to make generalisations about relatively large sections of the populations (Coolican 1990, p. 90). Experimental methods also attempt to select and use representative samples,
however whilst the research method (s) adopted focus is on determining the effect of treatments or interventions applied to either randomised or non-randomised participant groups. Quantitative research uses tight controls relying on closed question approaches to provide numeric results that are generalizable and repeatable to provide validity (Creswell 2014, p. 17). In addition, the numeric data generated by quantitative collection methods can be measured using a range of statistical testing methods that are selected depending on the sample size and the most suitable techniques to measure the difference between groups or the strength of the relationship between research variables (Pallant 2013, p. 107).

A quantitative research method is typically defined by the survey design, population and sample selection, instrumentation, variable identification and data analysis and interpretation (Creswell 2014, p. 17).

As will be described more fully in section 3.5 below, the assumptions relating to quantitative statistical testing, reliability and validity had a significant influence on the development of the RMTDF research methodology. Because of practical limitations imposed on the research design by, (a) not all NSW TAFE’s agreeing to participate in the research, and (b) the small numbers of the research population at NSW TAFE senior training decision making levels (there are only 10 TAFE Institute Directors in NSW for example), it was considered that using quantitative analyses alone would probably not provide valid and reliable research outcomes and other methodologies should be considered.

Quantitative research projects may be threatened by internal or external validity considerations. Internal validity threats arise where experimental treatments or participant experiences are loosely controlled and circumstances change (for varied reasons), and the researcher is unable to draw valid (i.e. consistent) inferences from data collected (Creswell 2014, p. 161). External threats to validity can arise for several
reasons: the narrowness of participants in an experiment limit the findings being generalised to a larger population, the characteristics of individuals in particular settings limits generalisation to other settings, and, because results of experiment are time bound, a researcher cannot always simply generalise the results to past or future situations (Creswell 2014, pp. 161-76).

Researchers must therefore develop specific approaches to manage validity, including identification of all potential threats to the research method and develop a plan to manage them (Creswell 2014, p. 164).

Following a researcher’s quantitative experiment or survey, the final stage of the quantitative method is to interpret findings in consideration of testing acceptance or rejection of the hypotheses or research questions initially established. The interpretation should address – by applying accepted decision rules - whether hypotheses or questions were supported or refuted, if treatments that were implemented made a difference with results compared to existing theory and literature. Threats to internal validity should be identified and reported, and indications/guidance should be made and provided as to how results can be generalized to certain people settings and times. Implications of the research, or the need for further research should be conveyed in the appropriate manner (Creswell 2014, p. 178).

These challenges and limitations were major reasons why this study was not able to adopt a wholly quantitative research design.

**Qualitative Research Methods**

Compared to quantitative research methods, qualitative research methods use looser controls and are less prescriptive (Coolican, 1999, p. 39). Qualitative processes focus on learning the meaning participants hold about issues and developing a framework that enables evidence to emerge from collected data. This
approach is opposed to applying strict testing rules that focus on the researcher’s meaning of a problem or as expressed in literature (Creswell 2014, pp. 178). Participants and sites (or documents & visual materials) are purposely selected to help researchers understand research problems.

For example, Miles and Huberman (1994) identify four important aspects for obtaining quality data; the setting, actors (who is participating), events (what participants are doing) and process (the evolving nature of events undertaken by actors within the setting) (Creswell 2014, p. 189).

Qualitative research methods are characterised by studies undertaken in natural settings with researchers considered ‘instruments’ in data collection. Typically qualitative data is collected through face to face interviews, observing behaviours or examining documents (Creswell 2014, p. 178). From this type and range of data, qualitative researchers’ attempt to build patterns, categories and themes from the ‘bottom up,’ inductively organising data in to abstract and more generalizable units of information. This information can be reviewed deductively to determine if more evidence is required to support initial themes or categories that have been established. A qualitative method requires both inductive and deductive thinking as research project moves forward (Creswell 2014, p. 178).

Researchers using qualitative methods typically become involved in sustained and intensive experiences with participants and may form opinions, relationships and make value or ethical judgements during data gathering procedures (Creswell 2014, p. 187).

It is important that qualitative inquirers reflect on their role in a study and how their personal background, culture, experiences and worldview have the potential to shape direction of the study (Creswell 2014, p. 187). Qualitative researchers try to develop holistic accounts of problems or issues being studied, allowing a bigger picture to
emerge from the multiple factors and perspectives involved in the research situation (Creswell 2014, p. 187).

Data collection and recording techniques used in qualitative research can be categorised into four main types. These are; observations, interviews, documentation reviews and audio visual reviews (Creswell 2014, p. 187).

The analysis of qualitative data is a controversial area that has led to many debates and exchange of theory and ideas over time (Punch 1999, p. 200). The richness and complexity of qualitative data mean a variety of analysis techniques can be utilised with no single “right” technique acknowledged in research literature (Punch 1999, p. 200). Consideration of the appropriate use of qualitative methods and techniques used to analyse RMTDF research data is discussed in detail in section 3.5 below.

A generalised framework for qualitative analysis has been developed by Creswell (2014, p. 197), and a key decision by this researcher was to adopt it as the basis of the study’s research design. Creswell suggested a general procedure that can be used to analyse qualitative data with more specific steps blended into the process as required (Creswell, 2014, p. 197). Creswell’s general qualitative analysis flowchart guided the interpretation and description of the qualitative data collected in the RMTDF research (results reported in tables 16-21, pp. 188-196). Creswell’s flowchart is shown below.
The step by step process above indicates a linear, hierarchical approach to qualitative data analysis. In practice the various stages interact with each other and the order of analysis may vary as the study progresses (Creswell, 2014, p. 197).

**Issues of Reliability and Validity for the RMTDF Study**

As qualitative methods use a variety and complexity of research techniques reliability, validity and generalisability indicators differ from those associated with quantitative methods. Reliability is not measured using statistical testing for
consistency of responses, and generalisability is not measured in terms of being repeatable in different settings with different people (Creswell 2014, p. 165). Yin (2009) and Gibbs (2007) suggested the following qualitative reliability procedures (Creswell 2014, p. 203):

- Documenting as many steps of analysis as possible
- Check transcripts for obvious mistakes made during transcription
- Elimination of ‘shift’ in definition and meaning of codes during coding process by constantly comparing codes and writing memos
- Regular communication and meetings in team research

Validity is considered a strength of qualitative research which is often described in terms of trustworthiness, authenticity and credibility (Creswell 2014, p. 203). Researchers can use a variety of measures to ensure findings are accurate including triangulation, member checking and rich descriptions to convey findings. Validity is also strengthened if researchers identify and clarify their own biases imbedded in the study, and also impartially represent negative or discrepant information that run counter to developing themes (Creswell 2014, p. 203).

Qualitative generalisation has limited meaning as typically qualitative studies focus on individuals or sites without intending to generalise research finding to other sites or settings (Creswell 2014, p. 203). There are exceptions to this thinking however, with Yin (2009) indicating qualitative case study results can be generalised to broader theory (Creswell 2014, p. 204).

Punch (1999, p. 261) indicated that transferability is a preferred term to describe the external validity of qualitative results. According to Punch (1999, p. 261) three key factors impact on the transferability of qualitative research results. They are; (1) ensuring appropriate variations are captured through diversity of sampling, (2) ensuring detailed and thick descriptions of data are available for readers to judge
transferability of findings to other situations, and (3) ensuring the level of abstraction is at a sufficient level to allow applications to other settings. The approaches used by the researcher to deal with the transferability issues highlighted by Punch (1999, p. 261) will determine the external validity of a qualitative research study.

Because of the strengths of qualitative research methods discussed above, the qualitative approach was strongly favoured by the researcher to be used as part of the RMTDF research design.

The researcher considered qualitative research methods would enable reliable and valid research outcomes even with the limitations of a small research sample. However, when strategies of enquiry that are linked to qualitative research methods were examined in detail, a number of limitations relating to practicality and research scope were exposed (a full description of qualitative strategy considerations is presented below in section 3.5).

The final consideration of research methodology was the mixed method approach. Mixed research methodology is now described below and is followed by the researcher’s justification and description of the actual research design that was eventually chosen to test and verify the user acceptability of the RMTDF.

**Mixed Research Method**

Mixed method research is a research method that collects qualitative and quantitative data bringing them together to capitalise on the strength of each approach and compensating for the weaknesses of each approach (Creswell, 2014; Punch 1999). The core assumption of mixed method inquiry is that a combination of methods will contribute to a greater understanding of a research problem than either qualitative or quantitative methods used alone.
Combining research approaches is not a simple strategy and a number of issues relating to the way methods are linked and the means of combining data and findings must be considered (Punch 1999, p. 246). Researchers need to consider the possibilities of adding one approach to another, interweaving the two approaches or linking the two approaches (Punch 1999, p. 246).

Mixing methods can be considered on a continuum of complexity. At the simpler end of this continuum methods are not combined but the results are. The next level brings together both types of data during analyses, contributing to the findings. At the most complex end of the continuum, studies that combine methods, data and findings can be described as full multi method studies (Punch 1999, p. 246).

Mixed method approaches can pose a number of challenges for researchers including; the need for extensive data collection, the requirement for analysing qualitative and quantitative data, and a requirement to be familiar with quantitative and qualitative forms of research (Creswell 2014, p. 219).

Clear visual models should also be incorporated in the data analysis because of the complexity of mixed method design (Creswell 2014, p. 219). The following table provides a summary of the research methods discussed above.

<table>
<thead>
<tr>
<th>Quantitative, Mixed and Qualitative Methods</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quantitative</td>
</tr>
<tr>
<td>Pre-determined</td>
</tr>
<tr>
<td>Instrument based questions</td>
</tr>
<tr>
<td>Performance data, attitude data, observational data and census data</td>
</tr>
<tr>
<td>Statistical analysis</td>
</tr>
<tr>
<td>Statistical interpretation</td>
</tr>
</tbody>
</table>

Table 10: Summary of Quantitative, Mixed Method and Qualitative Research Methods (from Creswell 2014, p. 17).
3.5 Consideration and Justification of the RMTDF Research Design

Research design is concerned with developing plans and procedures that encompass all aspects of a research project. As detailed so far in chapter three, research designs must consider the philosophical worldviews held by researcher, strategies of enquiry that best suit the research problem and appropriate methods of data gathering and analysis.

A starting point for justification of the RMTDF research design is the identification of the pragmatic worldview assumptions held by the researcher. This meant the primary focus for the researcher was the research problem and what research approaches could be most practically utilised to understand the problem (Creswell 2014, p. 10). Therefore, quantitative, qualitative and mixed methods approaches were all considered as potential research strategies to answer the research question(s).

The research was principally concerned with verifying the proposition that a RMTDF can be used to improve the effectiveness of training decision outcomes. Whilst all research strategies could be considered for this task, generally quantitative approaches are used in verification studies whilst qualitative approaches are used for theory generation (Punch 1999, p. 247). Initially, quantitative strategies were considered the most suitable approaches for analysing and verifying the effectiveness of the RMTDF. However, as the research planning progressed, it was apparent that small NSW TAFE sample sizes (at senior training decision making levels) would limit the ability to determine normative statistical research outcomes from the phase 1 research questions that had been developed.

With this limitation identified, qualitative and mixed method strategies increasingly influenced the researcher’s pragmatic worldview mindset. A number of qualitative research strategies were therefore considered by the researcher, including; case studies, phenomenological research, narrative research, ethnography and grounded
theory. Consideration of these strategies to answer the central research question are discussed below.

**Case studies** are qualitative approaches where one case or small numbers of cases are studied in detail (Punch 1999, p. 150). A variety of procedures are used in case studies, they are usually conducted over a sustained period of time and they seek to obtain in depth data and analyses of a program event or activity (Creswell 2014, p.14). Critics of case studies method argue that their findings are not generalizable however case studies can be useful in situations where our knowledge is fragmentary, incomplete or non-existent (Punch 1999, p. 150). Case studies were not considered appropriate for this research as the central research question was tested through the development of a sub set of research questions that addressed specific training effectiveness categories (38 phase 1 questions). These categories applied to different decision makers in the NSW TAFE training organisational hierarchy and using case studies would have limited the ability to obtain a diverse sample across multiple NSW TAFE institutes participating in the research (5 institutes participated).

Another qualitative method considered was phenomenological research. Phenomenological research is orientated towards understanding the human experiences of phenomena at the deepest level (Creswell 2014, p. 14). The focus of phenomenological research is developing understanding the ‘lived experiences’ of the participants and focusing on understanding ‘how things happen’ as opposed to ‘why things happen’ (Nueman 2006, p. 474). Phenomenological methods require direct and prolonged engagement between researcher and participants. Whilst this approach may have provided useful insights into the application of the RMTDF in a real world setting, issues of time, accessibility and lack of diversity meant that **phenomenological methods** were considered unsuitable for inclusion in the research design.
Narrative research is a design of enquiry focusing on understanding a chronology of events linked to human individuals or groups (Nueman 2006, p. 474). Central to narrative analysis is the reliance on participants to tell stories about their lives so that researchers can deduct patterns, chain of events, group interdependencies and individual interactions (Nueman 2006, p. 474). Narrative research can often end with the views of the participants linking with the views of the researchers forming a collaborative narrative (Creswell 2014, p. 14). Whist the narrative strategy would be a means of gathering rich and accurate data in the way NSW TAFE participants apply the RMTDF, it would create an onerous data collection and analyses task for the researcher. The RMTDF being researched is based on a ‘whole of organisation’ approach that impacts on all organisation training decision makers. Therefore a central philosophy underlying the research strategy is that all levels of personnel involved in training decision making must be asked questions with their feedback analysed. With a large amount of questions (38 phase 1 questions) asked across 5 different NSW TAFE institutes, the volume of data generated does not fit in with a narrative research approach.

Ethnography is a qualitative research technique involving researchers studying a cultural group over a period over time in natural settings (Creswell 2014, p. 14). Data collection involves detailed observation and interviews with the researcher becoming an insider to the cultural situation in order to understand the research issue intimately (Nueman 2006, pp. 381-3). As with other qualitative approaches discussed, the ethnography approach would provide rich insights into how a RMTDF could be used by NSW TAFE practitioners, however it was simply not viable for the researcher to spend the amount of time required to study NSW TAFE practitioners in this way. The approach would also have limitations as discussed above due to the requirements to consider a wide spectrum of research participants and not focus on a small sub section of organisational training decision makers.
The final qualitative strategy considered here is grounded theory. Whilst described as a theory, grounded theory is not actually a theory but a strategy of enquiry used to develop general abstract theory that is grounded in views of participants (Creswell 2014; Punch 1999). Grounded theory does not start with a theory from which it deduces hypotheses for testing, it starts with an open mind aiming to end up with theory (Punch 1999, p. 166). Grounded theory is systematic and flexible, it provides discipline and organised approaches to analysis and is suited to developing theory in new areas of research (Punch 1999, p. 166). Whilst grounded theory provides a strong qualitative analytical model it would not be suited to the RMTDF research project as a research question is already developed (can the RMTDF improve training decision making effectiveness?). The research strategy is principally concerned with comparing the RMTDF with existing NSW TAFE decision making approaches and verifying if the RMTDF is more effective in the 38 developed training decision making categories.

Having ruled out using only qualitative research strategies, and with the researcher's view that using only a quantitative approach would limit the validity of findings, the researcher decided a mixed method data gathering approach would be the most suitable to address the research design issues. As described earlier, a mixed method approach capitalises on the strengths of quantitative and qualitative approach’s providing a greater understanding of a research problem than either qualitative or quantitative methods used alone (Creswell, 2014; Punch 1999).

Mixed methods offer an approach that can increase the scope, depth and power of research (Punch 1999, p. 166). Relating the approach to the RMTDF research, a mixed method approach was selected because it enabled a wide range of NSW TAFE training decision makers to be involved in a quantitative research question process (phase 1). This was considered important because the RMTDF research was concerned with training decision making on a whole of organisation bases.
Whilst the phase 1 quantitative component enabled a wide range of questions to be asked, the small population of training decision makers (at NSW TAFE management levels) limited the sample size and ability to determine normative statistical outcomes. A mixed method strategy therefore provided the opportunity to use a second phase of qualitative questions and analyses to interpret and verify the initial phase 1 quantitative trending data. According to Punch (1999, p. 247), triangulation of data in this way provides a richness and depth to data analyses, increasing the validity the research outcomes.

An epistemological rationale for using mixed method is provided by Symonds and Gorard (2008, p. 4) with their key points summarized below;

1. It is possible that all singular methods (i.e. interview, survey) and data types (numerical, audio, visual, word based) can be classified under one of two succinct paradigms (quantitative and qualitative)
2. It is possible for elements from each of these two paradigms to coexist in a single study
3. A third category is needed to refer to studies which use elements of both paradigms
4. Pragmatism is considered as the philosophical basis for this third category
5. The third category should itself be considered a separate paradigm

Supporters of mixed method approaches suggest it can improve research validity and provide more flexibility and scope for dealing with research problems. Critics of mixed method approaches argue that it has low construct validity (in specific circumstances) and can be viewed as a perspective on how research can be done, and not what the research actually is (Symonds and Gorard, 2008, p. 5). Also it can be argued that mixed methods can lead to bias against other real life forms of research, and is likely
to restrict the research community’s potential for creating new and more effective models (Symonds and Gorard, 2008, p. 5).

3.6 The RMTDF Research Design

Having decided on a mixed method research design and method, the researcher then had to make a number of strategic decisions on how the qualitative and quantitative approaches were weighted, how they interacted and how they were sequenced (Punch 1999, p. 247). Guided by the researcher’s pragmatic worldview mindset, the mixed method design utilised practical techniques to gather and analyse research data. These techniques utilised single factor phase 1 questions (used for RMTDF correlational analyses) and open ended qualitative phase 2 questions (used to validate the trending patterns established from phase 1). The data was gathered from a diverse population of training decision makers (NSW TAFE participants and TAFE expert panel), located in a wide range of geographical locations in NSW. The fundamental research design criteria are now outlined in the following section.

3.6.1 Description of RMTDF Research Design

Three basic mixed method designs were identified and summarised in section 3.3. They were: Convergent Parallel Mixed Method Design, Explanatory Sequential Mixed Method Design and Exploratory Sequential Mixed Design (Creswell 2014, p. 219). Having considered the strengths and weaknesses of these approaches and with a pragmatic world view focus the researcher decided that an Exploratory Sequential Mixed Method Design was most suited to address the RMTDF research question.

Explanatory sequential mixed method design typically involves a two phase project where the researcher collects quantitative data in phase 1 and uses the results to plan or build the second qualitative phase (Creswell 2014, p. 244). The overall intent of this design is to have qualitative data explain in more detail the results of the quantitative phase (Creswell 2014, p. 244).
Using the standard approach to sequential method design, quantitative survey data was collected in the first phase of this research (38 phase 1 questions) and followed up with qualitative data collection in the second phase (follow up questions to TAFE sample & TAFE expert panel). The second phase qualitative analyses was used to explain and verify the trends detected in the first phase data. A third research phase was then used to combine the findings from phase 1 and 2 and report back on the effectiveness of the RMTDF in the seven significant training decision categories that were the bases for the research question development. The qualitative analyses included responses both from NSW TAFE personnel and a separate expert TAFE panel enabling a high level of data triangulation and verification.

3.6.2 Question Development and Sample

An overview of phase 1 research question development was provided in chapter one. The first phase questions were developed following a review of existing literature and were based on a series of training effectiveness questions first posed by Salas et al. (2012, p. 94). From this series of questions, seven significant training decision categories were identified. It was considered these seven significant training decision categories would influence decision making effectiveness in most training situations. The significant training decision categories were then aligned to the roles and responsibilities of the training decision makers at NSW TAFE. To obtain a comprehensive response to the effectiveness categories nominated by Salas et al. (2012, p. 94) it was decided that 5 levels of NSW TAFE training decision makers should be included in the research sample. The NSW TAFE decision makers selected for the research sample were;

- Institute Director
- Finance manager
- Human Resource Manager
Course Coordinator
Course trainer

The variations in NSW TAFE personnel training making responsibilities are identified below. The comparison below of a NSW TAFE Institute Directors’ position responsibilities with a NSW TAFE Teacher/Trainer position responsibilities indicate why different question categories were developed for the NSW TAFE sample.

‘The Institute Director must manage the functions of staff and resources at the Institute to ensure efficient and effective delivery of the Institute’s vocational educational training programs and services within the context of the Governments commitments to the education and training sector and the Departments policy framework’ (NSW Department Education 2008).

 Whilst the Institute Director has overall responsibility for effective delivery of training programs TAFE training personnel have more specific training decision making requirements. These are;

‘The role of Teacher/Trainer is to be a professional educator and help, construct, guide, and enhance the educative process. You are responsible for delivering education programs, facilitating learning and enabling students to achieve their desired outcomes. Your activities will include; providing variety and flexibility in educational practice, undertaking evaluation and assessment of learning outcomes and contributing to decision making that affects the learning environment’ (Jobs NSW 2014).

The sample of five levels of NSW TAFE training decision makers provided the opportunity to obtain diverse and comprehensive research data. This was important when the transferability and validity issues raised by Punch (1999, p. 261) are considered. The following table shows how NSW TAFE training decision maker roles can be aligned with NSW TAFE training decision making responsibilities. Appendix A
lists all questions that are linked to the NSW TAFE decision makers’ responsibilities (38 in total).

<table>
<thead>
<tr>
<th>Decision Making Level</th>
<th>Area of training decision making responsibility</th>
</tr>
</thead>
<tbody>
<tr>
<td>Institute Director</td>
<td>Legal/Corporate/Policy/ Strategic alignment train resource</td>
</tr>
<tr>
<td>Finance Manager</td>
<td>Resource allocation/Train Prioritisation /Return on Train invest</td>
</tr>
<tr>
<td>Human Res Manager</td>
<td>Workforce skill development/align corp strategies with training</td>
</tr>
<tr>
<td>Training Coordinator</td>
<td>Course planning/ types of training strategy&amp; approach</td>
</tr>
<tr>
<td>Course Trainer</td>
<td>Knowledge requirement/ train methods/assessment &amp; evaluation</td>
</tr>
</tbody>
</table>

Table 11: Linking of Research Participant Training Decision Responsibilities to Difficult Choice Areas (reproduced from chapter 1).

The phase 1 quantitative questions were used to compare and measure the NSW TAFE respondents’ confidence levels when their existing training decision approaches were compared to the RMTDF approach. The outcomes of this correlational testing was then used to generate summative trending results across the range of 38 first phase questions. When the trends from the first phase of questions had been analysed, the researcher then developed a second phase of qualitative questions – the phase 2 questions.

Phase 2 Questions

Two different sets of open ended qualitative questions were asked in phase 2 of the research. One set of questions asked the research participants to provide follow up explanatory responses based on their phase 1 answers. Another set of qualitative questions asked the TAFE expert panel to comment on the trending outcomes produced by the researcher from the first phase question analyses. A full description of the phase 2 qualitative questions is listed in appendix (B).

To guide the implementation of the second phase questions, an ‘interim’ or ‘hybrid’ question was developed following analyses of phase 1 data. The use of an interim question is an innovative addition to a mixed method research design and provides a
bases on which qualitative and quantitative components of a research design can be connected (Creswell 2014, p. 149). The interim question used to guide the second phase questions was: ‘Do changes in decision making confidence levels indicate the RMTDF can improve the effectiveness of training decision outcomes?’

Pilot Testing of Phase 1 Questions

Prior to asking the first phase questions at NSW TAFE institutes a set of proposed single factor quantitative questions were trialled at a NSW Public Health Facility. The trial targeted public health training decision makers with similar decision making functions as those in the NSW TAFE sample (trainer, training coordinator). The purpose of the trial was to test the reliability and validity of the question structure and the scaling method developed by the researcher. Guided by the single factor questions, respondents were required to score their training decision confidence levels both with and without the RMTDF on two separate occasions. The confidence levels were measured using a Likert scale (Coolican 1990, p. 98). Following the trial minor adjustments were made to the question structure. The full outcomes and description of the pilot testing is reported in chapter four.

3.6.3 Question Response Measurement and Analyses

Phase 1 Question Analyses

As already discussed, a Likert scale based design was used to measure the decision making confidence levels of NSW TAFE research participants. The research participants were required to score their decision making confidence levels with and without the use of the RMTDF using a Likert scale of 1-4 (1= low confidence, 4= high confidence). This approach required respondents to score the phase 1 questions twice (time one and time two). The single factor questions were therefore measuring the effect the independent variable (RMTDF) had on the dependent variable (the sample groups confidence score) (Creswell 2014, p. 52).
The comparison of the mean scores between time one (not using the RMTDF) and time two (using the RMTDF) enabled changes in respondent decision making confidence levels to be measured. This measurement determined if respondents had more (or less) confidence when using the RMTDF for decision making in each of the 38 question categories surveyed. It was also possible to measure the size of variation in confidence levels in each question category to understand if the variation was statistically significant.

Statistical significance testing of the phase 1 data was undertaken using Wilcoxon signed rank test. This is a non-parametric alternative to repeated measures t-testing. The Wilcoxon approach converts score to ranks and compares them at time one and time two (Pallant, 2013, p. 238). Non-parametric testing does not have the sensitivity and power of parametric testing however is appropriate for measuring ranked scales with small samples that do not meet the stringent assumptions of parametric techniques (Pallant, 2013, p. 221).

A limitation to the research design has already been acknowledge due to the inability to determine a truly randomised NSW TAFE sample. There are 10 TAFE Institutes in NSW, however only 5 agreed to participate in the research. In that practical sense the participating NSW TAFE’s were purposely self-selected. This non-random approach violated the usual quantitative research design assumptions used for statistical inference testing (Pallant 2012, p. 222). It is also acknowledged that assumptions relating to sample confidence levels and sample margin of error percentages have not been met (Creswell 2014, p. 159 NSS 2014, p. 1).

Due to sample limitations, the phase 1 data was not intended to provide normative statistical outcomes. The phase 1 data provided summative results only. Trending patterns from phase 1 data were then used as the bases for the second phase question development and subsequent (mainly) qualitative based validation. The
tending patterns from the 38 phase 1 questions are graphically represented and summarised in chapter four.

Despite the statistical limitations of the research design, the actual participation rate obtained from NSW TAFE institutes is considered a research strength. The fact that five NSW TAFE Institutes’ were prepared to participate in independent research during a period of significant reform to the NSW TAFE sector is considered a significant achievement. During this period of change and reform to the NSW TAFE sector, personnel had been asked to complete many surveys and questionnaires. Anecdotal reports indicated a culture of ‘survey fatigue’ was prevalent in most NSW TAFE institutes. In this context, having 5 NSW TAFE institutes agreeing to participate in the RMTDF research was considered a significant achievement. Also significant was the phase 1 response rate of 100% from the management section of the sample and a 75% management response rate in phase 2. Email survey response rates over 70% are considered ‘very good’ (University of Texas 2011), and indicative that survey respondents are engaged and interested in the research topic. Such a high participation rate also demonstrated a ‘comprehensiveness’ of research implementation, enabling rich and deep research outcomes (Punch 1999, p. 166).

**Phase 2 Question Analyses**

Phase 2 required the analyses of both follow up questions asked of the NSW TAFE sample, and questions asked of the separate NSW TAFE expert panel. The follow up questions were based on the trended analyses from the phase 1, as selected and developed by the researcher. Four categories of training decision making confidence level responses emerged from the trended phase 1 data. Those categories were; higher confidence levels, lower confidence levels, mixed confidence levels and no change in confidence levels. Sample respondents were asked to explain why the RMTDF changed their confidence levels in relation to their specific NSW TAFE
training decision making responsibilities. The NSW TAFE panel were asked to comment on the overall first phase confidence level trending patterns reported to them by the researcher.

Large amounts of second phase qualitative data were received from respondents with written responses of up to ten lines common. The analyses of the qualitative second phase data involved techniques shown by Creswell (2014 p. 197) where open ended questions, containing large amounts of data, are broken into usable chunks of information. This approach uses memo writing and coding to develop themes and descriptions needed for interpretation of data (Creswell 2014, p. 197). Coding is a process of organising data by segmenting sentences into categories, and labelling those categories with a term based on the actual language of the participant (called an “in vivo” term) (Creswell 2014, p. 198). Several methods of coding can be used to organise data. These methods are: developing codes only on the basis of emerging information, using predetermined codes and fitting data to them, or a combination of both approaches (Creswell 2014, p. 197).

This study used the method of establishing predetermined codes and fitting data to them. A coding table was developed to categorise and label data so as to enable meaningful data analyses. The following three categories were used to sort the raw data into statements indicating why the RMTDF changed training decision confidence levels:

- Category one – Statements indicating RMTDF training decision rules understood
- Category two – Statements linking the use of the RMTDF decision rules to effective training decision outcomes
• Category three – Statements linking RMTDF rules to specific effective
decision making responsibility areas (significant choice areas per
individual)

A coding table indicating how coding categories link to overall data analyses is shown
in chapter four.

3.6.4 Interpretation and Validity

A final component of explanatory sequential mixed method design is to report the
findings of the research in a staged approach. The first stage reports the quantitative
findings; the second stage reports the qualitative results. A third level of interpretation
is then used to explain how the qualitative findings help explain the quantitative results
(Creswell 2014, p. 224).

In this research, the first stage reporting is the quantitative phase 1 question
comparison scores that have been trended, graphically represented and analysed for
statistical significance (chapter four). The second stage reports the reasons given by
respondents for their confidence level variations and identifies the components of the
RMTDF that had a positive or negative effect on training decision outcomes. Also
reported at this stage were the answers provided by the four members of the TAFE
expert panel who considered the researcher’s stage one data trending analyses and
provided feedback (panel qualifications & experience listed in appendix C). The third
stage of reporting used the qualitative interpretations from stage two to verify and
justify the findings of the stage one quantitative trending analyses (chapter 5). This
combined evidence is then used to make research conclusions. These conclusions
indicated how the RMTDF can improve training decision making effectiveness in each
of the seven significant training decision categories initially developed from the Salas
et al. (2012, p. 94) question series.
Creswell (2014, p. 225) indicated threats to validity of mixed method studies arise if the researcher does not consider and weigh all follow up options from the quantitative results. Also a researcher may invalidate results by using different samples or choose inappropriate sample sizes at each stage of the mixed method enquiry (Creswell 2014, p. 225).

The validity threats are addressed in this research by nominating four distinct follow up categories that link to the central research question. These categories specifically address stage one responses of higher level decision making confidence, lower level decision making confidence, mixed levels of decision making confidence and no change of decision making confidence. Ensuring each of these categories is analysed comprehensively in the second stage reduces the threat of researcher bias and provides an accurate interpretation of the effect the RMTDF had on respondent confidence in training decision making.

The sample selection has been discussed above and is well suited to providing valid research outcomes. The sample size in phase 1 and 2 is small in numeric terms, however is comprehensive as it included all five participating NSW TAFE Institutes managerial training decision making personnel (Institute Director, Finance Manager and Human Resource Manager). The sample is less comprehensive at Course Coordinator and Course Trainer level. The samples were linked in both phases of the research with the same participants being asked phase 1 and phase 2 questions. Survey response rates in the first stage were exceptional; 100% for the top four respondent levels and 50% for the final level (Course Trainer –target 100). Response rates in the follow up qualitative section were 75% for the top four levels and 20% in the course trainer level.

A final strategy to increase the internal validity of the research was the use of TAFE expert panel to interpret the researchers’ analyses of stage one data and provide their
expert commentary on the reasons for confidence level variations in the 38 first phase questions.

The Explanatory Sequential Mixed Method Design used in this research project is summarised in the figure below. The reporting of the findings from phase 1 and 2 and the conclusion to these findings is reported in detail in chapters four and five.

![Figure 16: Summary of Explanatory Sequential Mixed Method Research Design (from Creswell 2014, p. 220).](image)

### 3.7 Ethical Considerations

All social research that involves collecting data on people about people, will encounter ethical issues (Punch 1999, p. 281). Ethical issues are important considerations gaining increased attention in today’s research environment and considerations of personal disclosure, authenticity, credibility, sensitivity of information and privacy must all be addressed in the research process (Creswell 2014, p. 92).

Research undertaken for this project involved interviewing respondents at two separate organisations across a number of different individual sites (NSW Public Hospital & NSW TAFE Institutes). The initial stage of the ethics process required approval from the Director General of NSW TAFE & Community Education to allow NSW TAFE Institutes to participate in the proposed research study. This approval was gained on 21st March 2012 and is attached as appendix (D). The next ethical process step entailed applying for research approval from the joint NSW Health and Wollongong University ethics committee. This approval was granted on 28th May 2013 and included permission to undertake research at specific Health Service sites.
(approval number HE/251 – appendix E). The final stage of the ethics approval process involved completing ethic applications at each NSW TAFE institute participating in the research study (example appendix F). The five applications for research at each institute were approved in a period between June - September 2013.

Data were gathered through email questionnaires (phase 1) and follow up open end questions answered via email (phase 2). All data has been stored securely and viewed solely by the researcher. Research participants were not placed at any risk during the research and no deceptive tactics or elements were used in the research process. A signed consent form detailing research conditions and ethical standards has been completed by every research participant (example appendix G).

A strict condition of the NSW TAFE ethics approval process was that institutional and personal anonymity must be maintained. Therefore all reported data is de-identified, so that the confidentiality and privacy of individuals and the organisations they work for is not compromised. All research participants were informed that research data would be published in a thesis document and be available as public document through the University of Wollongong internet processes.

As the RMTDF is considered an innovative idea with potential applications across a range of organisational training settings, an application for an innovation patent was lodged with Australian government agency Intellectual Property Australia (IP Australia) prior to the research questions being sent to NSW TAFE participants. The innovation patent was granted in July 2012 by IP Australia, and consequently the RMTDF is registered as innovation patent number 2012100862.

3.8 Conclusion

This chapter has summarised the different types of approaches that can be considered for a research project and identified the relevant factors involved in research design. Specifically, issues such as the researchers philosophical world
view, strategy of enquiry and research method have been explained and justified in the context of the research question being investigated and current research methods literature.

The chapter began by explaining that the RMTDF being investigated by the research had been justified and developed from a literature review provided in detail in chapter two. The literature base established in chapter two was a key influence on the research question development (based on the Salas et al. 2012 question series) and the choice of research strategy. Chapter three also identified the researcher’s worldview philosophy as being pragmatic and identified and adopted a model incorporating several different research strategies that could most suitably address the research problem being investigated.

A combination of both qualitative and qualitative methods of enquiry have been justified by this chapter as the best fit to the researcher’s pragmatic worldview assumptions. This mixed methodology based method offered the most effective means of verifying the effectiveness of the RMTDF and understanding the practical implications of the research data.

The mixed method approach enabled phase 1 quantitative method based comparison and analyses of respondent decision confidence levels with and without the support of the RMTDF. The phase 2 follow up based on qualitative questions, then provided meaningful data that described in detail the reasons respondents considered the RMTDF would provide them with higher or lower levels of training decision making confidence. A third stage of interpretation uses the technique of combining the both quantitative and qualitative results to provide verification evidence of the perceived effectiveness of the RMTDF in the significant training decision categories (Salas et al. 2012, p. 94) that were the bases of the research question design.
Maximising research validity was also discussed in this chapter. Validity is a strength of qualitative research (Creswell 2014, p. 201) and by using the phase 2 qualitative question and analyses this research project strived to present trustworthy, authentic and credible findings that supported and enhanced the quantitative stage one findings. Consistent questioning to the same sample group during the research phases 1 and 2 was a key strategy used to maintain the internal validity of the research project. A second strategy used to enhance internal validity was the use of a panel of expert TAFE personnel to review the researcher’s initial (i.e. stage 1) quantitative findings, and to provide commentary on the relevance and credibility of these findings – a commentary which was based on their extensive experience as TAFE training decision makers.

The chapter concluded by reviewing and discussing how the study adequately dealt with the ethical considerations and the requirements of both NSW TAFE and Wollongong University ethics processes. All ethical requirements were fulfilled with the specific issues of harm, deception, consent, privacy and confidentiality addressed in the research design. For example, research participants cooperated willingly and understood that de-identified data from their organisations would be published in this research thesis. It was agreed by those sampled that research data and outcomes would be made available for their professional consideration on completion of the project.

Chapter three has developed the rationale for the research design and justified the chosen approach and research method. Chapter four will now provide the detailed phase 1 and phase 2 findings from the explanatory mixed method research undertaken at five NSW TAFE institutes.
Chapter 4: Data Collection, Interpretation and Analyses

4.1 Introduction

The previous chapters reviewed existing research literature (Chapter two) and provided a rationale (Chapter three) for selecting a mixed method strategy for data collection, interpretation and analyses. This chapter describes how the research was actually conducted and presents the findings and analyses of the three phased mixed method research process.

4.2 Overview of Data Collection Process

Phase 1 research was used to obtain response data from a sample of five different categories of NSW TAFE training decision making personnel as justified by the research design, and tested if selected aspects of the RMDTF would improve training effectiveness and outcomes.

As explained in detail in chapter three, a total of 38 phase 1 research questions were developed from a series of training effectiveness questions which were initially proposed by Salas et al. (2012, p. 94) in the science of training literature. These 38 phase 1 questions were used for obtaining responses about whether the RMTDF was perceived as capable of improving training decision making from the sample of NSW TAFE research participants. Specific questions were developed for each of the five levels of training decision makers constituting the sample, and questions were developed that were aligned directly to the respondent’s areas of training responsibility. In some cases these areas of responsibility overlapped and the same questions were asked at all levels of the sample. This approach is indicative of the team based requirement of an organisational training environment, where training decision making responsibility requires a partnership approach between all personnel involved in training decision making (Buckley & Caple 2009, p. 4).
As indicated in chapter three, research data was gathered initially by asking a series of quantitative phase 1 questions. The phase 1 questions were emailed to NSW TAFE participants in a questionnaire format (appendix H). When the phase 1 question response data had been analysed, a set of qualitative second phase follow up questions were developed by the researcher and were emailed both to the participating NSW TAFE sample and to the expert TAFE panel. The quantitative first phase questionnaire was initially pilot tested for internal validity at a NSW Public Health organisation prior to questionnaires being sent to the NSW TAFE sample. The outcomes of the pilot testing are detailed in section 4.3 below.

Five NSW TAFE’s participated in the research, representing 50% of the NSW TAFE population. A strong question response rate was recorded at the four TAFE senior management levels of the selected research sample (phase 1- 100%, phase 2-75%). The response rate at the trainer level of the sample was less impressive (phase 1- 50%, phase 2- 20%). These response rates (particularly at senior training decision making levels) were considered indicative of a genuine interest in the research topic and a willingness to consider an innovative training decision framework that had not previously been used by NSW TAFE training decision makers. The strong question response rate enabled high quality and reliable data to be gathered to test and verify the research question (s). It is acknowledged that a non-response bias in phase 2 trainer responses limited the opportunity to verify some of the phase 1 trends identified in the trainer question categories. Chapter five provides full details of the verification outcomes when data from phase 1 and 2 are combined.

4.2.1 Method Used to Collect & Analyse Phase 1 and 2 Data

The phase 1 questions were emailed to respondents with an information package describing the RMTDF and how risk management decision rules could be used for
training decision making (research participants’ information package appendix I). The phase 1 questionnaire asked respondents to undertake two tasks. Task one asked respondents to score their training decision making confidence levels using existing NSW TAFE decision making methods. The second task required respondents to consider the information package (indicating use of risk management training decision rules) and score their confidence levels when risk management decision rules were applied to their training decision making. The variations in scores between time one measurement (existing decision making confidence levels) and time two measurement (decision making confidence levels using RMTDF) provided the bases for phase 1 correlational analyses. The phase 1 analyses was used to identify summative trending patterns (higher or lower confidence levels) in the 38 decision making question categories aligned to the NSW TAFE respondents training decision making responsibilities.

SPSS software was then used to review confidence score variations between time one and time two measurement to understand if variations identified in the 38 question categories were statistically significant (using Wilcoxon signed rank test).

Four categories of decision making confidence levels were identified from sample responses to the phase 1 data. The sample respondents indicated that the RMTDF provided either; a higher level of decision confidence, a lower level of decision confidence, a mixed level of decision confidence or no change in decision confidence level. To ensure consistency, validity, and to reduce researcher bias, the follow up phase 2 questions explored all four confidence levels categories equally (Creswell 2014, p. 225). This approach ensured the second phase qualitative findings were balanced and comprehensively represented NSW TAFE respondents understanding of the RMTDF effectiveness.

Table 12 below indicates the comprehensiveness of phase 2 data collection.
The follow up phase 2 qualitative questions were guided by an ‘interim’ research question that was developed after summative phase 1 trends had been identified. The interim research question used to guide the second phase qualitative questions was: ‘**Do changes in decision making confidence levels indicate the RMTDF can improve the effectiveness of training decision outcomes?**’ Follow up questions were sent to the NSW TAFE sample and to the TAFE expert panel by email.

The NSW TAFE sample follow up questions comprised two open ended qualitative questions. These questions asked respondents to provide detailed reasons why the RMTDF decision rules affected their training decision making confidence levels and

<table>
<thead>
<tr>
<th>TAFE Personnel</th>
<th>No of Responses Received/ Total Sampled</th>
<th>Higher Confidence</th>
<th>Lower Confidence</th>
<th>Mixed Confidence</th>
<th>No change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Institute Director</td>
<td>4/5</td>
<td>3</td>
<td></td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Finance Manager</td>
<td>4/5</td>
<td>2</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Human Resource Manager</td>
<td>4/5</td>
<td>2</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Course Coordinator</td>
<td>3/5</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Course Trainer</td>
<td>4/10</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td></td>
</tr>
</tbody>
</table>

Number of second stage responses received, and indication of patterns of response across range of confidence categories

Table 12: Indication of identified confidence level categories from phase 1 responses and number of phase 2 qualitative responses received.
why aspects of the RMTDF impacted on the effectiveness of training decision outcomes.

The TAFE expert panel questions comprised of three open ended qualitative questions (appendix J). The TAFE expert panel were provided with the researcher’s phase 1 question analyses (and RMTDF support information) and asked to consider if phase 1 decision making trends identified by the researcher could be linked to more effective training decision outcomes in the VET sector. The involvement of the TAFE expert panel provided an additional level of triangulation and validation of phase 1 and 2 data by comparing their responses to the main sample group responses.

Description of Interview Process

As described above, all interviews were conducted by email. Coordinators at each TAFE Institute facilitated the dissemination of the email questions to the research participants’. The researcher did not enter into any other dialogue with individual research participants’.

The phase 1 research questions were closed single factor questions which were designed to measure the changes in decision confidence levels of NSW TAFE respondents both with and without the use of the RMTDF. To assist the participants understanding of the RMTDF, a support package was emailed with the phase 1 questions detailing how the RMTDF could be applied to training decision making (appendix I). No respondents sought further clarification on the information in the support package. All phase 1 data was recorded through the email responses of the phase 1 participants.

Following the researcher’s analyses of the phase 1 data – phase 2 questions were emailed to NSW TAFE participants (see table 12 above) and the TAFE expert panel. The second phase questions consisted of two open questions asked of the NSW TAFE participants and three open questions asked of the TAFE expert panel.
The second phase questions asked of the NSW TAFE respondents focused on their initial confidence ratings of the 38 question categories developed from Salas et al. (2012, p.94) question series (i.e. why was their confidence higher or lower in selected categories?). The second phase questions to the TAFE expert panel focused on their review of the researcher’s phase 1 analyses and if they supported or refuted the initial phase 1 trending patterns (examples of phase 1 & 2 questions are in appendixes B, J & H).

Using email to gather and record data was deemed the most pragmatic approach when the wide range of geographic locations of NSW TAFE participants was considered. The lack of interpersonal intervention by the researcher (i.e. face to face or phone interviews/discussion) ensured the email survey provided consistent and reliable data outcomes and limited the potential for interview bias.

As described below, the high email response rates and the comprehensiveness of many of the written responses demonstrated the research materials used in the email approach clearly engaged the research participants,’ enabling valid and reliable research data to be obtained.

4.3 Pilot Testing - Question/Scale Reliability Outcomes

The measurement and comparison of the phase 1 respondent training decision making confidence level scores was undertaken using techniques applicable a Likert scale based methodology. The Likert scale enabled respondents to rank their training decision making confidence levels using a scoring system where 1 represented low levels of training decision confidence and 4 represented high levels of training decision confidence.

The Likert method of summated ratings is considered a simple form of scaling when compared to other methods, such as the Thurstone or Guttman approaches (Punch 1999, p. 95). It has its strengths as a diagnostic tool through correlation of individual
items within a set of overall scaled responses. The weakness of the Likert approach is the scale value of an attitude or item being measured (which may vary from respondent to respondent) is lost (Punch 1999, p. 95).

A further weakness of the Likert scale is the tendency of respondents to be indecisive when rating required attitudes or items and opting to respond with an undecided or neutral position (Coolican 1993, p. 98). This can provide ambiguous research results and was a consideration in the development of the Likert scale for this research. A scale of 1-4 was used to score NSW TAFE training decision confidence levels, forcing respondents to make unambiguous decisions on training decision confidence. Had the scale been constructed at 1-5, respondents could have more easily recorded the ambiguous middle score of 3.

Two types of questions were developed for the two phased research approach. Quantitative design was used to construct phase 1 questions to enable measurement of score variations between time one testing and time two testing of NSW TAFE participants. The phase 1 questions were designed using a closed single factor structure, used simple language, avoided emotionally loaded words and were constructed so as not to lead participants (Pallant 2013, p. 10). The second phase questions were developed using a qualitative approach, where longer open ended questions were required. The open ended questions for the NSW TAFE sample began with a preamble reminding respondents of their scores in the phase 1 questionnaires. Respondents were then asked to explain the reasons their confidence levels had varied between time one and time two testing. Open ended questions to the TAFE expert panel provided an overview of the phase 1 research findings and asked for commentary on the trends identified by the researcher.

To test the reliability and consistency of the developed first phase questions and use of the Likert scale, piloting of the questions was undertaken using a test – re test
approach. A sample of trainers and training coordinators at a NSW Public Health establishment were selected to participate in the pilot testing process. The test-retest approach is a frequently used method of indicating a scales internal consistency and reliability (Pallant, 2013, p. 6). Graphical representation of the pilot sample responses to the test and retest of the phase 1 single factor questions is shown below.

**Graph 1 - survey of 4 trainers on 11-06-2013 (TEST TIME ONE)** showing the comparative confidence levels of making effective decisions with and without applying a risk management decision making framework.

**Graph 2 - survey of 4 trainers on 27-07-2013 (TEST TIME TWO)** showing the comparative confidence levels of making effective decisions with and without applying a risk management decision making framework.

The key decision making aspects represented in the categories above are:

<table>
<thead>
<tr>
<th>Cat A</th>
<th>Prioritising training methods to meet targeted organisation training needs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cat B</td>
<td>Application of logical and coherent evaluation procedures to decide on training priorities</td>
</tr>
<tr>
<td>Cat C</td>
<td>Ensuring course content is structurally linked to identified corporate skill development</td>
</tr>
<tr>
<td>Cat D</td>
<td>Justifying on a logical basis structured or unstructured training methods</td>
</tr>
<tr>
<td>Cat E</td>
<td>Ability to predetermine training outcomes</td>
</tr>
<tr>
<td>Cat F</td>
<td>Common language to discuss training requirements with different levels of a management</td>
</tr>
</tbody>
</table>
Figure 17: Comparison of responses to pilot questions asked at a public health establishment – course trainers (n=4).

Graph 3 - Survey of 3 training coordinators on 11-06-13 (TEST TIME ONE) showing the comparative confidence levels of making effective decisions with and without applying a risk management decision making framework.

Graph 4 - Survey of 3 training coordinators on 25-7-13 (TEST TIME TWO) showing the comparative confidence levels of making effective decisions with and without applying a risk management decision making framework.

The key decision making aspects represented in the categories above are:

<table>
<thead>
<tr>
<th>Cat</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cat A</td>
<td>Assess corporate goals and match employee skill level requirements</td>
</tr>
<tr>
<td>Cat B</td>
<td>Selection of most suitable training methods</td>
</tr>
<tr>
<td>Cat C</td>
<td>Logical process for assessment and evaluation existing course implementation</td>
</tr>
<tr>
<td>Cat D</td>
<td>Process for ensuring inclusion of most relevant content</td>
</tr>
<tr>
<td>Cat E</td>
<td>Prioritising resource allocation for discussion with other org train managers</td>
</tr>
<tr>
<td>Cat F</td>
<td>Use of common training language for training decisions</td>
</tr>
<tr>
<td>Cat G</td>
<td>Ability to predetermine training outcomes</td>
</tr>
</tbody>
</table>

Figure 18: Comparison of responses to pilot questions asked at public health establishment – training coordinators (n=3).
Testing for pilot response data for consistency and reliability

Two separate techniques were applied to the pilot question response data to test for consistency and reliability, those were;

- Cronbach’s coefficient alpha (testing for internal consistency)
- Spearman’s Correlation Bivariate (testing for reliability of questions asked on two separate occasions in a ranked scale)

The Cronbach coefficient alpha provided an indication of the average correlation among all items making up a scale with values ranging from 0-1 (Pallant 2013, p. 6). Higher Cronbach values indicate greater reliability, with a minimum level of .7 recommend by Nunnally (1978) due to variations in purpose and nature of scales (Pallant, 2013, p. 6). The application of Cronbach’s coefficient alpha testing of the two sets of pilot question produced scores .86 for the trainer category questions, and .94 for the training coordinator question categories. These scores are indicative of the trialled scale having a high level of internal consistency (calculations are shown in appendix K).

The Spearman correlation test was used to compare the scores between the pilot testing time one and time two and correlate the strength of relationship between question responses. A strong correlation indicates consistency and that questions are being reliably answered, whilst a weaker correlation indicates less reliability (Pallant, 2013, p. 6). The correlation coefficient used in the Spearman approach ranges from -1 to 1 with the value indicating the strength of relationship between two variables (positive or negative) (Pallant 2013, p.139). Interpretation of the values of Spearman’s coefficient varies amongst academics with the guidelines recommended by Cohen (1998) provided below (Pallant 2013, p.139);

- Small r = .10 to .29
- Medium $r = .30$ to $.49$
- Large $r = .50$ to $1.0$

When the Spearman correlation was applied to the first and second time pilot question responses at the public health facility, a scoring range of $r = .335$ to $r = .481$ was recorded. Using the Cohen values these scores are indicative of a medium strength positive correlation between occasion one question responses and occasion two question responses (same questions asked six weeks later). IBM SPSS worksheets showing the calculations of Spearman’s correlation coefficient are shown in appendix (L).

The analyses of the testing and retesting of the pilot question responses indicated that the trialled phase 1 questions had been answered reliably and consistently. This provided evidence that the proposed questions were suitably structured. It also demonstrated the intervention material was appropriate and understood by respondents (information pack explaining RMTDF training framework).

**4.4 Presentation of Research Outcomes**

The process and method used to collect, measure and analyse data has been explained and justified. The research outcomes will now be presented using the following structure:

1. Summary of research results
2. Presentation of phase 1 data collection and analyses
3. Presentation of phase 2 data collection and analyses
4. Discussion and findings
4.4.1 Summary of Research Results

Phase 1 Quantitative Analyses

A total of 38 quantitative sub-questions were developed and used in the phase 1 questionnaire. As already explained, the phase 1 questionnaire categories linked NSW TAFE respondent training decision making responsibilities to the significant training decision choice categories developed from a series of key training stakeholder questions posed by Salas et al. (2012, p. 94).

The outcomes of the phase 1 survey were;

- The RMTDF provided respondents with a higher level of training decision making confidence in 23 ‘significant training decision categories’, i.e. 60% of total phase 1 question categories.

- The RMTDF provided respondents with a lower level of training decision making confidence in 8 ‘significant decision categories’, i.e. 21% of total phase 1 question categories.

- The RMTDF had no effect on respondent training decision making confidence levels in 7 ‘significant decision categories’, i.e. 18% of total phase 1 question categories.

The phase 1 survey data indicated a strong trend towards higher confidence levels when training decision makers use risk management decision rules (60% of categories surveyed). This trend was most obvious in the higher level management responsibility categories of Institute Director, Finance Manager and Human Resources Manager and least obvious in the operational level Trainer category.

As acknowledged previously, the small population from which the sample was drawn limited the ability to determine statistically significant outcomes that can be
generalised to a normal population distribution. Despite the statistical limitations that have been described, the researcher did undertake to demonstrate the process of statistical significance testing by applying the Wilcoxon Signed Rank Test to each question category showing confidence level variations. Of the 31 categories tested (i.e. categories where confidence levels were higher or lower), 3 were identified as statistically significant. These 3 categories are listed below;

- Trainer Category (b) - logical assessment of existing course training for relevance for future training methods.
- Trainer Category (e) – ability to pre-determine the outcomes of training methods.
- Trainer Category (f) – ability to communicate training decision making throughout Institute.

**Phase 2 Qualitative Analyses**

Phase 2 of the research asked two follow up questions of individuals from the NSW TAFE sample and three questions of the NSW TAFE expert panel. Participants were asked to provide written responses of up to ten lines, with the actual responses averaging eight lines.

The detail and content of second phase question responses for both sample respondents and TAFE expert panel respondents is considered to be of high quality. TAFE sample respondents gave detailed and clear reasons for variations to their training decision making confidence levels when the use of the RMTDF had been considered. This level of detail combined with a high second phase survey response rate (75%), enabled the second phase data to explain and expand on phase 1 quantitative data in a meaningful and valid way. Comprehensive responses by the TAFE expert panel also strengthened the depth and quality of the second phase data.
A summary of factors reported by the TAFE sample respondents indicating the RMTDF could improve training decision effectiveness outcomes are as follows;

- We could use basic risk management (RM) broadly to assess risk in a number of different contexts in TAFE. Assessing risk is a useful lens to add when assessing training priorities – **Institute Director**

- The new smart & skilled environment TAFE is moving to is foreign to our current operations and will have biggest impact since Gough Whitlam declared free TAFE training. As a consequence Head Teachers/Faculty Directors will use RM to decide on which courses are run. RM will play a major role as we anticipate/forecast, but funding based on completion is likely to have major impact on our resources – **Finance Manager**

- A RM based decision aims to increase the likelihood of successful outcomes using a cost effective approach. All training decisions begin with the desired outcomes for the individuals and the organisation. A RM approach is sensible as it considers the various options for each situation and takes account all the critical factors that could impact the effectiveness and efficiency of the training so that the best option can be selected and remaining risks managed - **Human Resources Manager**. 

- RM training decision principles provide logical and sequenced structures that allow you to rank and prioritise training based on institute needs – this is a real issue for me – providing and working with a logical structure to inform training decisions. With training, this type of framework will be allowing staff to invest in their management capital to improve their decision making reasoning – **Course Coordinator**

- The RM decision making framework gave me a higher level of confidence in categories A,B,C,D,E, & F because it limited my assumptions as a trainer. I would be able to justify training decisions made by using a logical and systematic approach, for example by evaluating the risk of undertaking various commercial training programs by considering staffing, technical and financial considerations and constraints when undertaking the training - **Course Trainer**

Respondents who thought risk management framework would not provide effective training decision outcomes provided the following reasons;

- My response to the original question influenced by the fact the current practice of communicating training decisions is considered effective and given high confidence level. As a result the influence of RM wasn’t seen to provide additional confidence to communication – **Finance Manager**
• The risk management based decision making framework described in the support material did not change my confidence levels for training decision making as I indicated due to our TAFE’s governance and accountability requirements our level of accountability is ranked at a medium level. That is in most cases our TAFE has effective decision making processes where training can be clearly justified and aligned to the Institute goals – Training Coordinator

• I believe the RM training matrix is too simplistic to be useful to predetermine delivery or assessment. The outcomes of successful training and education cannot be predicted from a simple matrix - Course Trainer

• I don’t think I could structure training methods to the “letter” to effectively use a RM assessment based matrix. Course Trainer

The expert TAFE panel question provided a further level of qualitative responses.

• Yes, the panel’s response is that our decision making confidence levels match the trends indicated by TAFE respondents and higher in the categories indicated with two exceptions. The two exceptions are disabilities and school leaver cohorts.

• Yes, the panel agrees with the trend of responses towards higher confidence levels when using risk management may lead to more effective training decision making in TAFE. Training decisions are based on various aspects including target group, resources, costs, funding models, training package requirements and project deadlines. This is noticeable in specially funded cohorts, such as government funded training with imposed deadlines, where training planning and delivery is required to meet contractual requirements in addition to training package regulations so students may gain the necessary skills and documentation to meet government objectives. By using the matrix a more objective decision can be reached without additional, and sometimes irrelevant, factors influencing the decision making process.

• The panel believes that decisions based on the training decision framework provide an advantage over NSW VET delivery, regardless of any new or future framework, due to the objectivity and thoroughness provided by the process. This approach applies to any model of VET training, whether corporate or registered training provider planned and delivered, to comprehensively assess risk for an organisation. By using the matrix to identify risk organisations are able to identify the exact nature of any possible risks quickly and effectively and incorporate decisions that alleviate the identified risk. Once alterations have been implemented the matrix would confirm if any further risks exist so that modifications may be conducted until a suitable plan is achieved. This provides a safety net that organisations have previously lacked in their decision making.
The summary of results from the two phases of the mixed method research approach has been detailed above. The full results of the phase 1 and 2 data collection and analyses will now be presented.

4.4.2 Presentation of Phase 1 Data Collection and Analyses

The results of the phase 1 questions are presented below in two sections. Section one provides a graphical summary of the variation in mean scores between time one testing of respondents confidence levels (existing confidence in training decision making) and time two testing (confidence if applying a RMTDF) across a range of significant choice categories. The measurement of respondent confidence levels was undertaken using a 1-4 Likert scale with 1 representing low confidence and 4 representing high confidence. The mean score of participants was calculated for each question category and plotted on the graphs below.

Section two indicates how statistical analyses testing was undertaken in decision categories where mean score variations in confidence levels were observed.

Section One

Graphical description of 5 levels of NSW TAFE sample training decision making confidence scores measured at time one (existing decision making confidence level) and time two (confidence levels when applying a RMTDF) shown below.
Important and difficult decision Categories for TAFE Institute Directors

<table>
<thead>
<tr>
<th>Cat A</th>
<th>Logical method of ranking and prioritising of required staff skills training</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cat B</td>
<td>Training implementation can be aligned with employees skill requirements to achieve key institute strategies</td>
</tr>
<tr>
<td>Cat C</td>
<td>Training framework would be defendable and logical if questioned at law</td>
</tr>
<tr>
<td>Cat D</td>
<td>Ability to assess and prioritise training targets in relation to institutes mission</td>
</tr>
<tr>
<td>Cat E</td>
<td>Training decision making principles are logical and transparent and clearly identified by auditors</td>
</tr>
<tr>
<td>Cat F</td>
<td>Allocation of training resources is undertaken effectively</td>
</tr>
<tr>
<td>Cat G</td>
<td>A logical framework exists to pre determine the outcomes of your current training implementation</td>
</tr>
<tr>
<td>Cat H</td>
<td>Effective communication of training decision making</td>
</tr>
</tbody>
</table>

Figure 19: Graph showing results of phase 1 Institute Director confidence level testing.
Respondent Level 2: NSW TAFE Finance Managers (N=5)

<table>
<thead>
<tr>
<th>Category</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cat A</td>
<td>Ability to match training resource allocation to institutes skill develop requirements</td>
</tr>
<tr>
<td>Cat B</td>
<td>Ability to rank and prioritise training requirement and investments</td>
</tr>
<tr>
<td>Cat C</td>
<td>Ability to allocate training resources to align with institutes overall corporate goals</td>
</tr>
<tr>
<td>Cat D</td>
<td>Decisions involving allocation of training resources are undertaken in a logical sequence</td>
</tr>
<tr>
<td>Cat E</td>
<td>Training Decisions undertaken provide a clear audit trail justifiable to external agencies</td>
</tr>
<tr>
<td>Cat F</td>
<td>Training decisions are logically communicated through organisation</td>
</tr>
<tr>
<td>Cat G</td>
<td>Decision approaches enable you to pre-determine likely outcomes of training resource allocation</td>
</tr>
<tr>
<td>Cat H</td>
<td>Decision approaches enable you to match your training resource allocation to required organisational skill development</td>
</tr>
</tbody>
</table>

Figure 20: Graph showing results of phase 1 Finance Manager confidence level testing.
**Respondent Level 3: NSW TAFE Human Resources Managers (N=5)**

**Important and difficult decision categories for TAFE Human Resources Managers**

<table>
<thead>
<tr>
<th>Category</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cat A</td>
<td>Ability to match training resource allocation to institutes skill development requirements</td>
</tr>
<tr>
<td>Cat B</td>
<td>Ability to rank and prioritise training investments</td>
</tr>
<tr>
<td>Cat C</td>
<td>Logical allocation of training resources</td>
</tr>
<tr>
<td>Cat D</td>
<td>Ability to decide on methods of training (structured or unstructured training)</td>
</tr>
<tr>
<td>Cat E</td>
<td>Linking methods of training to targeted and specific institute training outcome requirements</td>
</tr>
<tr>
<td>Cat F</td>
<td>Ability to pre determine outcomes of training methodologies</td>
</tr>
</tbody>
</table>

**Figure 21: Graph showing results of phase 1 Human Resource confidence level testing.**
**Respondent Level 4: NSW TAFE Course Coordinators (N=5)**

<table>
<thead>
<tr>
<th>Category</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cat A</td>
<td>Ability to match skill requirements to corporate goals</td>
</tr>
<tr>
<td>Cat B</td>
<td>Ability to rank and prioritise training based on Institutes needs</td>
</tr>
<tr>
<td>Cat C</td>
<td>Selection of training methods that are most suitable for institute needs</td>
</tr>
<tr>
<td>Cat D</td>
<td>Ability to assess and evaluate existing course implementation to decide on future training implementation</td>
</tr>
<tr>
<td>Cat E</td>
<td>Ability to ensure most relevant course content included in course design</td>
</tr>
<tr>
<td>Cat F</td>
<td>Ability to logically assess and evaluate resource allocation for training</td>
</tr>
<tr>
<td>Cat G</td>
<td>Logical feedback mechanisms other decision makers who are responsible for training resource allocation</td>
</tr>
<tr>
<td>Cat H</td>
<td>Effective processes are used to communicate your organisation's training decision making rationale</td>
</tr>
<tr>
<td>Cat I</td>
<td>Training decisions making is communicated through the institute using well understood logic</td>
</tr>
<tr>
<td>Cat J</td>
<td>Ability to predetermine outcomes of training methodologies</td>
</tr>
</tbody>
</table>

**Figure 22: Graph showing results of phase 1 Course Coordinator confidence level testing.**
Respondent Level 5: NSW TAFE Course Trainers (N=51)

<table>
<thead>
<tr>
<th>Important and difficult decision categories for TAFE Course Trainers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cat A</td>
</tr>
<tr>
<td>Cat B</td>
</tr>
<tr>
<td>Cat C</td>
</tr>
<tr>
<td>Cat D</td>
</tr>
<tr>
<td>Cat E</td>
</tr>
<tr>
<td>Cat F</td>
</tr>
</tbody>
</table>

Figure 23: Graph showing results of phase 1 Course Coordinator confidence level testing.

The graphs above indicate that TAFE participants had a higher mean score confidence level in 23 question categories, a lower mean score confidence level in 8 question categories and 7 question categories had no change. The highest variation in mean scores was at Institute Director level question category (H), which measured a variation of 1.0 between mean scores, and the lowest mean score variation was 0.18, category (E) for Trainers.

The Wilcoxon signed rank method was used to test for statistical significance in training decision categories indicating mean score variations. An explanation of the Wilcoxon technique is explained below and followed with the phase 1 statistical significance testing results.
Statistical Analyses using Wilcoxon Signed Rank Test

The Wilcoxon Signed Rank Test uses a non-parametric statistical testing technique. Parametric and non-parametric techniques differ because of the assumptions made about the population from which a sample has been drawn (Pallant 2013, p. 221). Parametric testing techniques make assumptions of a normally shaped population distributed whilst non-parametric testing techniques do not (Pallant 2013, p.221).

Due to the different assumptions made between testing techniques it is considered that parametric testing is more powerful and sensitive than the non-parametric alternative and a preferred method. The circumstances when it is appropriate to use non-parametric techniques occur when data are measured on ordinal scales and when sample sizes are small (Pallant 2013, p.221). These factors are consistent with this research design and therefore the non-parametric testing provided the best fit for statistical analyses of the NSW TAFE data.

Assumptions made in non-parametric testing are that samples must be chosen randomly, each person or case can be counted only once, and data from one subject cannot influence data from another (Pallant 2013, p.221). The exception to the second group of assumptions is that several non-parametric repeated measure techniques can be used to compare groups or items (Pallant 2013, p.221). The Wilcoxon Signed Rank Test is designed for use with repeated measures when participants are measured on two occasions or under two differing circumstances (Pallant 2013, p. 221). The Wilcoxon test is the non-parametric version of the repeated measure t-tests. It does not compare mean scores, but instead converts scores to ranks and compares them at time 1 and time 2 (Pallant, 2013, p.228).

As already acknowledged in chapter three, not all NSW TAFE’s agreed to participate in the research. This meant that participating NSW TAFE’s were purposely self-selected and the sample was not truly randomised.
IBM SPSS software was used to analyse the NSW TAFE data. A codebook was developed setting out the method and coding instructions for analyses. The codebook is shown below with a summary of the statistical technique used to analyse NSW TAFE respondents’ data. This is followed by tables providing examples of statistical outcome testing in two question categories (Institute Director and Course Trainer).

<table>
<thead>
<tr>
<th>Questions being asked</th>
<th>Parametric statistic</th>
<th>Nonparametric alternative</th>
<th>Independent variable</th>
<th>Dependent variable</th>
<th>Essential features</th>
</tr>
</thead>
<tbody>
<tr>
<td>Is there a change in decision making confidence level using RM</td>
<td>Paired sample t-test</td>
<td>Wilcoxon Signed Rank Test</td>
<td>One categorical independent variable (two levels) time 1/time 2</td>
<td>One continuous dependent variable confidence level score</td>
<td>Same people on two different occasions</td>
</tr>
</tbody>
</table>

**Table 13: Summary of statistical analyses techniques (from Pallant 2013, p. 23).**

<table>
<thead>
<tr>
<th>Full Variable Name</th>
<th>SPSS Variable Name</th>
<th>SPSS Variable Label</th>
<th>Coding Instructions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Confidence existing training decision making</td>
<td>Conf1</td>
<td>Confidence time 1</td>
<td>Confidence in existing training decision making at time 1. Possible range of scores 1-4. High scores indicate high confidence levels</td>
</tr>
<tr>
<td>Training Decision Making Confidence with RM applied</td>
<td>Conf2</td>
<td>Confidence time 2</td>
<td>Confidence in existing training decision making at time 2. Possible range of scores 1-4. High scores indicate high confidence levels</td>
</tr>
</tbody>
</table>

**Table 14: Codebook developed by researcher for data entry into IBM SPSS.**
Section Two: Examples of statistical significance testing using IBM SPSS.

Test One – Institute Directors

Question Category H - Effective communication of training decision making

NPar Tests

<table>
<thead>
<tr>
<th></th>
<th>Percentiles</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>25th</td>
<td>50th (Median)</td>
<td>75th</td>
</tr>
<tr>
<td>ConfidenceLevel1</td>
<td>5</td>
<td>1.5000</td>
<td>3.0000</td>
<td>3.0000</td>
</tr>
<tr>
<td>ConfidenceLevel2</td>
<td>5</td>
<td>3.0000</td>
<td>3.0000</td>
<td>4.0000</td>
</tr>
</tbody>
</table>

Wilcoxon Signed Ranks Test

<table>
<thead>
<tr>
<th>Ranks</th>
<th>N</th>
<th>Mean Rank</th>
<th>Sum of Ranks</th>
</tr>
</thead>
<tbody>
<tr>
<td>ConfidenceLevel2 -</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ConfidenceLevel1 Negative Ranks</td>
<td>0&lt;sup&gt;a&lt;/sup&gt;</td>
<td>.00</td>
<td>.00</td>
</tr>
<tr>
<td>Positive Ranks</td>
<td>4&lt;sup&gt;b&lt;/sup&gt;</td>
<td>2.50</td>
<td>10.00</td>
</tr>
<tr>
<td>Ties</td>
<td>1&lt;sup&gt;c&lt;/sup&gt;</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>5</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

a. ConfidenceLevel2 < ConfidenceLevel1
b. ConfidenceLevel2 > ConfidenceLevel1
c. ConfidenceLevel2 = ConfidenceLevel1

Test Statistics<sup>a</sup>

<table>
<thead>
<tr>
<th>ConfidenceLevel 2 - ConfidenceLevel 1</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Z</td>
<td>-1.890&lt;sup&gt;b&lt;/sup&gt;</td>
<td>.059</td>
</tr>
</tbody>
</table>

a. Wilcoxon Signed Ranks Test
b. Based on negative ranks.

Statistical Significance is indicated if the Asymp Sig (2-tailed) is equal to or less than .05

The Wilcoxon Signed Rank Test revealed that the increased confidence levels for Institute Directors in the category of “Effective communication of training decision making” is not statistically significant. The effect size is high (r = .59) using the Cohen scale.

Figure 24: Significance outcomes testing using Wilcoxon signed rank test
Test Two - Course Trainer - Category B

NPar Tests

### Descriptive Statistics

<table>
<thead>
<tr>
<th></th>
<th>N</th>
<th>25th</th>
<th>50th (Median)</th>
<th>75th</th>
</tr>
</thead>
<tbody>
<tr>
<td>ConfidenceLevel1</td>
<td>51</td>
<td>3.000</td>
<td>3.000</td>
<td>4.000</td>
</tr>
<tr>
<td>ConfidenceLevel2</td>
<td>51</td>
<td>3.000</td>
<td>3.000</td>
<td>4.000</td>
</tr>
</tbody>
</table>

**Wilcoxon Signed Ranks Test**

### Ranks

<table>
<thead>
<tr>
<th></th>
<th>N</th>
<th>Mean Rank</th>
<th>Sum of Ranks</th>
</tr>
</thead>
<tbody>
<tr>
<td>ConfidenceLevel2 - ConfidenceLevel1</td>
<td>Negative Ranks</td>
<td>0&lt;sup&gt;a&lt;/sup&gt;</td>
<td>.00</td>
</tr>
<tr>
<td></td>
<td>Positive Ranks</td>
<td>11&lt;sup&gt;b&lt;/sup&gt;</td>
<td>6.00</td>
</tr>
<tr>
<td></td>
<td>Ties</td>
<td>40&lt;sup&gt;c&lt;/sup&gt;</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>51</td>
<td></td>
</tr>
</tbody>
</table>

- a. ConfidenceLevel2 < ConfidenceLevel1
- b. ConfidenceLevel2 > ConfidenceLevel1
- c. ConfidenceLevel2 = ConfidenceLevel1

### Test Statistics<sup>a</sup>

<table>
<thead>
<tr>
<th></th>
<th>ConfidenceLevel2 - ConfidenceLevel1</th>
<th>Z</th>
<th>Asymp. Sig. (2-tailed)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>-3.317&lt;sup&gt;b&lt;/sup&gt;</td>
<td>.001</td>
</tr>
</tbody>
</table>

- a. Wilcoxon Signed Ranks Test
- b. Based on negative ranks.

Statistical Significance is indicated if the Asymp Sig (2 tailed) is equal to or less than .05

The Wilcoxon Signed Rank Test revealed that the increased confidence levels for Course Trainers in the category of ‘Logical assessment of existing course training for relevance of future training methods’ is statistically significant with a medium effect size (r= .32) on the Cohen scale.

Figure 25: Significance outcomes testing using Wilcoxon signed rank test.
Variations in confidence levels between time one and time two testing were identified in 31 question categories (23 higher level confidence - 8 lower level confidence - 7 no change). Each question category with a mean score variation was tested using the IPM SPSS tables above to check for statistical significance and effect size. For practical reasons only two testing tables are reported in the main body of the thesis to demonstrate analyses techniques. Further examples of SPSS significance calculation tables from each training decision making level is provided in appendix (M). The graph below provides a summary of the phase 1 question analyses.

Figure 26: Graph showing summary of training decision making confidence response variations across the range of 38 phase 1 questions.
The statistical analyses of the response variations indicated that only three question categories were of statistical significance. These were:

- Course trainer question category B
- Course trainer question category E
- Course trainer question category F

The effect size for each of these categories using the Cohen scale (Pallant 2013, p. 240) were calculated as medium for question category B (r=3.2), small for question category E (r=2.6), and medium for question category F (r=4.5). The effect size identifies the strength of the conclusions about the variations in confidence levels between time one and two testing and it shows the practical significance of results apart from inferences being applied to the population (Creswell 2014, p. 165). Calculations showing how the effect size is determined are shown in appendix (O).

A number of question categories from the stratified sample indicated a higher mean score than those reported as being statistically significant. For example, the highest mean score differential of 1.0 was identified the Institute Director level category (H).

The limitations of significance testing were caused by the small sample sizes. As reported by Punch (1999, p. 134) sample size is important in determining the outcomes of a statistical significance test;

*The bigger the sample size, the smaller numerical value of the statistic required in order to reach significance. Conversely, the smaller the sample size, the bigger the numerical value of the statistic required in order to reach significance* (Punch 1999, p. 134).

The small size of the stratified sample is unavoidable due to the small population of NSW TAFE training decision makers that are employed in the levels of management sampled in this research.
4.4.3 Presentation of Phase 2 Data and Analyses

Data was gathered for the second phase of the research process by using open ended follow up questions. Phase 2 questions were asked both of respondents who had participated in the phase 1 questionnaire and the expert TAFE panel. The phase 2 questions attempted to verify how the trending patterns in phase 1 could be linked to more effective decision outcomes through the use of the RMTDF.

Prior to sending the phase 2 questions, categories of responses to the first phase data were established. Respondent answers to the first phase questions were sorted into categories of higher confidence levels, lower confidence levels, mixed confidence levels and no change to confidence levels.

The second phase questions sent to NSW TAFE respondents were directly linked to their individual phase 1 survey responses. The second phase follow up questions to the expert TAFE panel were based on the overall trending pattern across all 38 phase 1 questions. An example of a typical follow up question to a NSW TAFE sample respondent is shown below;

**Follow up questions example (Institute Director - Higher Confidence Level);**

Your responses in the phase 1 research questionnaire indicated no change of confidence levels when using a RMTDF except in categories A, C, E, & H where higher confidence levels were recorded (initial responses attached). As a follow up to the initial set of questions can you please provide answers of up to ten lines for the following two questions?

1. Why did the risk management based decision making framework described in the support material give you a higher level of training decision making confidence in the noted categories? Please give examples:
2. In the context of the change in your recorded confidence levels do you think training decision making that uses a risk management framework has the potential to impact on the effectiveness of organisational training outcomes? Please give examples and reasons why:

The responses to the second phase data varied in quality from poor to good. The poorer responses provided limited detail and explanation whilst the good responses
provided rich data explaining in detail reasons for higher or lower decision making confidence levels using the RMTDF. Examples of a low quality and a high quality phase 2 response are shown below;

**Poor Quality response (Question 1 Institute Director)** - Our organisation has applied ISO 31000:2009 Risk management for a number of years and has continually improved its overall risk management approach. Therefore the answer to the question is “no” given we already apply the approach. Our risk management approach has improved our decision making outcomes.

**High Quality response (Question 1 Trainer)** - The risk management based decision making framework gave me a higher level of confidence in the noted categories because it limited my assumptions as a trainer. I would be able to justify training decisions made by using a logical and systematic approach, for example, by evaluating the risk of undertaking various commercial training programs by considering staffing, technical and financial considerations and constraints when undertaking the training. It would provide continuity across an organisation, for example, everyone using the same decision making process to make informed decisions in regards to training to be delivered to achieve an organisation’s goals and objectives and satisfy our customer needs.

**Coding of Interview Data**

A large amount of qualitative data was received in the phase 2 responses. Therefore raw data was required to be broken into ‘chunks’ of information that connected sentences and paragraphs of respondents to the research categories (Creswell 2014, p. 165). Three indicative content categories were used to provide verification evidence of the RMTDF effectiveness. The categories used were;

1. Evidence that respondents understood and can apply risk management decision rules to their training decision making
2. Evidence that the risk management training decision rules affect training decision outcomes
3. Evidence that risk management training decision rules affect decision outcomes in the significant choice categories identified for personnel in the NSW TAFE sample
A qualitative coding table was developed prior to qualitative data analyses. The coding table enabled the researcher to preselect and match data to evidence verification categories. The coding table is shown below. Categories that emerged in the qualitative analyses and not included in the initial coding structure are reported as emerging content in the second phase analyses.

<table>
<thead>
<tr>
<th>1. Data Gathering Procedures</th>
<th>Two follow up questions emailed to respondents participating in initial questionnaire</th>
<th>Questions target the confidence categories that emerge from initial questionnaires</th>
<th>Each respondent provided with opportunity to provide feedback on why their confidence levels may have varied (higher – lower) with and without RM –TAFE Panel feedback on trending data</th>
</tr>
</thead>
</table>
|                             | Three follow up questions emailed to TAFE panel                                  | 1. Higher Conf  
2. Lower Conf  
3. Mixed Conf  
4. No Change                     |                                                                                  |
| 2. Significant decision making categories being verified | Is RM effective for choosing  
*course structure and method  
*type of knowledge required for training | Is RM effective for  
*matching training outcomes to org objectives  
* enabling consistent evaluation processes  
* justifying and prioritising training budgets | Is RM effective  
*in formulating training outcomes to meet uniform corporate goals (strategic alignment)  
* in prioritising training needs in legal compliance context |
| 3. Indicative content itemised under these categories for verification evidence | 1. Statements indicating RM training decision rules are understood.  
2. Statements linking the use of RM decision rules for effective training decision outcomes (including use of matrix)  
3. Statements linking RM rules to specific effective decision making responsibility areas (significant choice areas per individual)  
4. Data Analyses Statements from each respondent level &TAFE Panel to provide level of verification | Matching common words  
Matching common sentences  
Looking for related themes  
Content pattern/percentage of responses verifying use/non use of RMTDF |

Table 15: Qualitative Coding Table.

The summarised qualitative responses from the NSW TAFE sample and TAFE expert panel are reported below in table format. The level of evidence linked to the three verification categories in the coding table is then discussed. The summarised data analyses provided in the tables below was guided by Creswell’s qualitative
data analysis flowchart (2014, p.197), which was described in the research methods (section 3.4, p. 136) of this thesis.

Summary Tables: Phase 2 Question Responses.

<table>
<thead>
<tr>
<th>Level - Institute Director</th>
<th>3 Higher confidence level responses</th>
<th>1 No change confidence level response</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Higher Confidence Level Responses</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Our TAFE has a sound base on which to base strategic risk management decision making using the framework of any kind will provide an added level of confidence particularly when it comes to prioritising a set of competing priorities</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• I had a higher confidence level Categories C &amp; E because they relate to external reporting or regulatory legislative requirements e.g. training decisions in the context of WHS requirements, licensing and requirement for ASQA &amp; TEQSA</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Decision making for legislative &amp; regulatory requirements can be made without a RM framework. Having said that the RM framework would add a very useful organising principle to assist in training prioritisation in these areas</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Using a decision making framework based on standard concepts of risk assessment would add a very useful organising principle to assist in prioritising training in an environment of restricted resources</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• In context of budget limitations prioritisation linked to compliance &amp; organisational priorities vs personal interests are clear RM matrix supports managers in allocating dollars to training activities</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• RM Matrix approach can also support internal audit processes to look at staff capabilities to meet standard for academic and technical compliance</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• RM Matrix can support managers to work with staff in personal capability planning</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• We could use basic RM broadly to assess risk in a number of different contexts in TAFE. Assessing risk is a useful lens to add when assessing training priorities. There will be factors that the RM matrix cannot identify – government priorities &amp; long term local needs that may not score highly on RM matrix but need priority for specific reasons</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• In a complex organisation like TAFE many demands are placed on budgets and programs. A structured RM framework applied over a period of time should support decisions that respond to key issues</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• A RM approach can ensure broad coverage of organisational needs rather than responding to “noise” or willing participants in discrete areas of business.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• If RM linked to strategic planning then impact should be more easily managed in the context of addressing business risk</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Using RM matrix to prioritise training is useful</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>No change in Confidence Level</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Our organisation has applied ISO 31000:2009 Risk management for a number of years and has continually improved its overall RM approach. Our RM approach has improved our decision making</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• We are attempting to embed risk management into our planning and performance management framework. Our risk management plan points to risk elements with associated training decision making from training matrix</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Summary – linking response content to categories – from coding table</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. All content indicated understanding of risk management decision rules when applied to training</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. 41% of responses indicated high value of using training matrix for effective training decision outcomes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Decision responsibility area – the area of prioritising training received most feedback (33%). This included prioritising staff training and training in the context of government and local needs. Effective allocation of resources was cited in several responses. More effective planning (for resources’ and staff capability) was discussed in three responses. One response indicated RM would be useful for auditing purposes. No responses addressed the difficult choice area of defendable</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
if questioned at law. 33% of responses indicated the supportive element of RM in linking decisions for decision makers across the organisation.

Emerging content

1. A pattern that emerged from the data not included on the initial coding table were several responses indicating the supporting aspects of the risk management decision framework. Respondents indicated RM supported their decision making across a number of decision categories.

Table 16: Summary of Institute Director phase 2 responses.

<table>
<thead>
<tr>
<th>Level – Finance Manager</th>
<th>Higher confidence level responses</th>
<th>Mixed confidence level responses</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2</td>
<td></td>
</tr>
</tbody>
</table>

**Higher Confidence Level Responses**

- As it is a framework logical resources v benefits can be applied. If a high risk area is identified then training should target against that area and resources allocated against it as an alternative to another, less risky area. However, risk assessment may rate the risk resulting former as high while the latter is low.
- Logically resources are channelled toward the high risk area as the benefit would be greater per $ spent.
- RM provides a logical and objective model of communicating or explaining the level of training required, within a limited budget how these would be prioritised. Examples would include where the expectations of the staff requiring the training on the level of structure didn’t meet the need & explanation across the organisation on why some programs may have not been funded.
- In the broadest sense yes, in that the organisation is increasing resources against highest perceived need by using RM. Therefore training is targeted and matched to organisational objectives. Whether outcomes themselves are affected depend upon issues such as the quality of delivery follow up and follow up or refresher training.
- The level of financial and human resource investment is more refined using RM so limits waste through over or under investment in achieving required outcome.
- Examples include high cost training that needs to deliver long term benefits, by using a risk management framework, you can assess the level of training and likely outcomes

**Mixed Confidence Level**

- The new smart & skilled environment TAFE is moving to is foreign to our current operations and will have biggest impact since Gough Whitlam declared free TAFE training as a consequence Head Teachers/Faculty Directors will use RM to decide on which course are run. RM will play a major role as we anticipate/forecast but funding based on completion is likely to have major impact on our resources.
- My response to the original question F influenced by the fact the current practice of communicating training decisions is considered effective and given high confidence level. As a result the influence of RM wasn’t seen to provide additional confidence to communication. The RM framework has the potential to increase clarity, focus and justification on decisions made.
- Moving from a funding model based on initial enrolments and no competition to an open market wherein students will be allocated entitlements and or VET fee help, any planning decision we make will be highly risky. Decisions will need to be made on past performance and industry growth areas.

**Summary – linking response content to categories – from coding table**

1. All content indicated the Finance Managers understood the concept of applying RM decision rules to training decisions
2. 33% of the Finance Managers responses indicated RM rules could lead to effective decision outcomes. They did not refer to the risk matrix specifically however used examples of undertaking risk assessments and understanding training decisions on a scale of high to low risk.
3. 55% of responses indicated the RM approach would be effective in the decision responsibility area of ranking funding and allocating funding to align with institutes corporate goals. One comment reflected improved communication processes using RM whilst another indicated RM thinking would have no effect on communication processes. One comment reflected the ability of RM to assess the likely outcomes of training decisions. 20% of respondents indicated the RM decision making framework could assist in aligning training decisions across an organisation.

Emerging content

No emerging content at this level of decision making

Table 17: Summary of Finance Manager phase 2 responses.

<table>
<thead>
<tr>
<th>Level – Human Resources Manager - 2 Higher confidence level responses</th>
<th>2 Lower confidence level responses</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Higher Confidence Level Responses</strong></td>
<td></td>
</tr>
<tr>
<td>• Prioritising training is always a challenge given limited budgets and the time constraints staff members’ face. A RM based decision aims to increase the likelihood of successful outcomes using a cost effective approach. All training decisions begin with the desired outcomes for the individuals and the organisation. A RM approach is sensible as it considers the various options for each situation and takes account all the critical factors that could impact the effectiveness and efficiency of the training so that the best option can be selected and remaining risks managed.</td>
<td></td>
</tr>
<tr>
<td>• While a risk management approach is used where training decisions are based on the potential risk to the organisation a structured framework is not currently used through a specific matrix with risk categories. This is why I selected higher confidence levels in categories A, B &amp; C.</td>
<td></td>
</tr>
<tr>
<td>• The existing level of confidence in areas of training to be conducted is fairly high as determined through consultation. However, confidence with best method of delivery and appropriate budget allocation is not as high.</td>
<td></td>
</tr>
<tr>
<td>• As stated in my first answer a RM approach is sensible as it considers the various options for each situation and takes account all the critical factors that could impact the effectiveness of the training so that the best option can be selected and remaining risk managed.</td>
<td></td>
</tr>
<tr>
<td>• By determining the factors to be considered when making training decisions – other than budget, the potential to reach the desired outcomes is more likely. Current decisions around the best delivery method are made based on the expertise of the trainer or provider and in consultation with the business customer after decision to go ahead with training is made. Considering training method risk to organisation, cost at the outset would provide a better allocation of funding and therefore organisational training outcomes. Presently funding is finite. A more structured, transparent and agreed approach to the decisions as to which training to fund and how much to allocate would provide a better ROI.</td>
<td></td>
</tr>
<tr>
<td><strong>Lower Confidence Level</strong></td>
<td></td>
</tr>
<tr>
<td>• I would like to say that on reflection my initial ratings were misjudged. As TAFE has set protocols for deciding on course I couldn’t link the RM matrix to our current decision making processes. However when I reviewed the support information for these follow up questions I realised the matrix approach offered quite a sophisticated model and if it could be included in a decision making process the decision making would be enhanced. In this context I would certainly rate the categories B, C &amp; D at a higher level than initially indicated.</td>
<td></td>
</tr>
<tr>
<td>• Yes I think using a RM framework would increase the effectiveness of the organisational training outcomes. It would mean the organisation could have some degree of confidence in their decision outing it through that scrutiny</td>
<td></td>
</tr>
<tr>
<td>• On re reading the support material to answer the second stage questions I believe I would rate my confidence level in categories B, D, E &amp; F as higher than I originally ranked these.</td>
<td></td>
</tr>
</tbody>
</table>
I think the RM matrix approach offers a sophisticated decision making tool that enables the targeting & prioritising of educational resources. It would enable critical decision making that would stand scrutiny from internal and external interest groups. It would obviously be effective for course involving Health and Safety (as the concept is understood) but could be used more widely if the matrix approach could be integrated into the organisations decision making processes. I think the matrix approach is a sophisticated tool that could lead to more effective training outcomes – i.e. improved targeting & prioritising of training implementation.

Summary – linking response content to categories – from coding table

1. All content indicated Human Resources Managers understood the concept of applying risk management to training decision rules.
2. 66% of responses indicated that RM could lead to effective decision outcomes. It is noted that two respondents provided positive follow up statements after initial low confidence responses to the first phase questions - the re-reading of support material clarified the RM concept in their thinking. 33% responses indicated the use of the decision matrix was a factor in improved decision confidence.
3. 33% of responses indicated the RM approach would be effective in the decision responsibility area of resource allocation. 33% of responses indicated RM would be effective in matching resource allocation to institutes skill development requirements. 33% responses indicated RM would be useful to prioritise training investments. 2 responses indicated RM could improve targeting of training implementation. 1 response indicted that RM approaches would stand scrutiny from internal and external interest groups. No responses indicated that RM would be effective in deciding on training structure. No responses indicated training outcomes could be predetermined using a RM approach. No responses linked RM with an improved alignment of decision making across the organisation.

Emerging content

Two responses indicated the risk management framework was a sophisticated decision making approach. Two indicated that RM would enable consideration of critical decision making factors. These comments are indicative of RM providing a higher order of decision making than the existing methods.

Table 18: Summary of Human Resources Manager phase 2 responses.

<table>
<thead>
<tr>
<th>Level – Training Coordinator -</th>
<th>1 Higher confidence level responses</th>
<th>1 Lower confidence level responses</th>
<th>1 No change in confidence level responses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Higher Confidence Level Responses</td>
<td>RM training decision principles allow you to match employee skill requirements to corporate goals – I think this type of framework allows you to better match staff capabilities to the type of training if you know from the outset what the course will look like – your best f2f trainers delivering f2f, your best online facilitators designing and delivering online. Matching corporate goals in this manner would be more transparent.</td>
<td>RM training decision principles provide logical and sequenced structures that allow you to rank and prioritise training based on institute needs – this is a real issue for me – providing and working with a logical structure to inform training decisions. With training, this type of framework will be allowing staff to invest in their management capital to improve their decision making reasoning.</td>
<td>RM training decision principles logically assess and evaluate course implementation to help decide on the effectiveness of future training implementation – I believe this tool can be used in a manner to then compare training effectiveness that’s starts with the initial decision about how/why a course is running. By using this data, future predictions can be enabled and reflective processes analysed to understand why some course work better than others</td>
</tr>
</tbody>
</table>
allow you to get a better picture to pre determine an outcome. Whilst I don’t necessarily think all factors could possibly be included (that inform of the success of a training program), I have more confidence that the application of the RM principles will provide us with better data than we ever had before.

- I believe the RM framework provides a suitable logic that can be applied to assist in determining what is acceptable risk when deciding whether or not to run a course or what structure the course could possibly have.
- I believe the matrices as provided, [provide] not only a framework but also a reminder that there may be other ways to deliver training that will still meet the intended outcomes but with reduced/accepted risk.
- Having a RM framework makes decision making more accountable and transparent. Risk-based decisions can be analysed from a business point of view and managed within the organisational position (eg –fiscal risk, strategic risk) which may change depending on the health of the organisation in those areas.
- Yes, a risk management framework has the potential to impact the effectiveness of organisational training outcomes. By having a solid foundation on which to base risk management decision making will enable our TAFE to evaluate the potential outcomes of training decisions and judgement of the potential effectiveness of selected training methods.
- The use of RM framework provides an objective, transparent mechanism for determining risk and most appropriate response to that risk i.e. organisational training. There is always a need to prioritise training requests to matched solutions. Since the RM framework incorporates business needs, it is a useful tool for determining those training needs that require short, medium and long term solutions.

### Lower Confidence Level

- Generally speaking a number of factors impact on training decision making and are spread across organisation. No matter how robust decision making framework experience shows us a number of other factors are required to ensure training outcomes achieved. A combination of intuitive feel for teaching environment, staff willingness and timing contribute to successful outcomes.
- There are a number of training provision circumstances where I can recommend but I am not responsible for the final decisions so while I can apply a RM framework of factors may intrude and lead to different decisions by the time the training is being rolled out.

### No Change in confidence level

- The risk management based decision making framework described in the support material did not change my confidence levels for training decision making as I indicated due to our TAFEs governance and accountability requirements our level of accountability is ranked at a medium level. That is in most cases our TAFE has effective decision making processes where training can be clearly justified and aligned to the Institute goals.

### Summary – linking response content to categories – from coding table

1. All responses indicated Training Coordinators understood the concept of applying RM training decision rules.
2. One response linked RM to decision making effectiveness through the use of the decision making matrix. Two responses indicated RM would not increase decision making effectiveness citing factors of intuition and existing processes as reasons.
3. In the responsibility decision areas relating to course coordinators one response indicated RM could effectively match skill requirement to corporate goals, one response indicated RM could rank and prioritise training effectively, one response indicated RM could logically assess and evaluate current course evaluation to help decide on the effectiveness of future training implementation, one response indicated the RM decision training framework enables the outcomes of training methodologies to be predetermined, one response indicated RM can be effective in selection of training method. No responses indicated RM decision rules would improve communication of training decisions. One response indicated RM would be effective in aligning decision making across the organisation

**NOTE – all responses**
indicating higher RM effectiveness outcomes provided by the same Course Coordinator.

Emerging content
No emerging content at this level of decision making

Table 19: Summary of Course Coordinator second phase responses.

<table>
<thead>
<tr>
<th>Level – Trainer</th>
<th>Higher confidence level response</th>
<th>Lower confidence level response</th>
<th>Mixed levels of confidence responses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Higher Confidence Level Responses</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• The RM based framework gave me a higher level of confidence in the noted categories because it limited my assumptions as a trainer. I would be able to justify decisions made by using a logical and systematic approach, for example evaluating the risk of undertaking various commercial training programs by considering staff, technical and financial considerations. RM would provide continuity across the organisations decision making processes.</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>• RM has the potential to impact on the effectiveness of an organisation's training outcomes because it would provide a clear view of where the organisation should allocate time and resources’ to maximise profit and minimise risk. Utilising RM for training decision making may present certain training opportunities that were previously not considered viable</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lower Confidence Level</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• The RM framework has limited usefulness for education decisions regarding delivery and assessment. Education decision making is complex and dependent on student cohort and needs of respective industry. I think the risk management framework would only work if all courses were the same, all learner cohort were the same and all industry expectations were the same - clearly they are not. The outcomes of successful training cannot be predicted from a simple matrix – it requires a wide range of measures.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mixed Confidence Level</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• The motivator for decisions about content and methods referred to in questions C&amp;D in my experience has been skewed by self-interest of some TAFE staff. I therefore feel lowly confident that the RM decision principles could be truly effective. I think given the organisational structure of TAFE the human element in planning &amp; implementation of teaching and learning make risk management hard to implement without bias.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Because key players in decision making have limited understanding of the complexities involved in my area of teaching they would not be able to use the risk management framework to make decisions that would lead to effective training outcomes</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• A,B and D I don’t think I could structure training methods to the letter to effectively use a risk assessment based matrix. Training methods vary from teacher to teacher, so I don’t think basing methods on a training matrix would work. Industry training needs can vary greatly between companies, location and type of repairs and I can’t see how you can cover all the industries under a single matrix. In question categories E and F the matrix system may be a good way to communicate a broad overview of training needs and methods through the unit. It may also help to determine you have successfully delivered a unit.</td>
<td></td>
<td></td>
<td></td>
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</tbody>
</table>

Summary – linking response content to categories – from coding table

1. All responses indicated Course Trainers understood the concept of applying RM training decision rules.
2. One response indicated RM would provide effective decision outcomes. Two responses indicated the decision matrix was too simplistic and could not be used to understand the complexity of decision making required at TAFE.
In the responsibility decision areas relating to trainers one response indicated RM could assess and prioritise training methods, and one response considered the training matrix as an effective means of communicating training needs and methods through a unit. No responses considered RM could be used for assessment of existing course training for relevance of future training methods. No responses indicated RM could be used to link learning goals of industry and institute to course learning methods. No responses indicated RM could be used to pre-determine outcomes of training methods. No responses indicated RM would be useful in aligning decision making across the organisation.

Emerging content

No emerging content at this level of decision making

Table 20: Summary of Course Trainer phase 2 responses.

<table>
<thead>
<tr>
<th>Level - TAFE Expert Panel - 3 questions responses to overall phase 1 trending patterns (38 questions categories).</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Does the panel think their own decision making confidence levels would match the trends indicated by TAFE respondents and be higher in the categories indicated?</td>
</tr>
<tr>
<td>• Yes, the panel’s response is that our decision making confidence levels match the trends indicated by TAFE respondents and higher in the categories indicated with two exceptions. The two exceptions are disabilities and school leaver cohorts.</td>
</tr>
<tr>
<td>• The first exception is the application of the matrix to a cohort of disabilities students, such as sight or hearing impaired, where the student will attract a higher cost due to support required. Intellectually impaired may or may not involve a higher cost dependent on the group and the skills to be learnt. For example, an intellectual disability group undertaking retail skills would be able to achieve learning outcomes with one teacher whereas the same or similar group undertaking hospitality training would require two teachers to enable the group to safely gain the skills practice required for skill attainment to meet learning outcomes.</td>
</tr>
<tr>
<td>• The second exception is the possibility of school leaver’s limited experience with unstructured learning in an adult learning environment. There are notable differences in teaching styles between high school and tertiary education. Moving from one level to the next can be difficult for some students and, with the addition of an unstructured delivery, may inhibit their learning rather than enhance it. In this instance learning often takes more time for a student to gain the self-management required to meet minimal learning required by the provided deadlines.</td>
</tr>
<tr>
<td>2. Does the panel think the TAFE sample trend of responses towards higher confidence levels when using risk management could lead to more effective training decision making in TAFE?</td>
</tr>
<tr>
<td>• Yes, the panel agrees with the trend of responses towards higher confidence levels when using risk management may lead to more effective training decision making in TAFE. Training decisions are based on various aspects including target group, resources, costs, funding models, training package requirements and project deadlines. This is noticeable in specially funded cohorts. By using the matrix a more objective decision can be reached without additional, and sometimes irrelevant, factors influencing the decision making process.</td>
</tr>
<tr>
<td>3. Does the TAFE panel think the RMTDF has advantages/disadvantages as NSW VET moves into the new era of Smart and Skilled Quality Framework.</td>
</tr>
<tr>
<td>• The panel believes that decisions based on the training decision framework provide an advantage over NSW VET delivery, regardless of any new or future framework, due to the objectivity and thoroughness provided by the process. This approach applies to any model of VET training, whether corporate or registered training provider planned and delivered, to comprehensively assess risk for an organisation. By using the matrix to identify risk, organisations are able to identify the exact nature of any possible risks.</td>
</tr>
</tbody>
</table>
quickly and effectively and incorporate decisions that alleviate the identified risk. Once alterations have been implemented the matrix would confirm if any further risks exist so that modifications may be conducted until a suitable plan is achieved. This provides a safety net that organisations have previously lacked in their decision making.

<table>
<thead>
<tr>
<th>Summary – linking response content to categories – from coding table</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. All responses indicated the TAFE panel understood the concept of applying RM training decision rules.</td>
</tr>
<tr>
<td>2. The TAFE panel indicated the RMTDF could have a positive effect on training decision outcomes with all three question responses describing the benefits of the RM decision making matrix.</td>
</tr>
<tr>
<td>3. The panel provided general feedback relating to responsibility categories – linking responsibility factors to overall organisations not individuals. The panel indicated the RMTDF could provide more objective decision outcomes in areas relating to training package requirements, targeting of groups, funding models and training resources. The panel indicated risk assessments were useful for an organisation to understand its training responsibilities. The panel indicated the RMTDF could help align decisions on an organisational bases and reach objective decisions without additional, and sometimes irrelevant, factors influencing the decision making process.</td>
</tr>
</tbody>
</table>

Table 21: Summary of TAFE Expert Panel phase 2 responses.

4.4.4 Discussion and Findings

The first verification category indicated that 100% of respondents (including TAFE panel) understood the principle of applying risk management decision rules to training decision making. The verification of the RMTDF as a genuine training decision making approach is important because the RMTDF is an innovative decision approach not previously used at NSW TAFE (or other organisations). Verification that the RMTDF was understood by respondents and could be applied to their training decision approaches provided evidence that research outcomes are based on a high level of construct validity. Construct validity is an indication of how well a research project meets its theoretical expectations by measuring what it claims to measure (Punch 1999, p. 101). It is clear that all responses from NSW TAFE sample and TAFE expert panel were based on a factual understanding of how the RMTDF could be applied in their areas of training decision making.

The analyses of the second verification category indicated mixed responses across the stratified sample. Institute Directors (41%) and Human Resources Managers
(66%) provided a medium to high percentage of responses indicating the risk management decision rules were effective. Finance managers provided a lower percentage of positive responses (33%). Only one positive response was indicated at Training Coordinator and Trainer level. The Institute Director and Human Resources sample respondents placed a high value on the use of the use of the risk management training decision matrix and identified the matrix as an effective decision making tool.

The third evidence verification category linked risk management training effectiveness to the decision making responsibilities of the NSW TAFE sample. Responsibility areas of assessing training priorities and effective allocation of training resources received medium numbers of positive responses from the top three sample levels (Finance manager 55%, Institute director 33% and HR manager 33%). Positive responses were also received from Finance Manager level linking the RMTDF to improved alignment of organisational strategic decision making (20%).

A small level of responses indicated the risk management framework would be effective for scrutiny of decision making approaches (auditing). Responsibility areas linked to pre determining training outcomes, selecting best training methods, and communicating training decisions received limited responses across the sample levels. The category of risk management providing a training decision making framework defendable at law received no responses.

Three un-coded categories emerged from the data. A number of responses described the risk management decision framework as a sophisticated approach to training decision making. Other responses stated that risk management can identify critical decision factors required in training decision making. These responses indicated the risk management decision framework provided a higher order of decision making than approaches currently utilised at NSW TAFE. Also emergent from the data were
responses indicating the **supporting aspects** of the risk management decision framework. Support for decision making was not a specific category used in the research questions and emerging comments reflected the overall view that a RMTDF would provide an overarching decision support mechanism.

The summarised phase 2 responses provided clear evidence that in some categories the risk management decision framework can be used to enable effective decision outcomes. In particular, the responses from Institute Directors (table 16), Human Resource Managers (table 18) and the TAFE Expert Panel (table 21) provide powerful supporting statements that demonstrate the RMTDF is an effective training decision approach. This supporting evidence will be used in the concluding chapter (five) when the two phases of mixed method research design are combined to provide the final outcomes summary.

**4.5 Conclusion**

This chapter began by explaining the rationale for sample selection and development of the two phased research question approach. Five levels of NSW TAFE decision makers were included in the two phases of questions, ranging from NSW TAFE Institute Directors through to NSW TAFE Trainers. Validation data were also collected from a panel of TAFE experts, enabling triangulation of the phase 2 data and providing a stronger evidence base on which to make valid research findings.

Prior to undertaking the two phased research process a pilot questionnaire was developed and tested with training decision makers at a NSW Public Health establishment. The pilot testing demonstrated the question structure and scaling to be appropriate and compliant with standard consistency and reliability testing parameters (utilising Cronbach’s and Spearman’s scales).

A strong response rate to the first and second phase questions (at senior management levels) indicated participants were interested in the research area and
willing to provide meaningful research data. The research was undertaken during a period of major structural change at NSW TAFE, with genuine fears of job losses and uncertainty of participant roles into the future. The NSW government had undertaken several surveys as part of the move towards the *Smart and Skilled Quality Framework* (NSW TAFE Commission 2013, p. 1), and several TAFE managers indicated to the researcher that an environment of “questionnaire fatigue” prevailed at many NSW TAFE institutes. In this context, the high level of responses to the RMTDF phase 1 and 2 questions was a significant achievement.

The analyses of phase 1 data provided a strong trend that NSW TAFE research participants would be more confident in their decision making if risk management decision based rules were incorporated into decision making processes. However, low sample numbers limited the ability to prove statistical significance in a range of decision categories. It is acknowledged that only three trainer level categories out of 31 categories tested indicated higher confidence levels of statistical significance.

A valuable resource obtained from the study is the rich set of qualitative data that was collected from the phase 2 questions. Respondents clearly understood the implications of using risk management for training decisions and in many cases provided examples of how risk management decision rules can be used for improving training decision making.

Several categories of outcomes emerged from the phase 2 data that were not included in the targeted content analyses. A number of responses indicated the risk management framework was a *sophisticated* decision making approach. Other responses suggested risk management could identify *critical decision factors* required for effective decision outcomes. These responses indicated the RMTDF has the potential to provide a higher order of training decision making than existing NSW TAFE approaches.
This chapter reported and analysed phase 1 and phase 2 data findings. Chapter five will now provide the interpretations made by the researcher from these results, and will use the explanatory sequential mixed method approach to report the perceived implications of combined phase 1 and phase 2 findings. The combined research findings are reported under the seven significant choice categories (developed from the Salas et al. 2012 question series) which were the bases of the initial research question development and subsequent research design.

Finally, chapter five will discuss the implications of the research findings for NSW TAFE training decision makers and other training environments.
Chapter 5: Findings, Conclusion and Recommendations.

5.1 Introduction

This chapter will bring together the summarised outcomes and provide the researchers major conclusions and findings which provide an answer to the central research question: ‘Can a Risk Management Training Decision Framework Improve Training Decision Making and Provide More Effective Training Decision Outcomes?’

The impetus for undertaking this research was the researcher’s view that organisational training decision making effectiveness is an area of research that has had limited attention and focus. This lack of research means a knowledge gap exists in our understanding of the effectiveness of training decision making methodologies and opportunities exist to explore different training decision approaches.

A new way of thinking about training decision making has been identified, explained and justified by this research. The research findings give support and justification to the overall conclusion that the RMTDF is an improved approach to training decision making. This new approach successfully applies risk management decision rules to the decision steps required for training decision making.

The RMTDF is shown to be an innovative training decision making approach which is accepted by a significant sample of NSW TAFE training decision makers as an improved approach to training decision making, and therefore this research is considered to provide an important intellectual contribution to the field of training and educational research.

The previous chapter detailed how phase 1 and 2 data was collected and provided separate findings and analyses of that data. At the analysis commentary level concerning a more detailed analyses of results, the completed research has partially
answered the central research question in the positive. Evidence in four of the seven nominated training effectiveness categories (developed from the Salas et al. 2012 question series) indicated the RMTDF would improve training decision making effectiveness. Improvements to the perceived effectiveness of training decision making by using the RMTDF were verified in the categories of; - resource allocation, matching training outcomes to organisational objectives, evaluation and legal/compliance considerations. However, it is acknowledged that a lack of evidence in two categories; - predicting training outcomes and communication of training decision making, meant that no conclusive findings were be made in those effectiveness categories. Indeed, the verification evidence from the final training effectiveness category; - deciding on training methods and structure, indicated the RMTDF was not perceived as an improvement, i.e. it would not improve training decision making effectiveness in that category.

An important finding is that the research data analysis has indicated key NSW TAFE training decision makers (i.e. the senior managers) understand the use of the RMTDF for training decision making and would use the RMTDF to manage and improve the effectiveness of their training decision making (in the categories identified).

This chapter will now justify the above summary findings by reviewing the combined evidence gathered from phase 1 and phase 2 of the research process to demonstrate why the NSW TAFE sample (and TAFE expert panel) generally considered the RMTDF to be an improved approach to effective training decision making.

5.2 RMTDF Decision Categories Improving Training Decision Making

The research findings that NSW TAFE training decision makers' perceive the RMTDF to be superior training decision making approach in the decision areas of: resource allocation, matching training outcomes to organisational objectives, training evaluation and prioritising training needs are important. These findings have far
reaching implications not only for NSW TAFE, but for all organisations that use training to improve workforce skills.

**Allocating Training Resources**

Allocating training resources is arguably the most important training decision category confronting modern organisations. All organisations (public and private) must work within budgetary constraints and are accountable to relevant stakeholders, such as, community groups, shareholders and government spending regulators.

The literature reviewed in chapter two indicated that whilst understanding of the link between training investments and training outcomes is increasing, many organisations still do not use effective return on investment (ROTI) approaches (Bassi et al. 2004, p. 1; Buckley and Caple 2009; p. 255; Blanchard and Thacker 2004, p. 4).

Further evidence from research bodies in Australia also support the concept that organisations need to improve the methods by which training investment decisions are made. The National Centre for Vocational Education Research (NCVER) indicated that despite Australian employers investing substantial amounts of time and money on training, the exact nature and amount of this investment ‘is poorly measured and understood’ (Smith et al. 2008, p. 2). According to the NCVER Australian organisations’ require more ‘sophisticated and nuanced’ methods when making investment decisions about workers training (Smith et al. 2009, p. 7).

In this context, the NSW TAFE respondents overwhelming endorsement of the RMTDF as an effective training resource allocation approach is a significant research finding.
The evidence from both phase 1 and 2 of this research demonstrated the RMTFD could improve the effectiveness of training resource decision making by NSW TAFE training decision makers. This claim will now be expanded as follows:

The first phase trended responses in the significant decision category of training resource allocation indicated higher confidence levels by NSW TAFE practitioners when using the RMTDF for training resource decision making. This trend was supported by comprehensive second phase data. The summary of first and second phase data is shown below.

![Table 22: Summary of phase 1 responses - training resource allocation.](image)

Examples of supporting second phase responses are summarised below:

‘The level of financial and human resource investment is more refined using RMTDF so limits waste through over or under investment in achieving required training outcomes. Examples include high cost training that needs to deliver long term benefits, by using a risk management framework, you can assess the level of training and likely outcomes.’ - Finance Manager.

‘RM provides a logical and objective model of communicating or explaining the level of training required, and within a limited budget how these would be prioritised.’ - Finance Manager.

‘The RM matrix approach offers a sophisticated decision making tool that enables the targeting & prioritising of educational resources. It would enable critical decision making that would stand scrutiny from internal and external interest groups.’ - Human Resources Manager.

‘In context of budget limitations, prioritisation linked to compliance & organisational priorities vs personal interests a clear RM matrix supports managers in allocating dollars to training activities.’ - Institute Director.
The RM approach allows more objective decisions to be reached without additional, and sometimes irrelevant, factors influencing the decision making process. - TAFE Expert Panel

These findings have significant implications for NSW TAFE because it means the RMTDF can now be used by NSW TAFE personnel to more effectively decide how finite training dollars can be allocated for competing areas of training needs. It also means that training resource decisions can be effectively justified (using risk levels as the bases of resource decision making). This approach will be particularly beneficial in the new Smart and Skilled NSW Quality Framework where NSW TAFE Institutions will be competing against private VET training providers for government funding (NSW TAFE Commission 2013, p. 1).

The benefits NSW TAFE organisations would gain from using the RMTDF for training resource allocation can also be generalised to other organisations that rely on a well trained workforce to maintain their competitiveness and viability. All organisations operating in a competitive environment must ensure that finite training dollars are well targeted and spent effectively on appropriate training. The RMTDF fills the ‘training decision funding gap’ noted by Smith et al. (2009, p. 7) and provides a sophisticated training resource decision process that could greatly enhance organisational training outcomes.

Matching Training Outcomes to Organisational Objectives

The second significant training decision category in which the RMTDF was demonstrated to be more effective than existing NSW TAFE decision approaches was the category of; ‘matching training outcomes to organisational objectives’ (also described as strategic alignment of training).

To ensure workforce skills are strategically aligned with organisational objectives it is critical that organisations undertake organisational training analyses (Salas et al.}
Organisational training analyses identify the jobs and functions that most influence organisational success and clarify the most critical organisational competencies that are needed to establish overall strategic learning imperatives (Tannenbaum 2002). Included in organisational training analyses are considerations of the type of knowledge employees require and considerations of whether trainees need to know, or simply need to access knowledge (Salas et al. 2012, p. 81). Also included in the organisational training analyses are considerations of training strategies required to develop relevant trainee knowledge.

RMTDF was described in chapter two as a decision framework that enabled effective organisational analyses by creating a paradigm of risk within an organisational training management system. Establishing a paradigm of risk in organisational training management systems means it is possible to link risk assessed training outcomes to risk assessed organisational objectives (facilitated through the RMTDF training matrix).

The NSW TAFE research participants indicated the RMTDF provided advantages over existing NSW TAFE strategic training approaches because of the logical and sequenced use of risk management decision rules. This endorsement of the strategic qualities of the RMTDF by the NSW TAFE research participants validates the use of the RMTDF as an effective strategic training analyses approach. There is strong evidence that this approach could be incorporated into all NSW TAFE training management systems to improve the strategic implementation of training approaches. The strategic alignment qualities incorporated in the RMTDF would also be highly valued by other organisations seeking to ensure organisational training aligns with organisational objectives.

The evidence from research phases 1 and 2 in the category of matching training outcomes to organisational objectives is summarised below.
Table 23: Summary of phase 1 responses- matching training outcomes to organisational objectives - (note: summary table categories vary in number according to differing NSW TAFE respondent training decision responsibilities linked to initial Salas et al. 2012, p. 94 question series).

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<td>Course Coordinator Cat A</td>
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<td>Course Coordinator Cat B</td>
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<td>Course Trainer Cat D</td>
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Examples of second phase data supporting the phase 1 trending pattern listed below:

‘A risk management approach to training would ensure a broad coverage of organisational needs rather than responding to “noise” or willing participants in discrete areas of business.’ - Institute Director.

‘RM training decision principles provide logical and sequenced structures that allow you to rank and prioritise training based on Institute’s needs - providing a logical structure to inform training decisions. With training, this type of framework will allow staff to invest in their management capital to improve their decision making reasoning.’ - Course Coordinator.

‘The risk management matrix would be useful for training planning and provide a planning safety net that organisations have previously lacked in their decision making.’ - TAFE Expert Panel.

Training Evaluation

Training evaluation was the third significant training decision category where the RMTDF was considered to improve training effectiveness outcomes. Evaluation is an integral part of effective organisational training provision and all organisational training that occurs has elements that need evaluating (Blanchard and Thacker 2013, p. 334). Traditionally organisations have relied on Kirkpatrick’s (1994, p. 21) hierachral training evaluation framework as the theoretical basis for evaluation processes (Salas et al. 2012, p. 91). Whilst the Kirkpatrick model has critics, it
remains a common approach used by many organisations for training evaluation (Patel 2010).

It was evident from the reviewed literature (Chapter two) that traditional attitudes and approaches to training evaluation are at best inconsistent, and in some cases are an ineffective means of understanding what training works and what doesn’t. Salas et al. (2012, p. 91) identified two specific weaknesses in traditional evaluation approaches – lack ‘of purpose’ and lack ‘of precision.’ According to Salas et al. (2012, p. 91) overly generic training evaluation approaches fail to provide organisational training decision makers with the information they need about the effectiveness of existing organisational training provision. This generic approach, lacking purpose and precision, in turn limits the ability of organisational training decision makers to plan future training provision that effectively meets organisational training needs.

Using the RMTDF for training evaluation can improve the two specific evaluation weakness areas highlighted by Salas et al. (2012, p. 91). Because the RMTDF identifies and links training risks to organisational risks, it provides a very clear ‘purpose’ for training evaluation (i.e. will the training meet and control the stipulated RMTDF risk level). Also, because the RMTDF is based on the ISO 31000:2009 (International Risk Management Standard), the training decision process steps and subsequent evaluation techniques imbedded in the RMTDF are very ‘precise.’

Evidence emerging from this research - that the RMTDF can be used as an alternative to traditional evaluation approaches - is an exciting prospect for organisational training decision makers. More precise and purposeful evaluation decision making using the RMTDF would allow organisations to tailor training to more effectively meet organisational objectives. Training that is effectively aligned with organisational objectives benefits the workforce (workers are motivated and training for a clear
purpose), and benefits the organisation by ensuring business continuity and competitive operating standards are met.

The summarised outcomes from phase 1 and 2 data analyses in the significant decision category of training evaluation is shown below.

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<td>Course Trainer Cat B</td>
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Table 24: Summary of phase 1 responses – inconsistent approaches to training evaluation (note: summary table categories vary in number according to differing respondent training decision responsibilities linked to initial Salas et al. 2012, p. 94 question series).

Summarised phase 2 data supporting the phase 1 trending data listed below.

‘RM training decision principles logically assess and evaluate course implementation to help decide on effectiveness of future training implementation. I believe this tool can be used in a manner to then compare training effectiveness that starts with the initial decision about how /why a course is run. By using this data, future predictions can be enabled and reflective processes analysed to understand why some courses work better than others.’ – **Course Coordinator**.

‘The RM based framework gave me a higher level of confidence in the noted categories because it limited my assumptions as a trainer. I would be able to justify decisions made by using a logical and systematic approach. For example evaluating the risk of various commercial training programs by considering staff, technical and financial considerations. RM would provide continuity across the organisations decision making processes.’ – **Course Trainer**.

‘The risk management matrixes could be used to plan training implementation and also used as a means to confirm or modify training plans using risk as the bases.’ – **TAFE Expert Panel**.
Prioritisation of Training Decision Making - Legal and Regulatory Compliance

The final significant training decision category where the RMTDF was judged to improve training decision making effectiveness was the category of prioritisation of training decision making within the vast array of legal and regulatory compliance issues impacting on Australian organisations. Legal and regulatory compliance issues are a growing area of concern for the Australian business community. Australian organisations’ invest large amounts of time and money (including large investments in training) to ensure they comply with the complex range of regulatory requirements to which they are subjected (Baxt 2013, p. 2). Non-compliance to issues where training has been mandated, or judged to be a solution to an organisational compliance problem may be costly to organisations through large fines and/or loss of reputation (Blanchard and Thacker 2013, p. 32).

Training plays an important role in ensuring organisations are able to meet legal and regulatory compliance requirements. In some case training is mandated by legislation. Health and Safety Training for example, requires organisations to undertake periodic training that is determined by state authorities. Failure to undertake such training can result in large corporate and individual fines (Blanchard and Thacker 2013, p. 32; NSW Workcover 2015). In other cases, even if training is not legally mandated, it can be legally wise to implement training. Training in areas such as sexual, racial, age and gender based discrimination can protect organisations from costly court actions (Blanchard and Thacker 2013, p. 32).

Organisations that provide training can also be subjected to legal proceedings if the training they provide does not produce expected student outcomes. Whilst not common, there are instances in Australia of Higher Education students taking Universities to court when they have failed to successfully obtain qualifications for courses on which they are enrolled (Hare 2013, p. 2). For example, the Southern
Cross University was sued by student Christopher Miller for offering education units that he claimed were ‘educationally defective’ in assessment design. Miller also indicated that there was a lack of ‘alignment between the stated objectives of the unit, the curriculum, the marking criteria and the assessment [process]’ (Hare 2013, p. 1). Miller’s case (and several others) have been through the Australian court system, and so far, these types of actions have been unsuccessful. Alternatively, similar cases in Britain and Canada have been successful (Hare 2013, p. 2). A lawyer working on the Miller case made the following comments;

‘the fact that this action is being taken is an interesting comment on the commodification of education ....students, rightly or wrongly, say that they are not getting what they paid for and want their money back’ (Hare 2013 p. 2).

Chapter two provided a very specific description as to how the RMTDF could enable effective organisational training decision making in relation to legal regulatory compliance requirements. The risk management approach enables organisations to assess issues relating to curriculum content, training priorities, training methodologies and assessment strategies using risk as the common factor. The RMTDF provides a systems based approach to training decision making enabling comprehensive and evidence based decision processes that are supported by the well understood and accepted international risk management standard ISO 31000; 2009 (Knight 2011, p. 2). Three key organisational compliance advantages of using a RMTDF are:

1. Using the RMTDF means a systems based decision framework is used ensuring a comprehensiveness of organisational decision making. This should lead to effective training decision making and successful training outcomes (i.e. preventing compliance problems arising that could lead to complaints and /or legal actions).
2. The RMTDF provides an evidence based approach to training decision making that would stand scrutiny from ongoing compliance audit processes (internal - external). Compliance issues can be more easily justified on the basis of risk, and risk management process and terminology is well understood by compliance auditors.

3. If compliance problems do arise (complaints, legal actions) the RMTDF provides a thorough framework on which to justify approaches to training. Australian courts and tribunals understand the language and process of risk management. Therefore, organisations using the RMTDF would be able to provide a comprehensive defence if their training approaches were questioned at law.

Reforms to the NSW VET sector under the Smart and Skilled policy require NSW TAFE Institutes to be more locally responsive, flexible and autonomous. Local NSW TAFE Institutes will be required to have a stronger focus on customer services and communities and training decision making will be devolved closer to where services are being delivered (NSW TAFE Commission 2013, p. 1). This approach, along with competitive VET funding arrangements, will undoubtedly mean NSW TAFE institutions will be subjected to increasing internal and external compliance scrutiny. In this environment, the comprehensive decision framework of the RMTDF can be used by local NSW TAFE institutes to justify training decisions when audited by internal and external compliance agencies.

The evidence that the RMTDF can improve the effectiveness of training compliance decision making is now presented below.
Table 25: Summary of phase 1 responses – prioritisation of training within vast array of legal compliance issues confronting Australian business.

Phase 2 responses supporting the strong phase 1 trend listed below.

‘I had a higher confidence level Categories A, C & E because they relate to external reporting or regulatory legislative requirements e.g. training decisions in the context of WHS requirements, licensing and requirement for ASQA & TEQSA.’ - Institute Director

‘In context of budget limitations prioritisation linked to compliance & organisational priorities vs personal interests a clear RM matrix supports managers in allocating dollars to training activities.’ - Institute Director

‘RM approach can support internal audit processes to look at staff capabilities to meet standard and academic and technical compliance.’ - Institute Director

‘Risk management provided higher levels of decision making confidence in areas directed by government objectives and where delivery is required to meet contractual requirement.’ – TAFE Expert Panel

5.2.1 RTMDF Decision Categories Lacking Verification Data

Two significant training decision categories tested by this research; ‘predicting training outcomes’ and ‘communicating training decision making’ provided inconclusive research data and no research judgements were made in these categories.

Predicting Training Outcomes

The first of these categories: ‘predicting training outcomes’ is aligned closely to decisions required for training design and delivery – and the use of Training Needs
Analyses (TNA) to make effective and strategic training decisions. A TNA is important because it identifies who should be trained, what needs to be trained and what organisational system should be used to undertake training (Blanchard and Thacker 2013, p. 109; Salas et al. 2012, p. 80). TNA’s can be used to predict expected learning outcomes, guide training design, and provide information about organisational factors that will facilitate or hinder training effectiveness (Salas 2012, p. 80). TNA’s play a central role in deciding if intended training will fit its purpose.

Three components of TNA’s were discussed in chapter two. These were; job task analysis, organisational analysis and person analysis. It was argued that the RMTDF could be used as a framework to undertake these analyses, and that issues relating to expected learning outcomes and training design could be decided upon using risk as a common factor.

Data received in the phase 1 category of: ‘predicting training outcomes’ showed a positive trend from NSW TAFE respondents when using the RMTDF. However, this trend was not verified by the phase 2 qualitative data because of sample non-response bias and lack of meaningful data from which verification evidence could be determined.

Due to the strong trend that emerged in phase 1 of this category, and considering the positive results for RMTDF decision categories closely aligned to ‘predicting training outcomes’ (i.e. training evaluation, strategic alignment), it is considered by the researcher that further research should be undertaken into the effectiveness of the RMTDF in the category of predicting training outcomes. This approach would allow the potential (and obvious) benefits of the RMTDF as superior approach to TNA development to be explored in more specific detail. The summarised data from phase 1 and 2 analyses is shown below.
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Table 26: Summary of phase 1 responses – predicting training outcomes.

As reported the lack of follow up phase 2 data limited the ability to make verification judgements in this category. Only one qualitative response was recorded and is shown below.

‘RM training decision principles enable you to pre determine the outcomes of the training methodologies that you have decided to implement – comparative data will allow you to get a better picture to pre determine an outcome. Whilst I don’t necessary think all factors could be included (that inform the success of a training program), I have more confidence that the application of the RM principles will provide us with better data than we ever had before.’ - Course Coordinator

Communicating Training Decision Making

The second difficult decision category lacking sufficient data for verification was: ‘communicating training decision making.’ The initial phase 1 trend of lower confidence (with limited phase 2 supporting evidence) was the research outcome that most surprised the researcher.

As discussed in the chapter two literature review, using risk management for decision making enables a language of ‘risk’ can be established within an organisational hierarchy and this risk language can be used as a communication tool between organisational managers (Knight et al. 2011, p. 2). With the majority of RMTDF significant decision categories demonstrating the risk management methodology was clearly understood by the NSW TAFE training decision makers (through application of RMTDF to their training decision making), an expected corollary of this understanding was that using ‘risk language’ would improve communication between organisational training decision makers. Whilst not a definitive research finding, the
phase 1 trending pattern indicating risk language would not improve training decision communication between organisational managers appears incongruous to the majority of the other research outcomes.

The summarised outcomes from phase 1 and 2 data analyses in the significant decision category of communicating training decision making is shown below.

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Table 27: Summary of phase 1 responses – communicating training decision making.

As reported limited qualitative responses were received in this category. A single response is shown below.

‘In question categories F the matrix system may be a good way to communicate a broad overview of training needs and methods through the unit. It may also help you determine you have successfully delivered a unit.’ – Course Trainer

Communication between organisational departments and personnel within those departments can significantly influence the overall effectiveness of organisational training provision. Further research into the use of the RMTDF for improved training decision communication is therefore recommended, so we can more fully understand the potential benefits of using risk language to improve the communication approaches between organisational training decision-makers.
5.2.2 Training Effectiveness Decision Category Not Improved by RMTDF

The evidence from phase 1 and 2 in the final difficult decision category: choosing training structures and methods indicated the RMTDF would not improve training decision making effectiveness in this category.

This final category is important because the training structures and methods used by organisations have a significant influence on the effectiveness of organisational training provision. Organisations can choose from a wide range of instructional approaches inclusive of formal classroom instruction with stringent outcome testing (highly structured), or less formal approaches, where students are self-directed to knowledge and outcome testing is less stringent (low structure). Training methods encompass a range of instructional techniques including; stand up lectures, discovery learning, error training, self-regulation, simulation, web-based training and computer based training (Salas 2012, p. 87).

Training methodologies are of particular relevance to NSW TAFE training decision makers in the reformed NSW Vocational Education and Training (VET) sector. The VET ‘Smart and Skilled’ initiatives developed by the NSW Government places the following obligations on NSW TAFE Institutes;

‘TAFE NSW will be expected to compete in a contestable market and deliver specialist training in industry and labour priority areas. TAFE NSW must also maximise learning opportunities by utilising world’s best practice training methodologies including, online, E-learning and other flexible approaches…. [and] utilise its work force capability in meeting emerging business challenges. (NSW TAFE Commission 2013, p.1).’
Chapter two of this research set out the reasons the RMTDF could be used for improved decision making on training methods and structure. The RMTDF (inclusive of training decision matrix tables) provides a framework that makes it possible to categorise and identify different approaches to organisational training methodologies on the basis of risk they represent for organisational training outcomes. The RMTDF can be used to justify non activity and non-testing formats or, conversely, closely detailed education and training programs with strict outcome testing. The RMTDF provides common reference points for training method decision making (Kaplan and Norton 2004, p. 10), by linking training risks to organisational risks, ensuring decisions on training methods can produce effective training outcomes that are strategically aligned with corporate goals.

Despite the theoretical attributes of the RMTDF detailed by the researcher in chapter two, the majority of NSW TAFE respondents indicated the RMTDF would not improve training decision making in this category. Reasons given by respondents for the lack of effectiveness of the RMTDF in this category included perceptions that the RMTDF process was ‘inflexible’ and would not be able to reflect the sometimes ‘intuitive’ nature of training methods decision making.

A summary of all evidence from the phase 1 and phase 2 analyses of using the RMTDF to improve training methods decision making is now provided below.

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<td>Human Resource Cat F</td>
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Table 28: Summary of phase 1 responses – decision on training structures and method.
Phase 2 responses supporting the phase 1 trend listed below:

‘I don’t think I could structure training methods to the letter to effectively use a risk assessment based matrix – training methods vary from teacher to teacher so I don’t think basing methods on a training matrix would work. Industry training needs can vary greatly between companies, location and type of repairs and I can’t see how you can cover all the industries under a single matrix.’ - Course Trainer.

‘The human element within a NSW TAFE decision making structure would mean decision making biases would occur and undermine the effectiveness of the RMTDF approach.’ - Course Trainer.

‘The RMTDF is too simplistic and would not be effective because of the complexities of education decision making which are dependent on student cohort and needs of respective industry.’ - Course Coordinator.

‘RMTDF could not be a substitute for the intuitive feel for a teaching environment, staff willingness and timing that contribute to successful training outcomes.’ - Course Coordinator.

‘We agree with the trend indicating lower confidence level for [training methods decision making] … [the matrix does not] identify differences in teaching styles between high school and tertiary education which should be based on ………school leavers limited experience in an unstructured learning within an adult environment.’ - TAFE Expert Panel.

Whilst the researcher accepts these findings as being valid and reliable research outcomes, it is possible the research participants misunderstood the intended logic and application of the RMTDF for training method decision making. It is considered by the researcher that follow up research involving increased use of the RMTDF by training decision makers would potentially result in higher acceptance of the RMTDF for training method decision making. Increased use of the RMTDF would increase user knowledge that the risk management decision steps can indeed be flexible, and also allow for intuitive training decision making (as part of the risk management process).
5.3 Conclusion

The primary objective of this study was to understand if NSW TAFE training decision personnel would accept and apply a training decision model based on a risk management decision sequence, and if so, would such a risk based decision sequence provide improvements to the NSW TAFE training product and NSW TAFE organisational training outcomes.

With the research cycle now completed, analysis of the results obtained from the comprehensive 3 phased mixed method research design has generated a number of research findings indicating NSW TAFE organisational training outcomes would indeed be improved if risk based training decision making was implemented at their Institutes.

These research findings are considered important and relevant to the NSW TAFE Institutes participating in the research, and are also considered by the researcher to be both relevant and transferable to the broader organisational/corporate training environment both in Australia and overseas.

The research findings, indicating training decision making effectiveness can be improved using the RMTDF, in turn leads to the broader research conclusion that the RMTDF is a training decision framework that can significantly improve the way organisational training is managed. Good management requires good decision making, and in this context the RMTDF is considered an effective training decision approach that can improve the way organisations manage their training provision.

The research has shown that the RMTDF can improve the way organisational training is managed by: improving the targeting of training funding, improving the objectivity of funding decision making and improving prioritisation of funding decision making.
The research also demonstrated that the RMTDF enables greater effectiveness in aligning training goals with organisational goals, provides effective organisational training evaluation processes and enables prioritisation of training when legal and compliance issues are considered. All of these advantages would be highly regarded by any organisation wanting to maximise the effectiveness of their training provision.

Organisational training decision making has traditionally received limited attention from academics and training researchers. The research that is available indicated a number of knowledge ‘gaps’ exist in relation to effective organisational training decision making and improvements to organisational training decision approaches are required (Smith et al. 2008, pp. 9-11).

This seminal research, describing and testing a RMTDF approach to training decision making, has been valuable because it not only provided important data and information to a research field lacking attention, but it has also validated a decision making framework that can be practically utilised by any organisation wanting to increase the effectiveness of their training provision. The three part RMTDF described and tested in this research provides a flexible ‘off the shelf’ training management template, that can be directly applied to existing organisational training systems and training policy implementation.

In a competitive global business environment, where organisations rely on appropriately skilled workforces to maintain competitive advantages, effective management of training should be a significant priority for organisational decision makers (Salas et al. 2012 p. 75). This research has demonstrated that using risk as the basis for training decision making, can improve organizational training decision outcomes. The RMTDF approach, when adopted, enables organisational managers to effectively decide on ‘how and why’ worker knowledge, skills and abilities (KSA’s) are developed in their organisational context. The RMTDF is therefore considered to
be a training management approach that can fundamentally influence organisational competitiveness and viability.

Further to the research findings demonstrating how the RMTDF can be used to effectively manage organisational training, the importance of the RMTDF in the Australian organisational training context has been emphasised by the decision of the Australian Government to grant an Innovation Patent (IP) to the RMTDF during the research period (IP 2012100862). The acknowledgement that the RMTDF has intellectual property attributes worthy of an innovation patent is a strong endorsement of the validity and integrity RMTDF training decision making approach.

5.4 Implications for Further Research

The RMTDF has emerged from this research as a highly sophisticated training decision approach that can be used to enhance the effectiveness of training decision making and improve the way training is managed in organisations.

The RMTDF research introduced, tested and validated a training decision making methodology that places ‘risk’ at the centre of all training decision making. The RMTDF research demonstrated that a risk based decision approach provided a high level of utility for NSW TAFE training decision makers and enabled practical and effective training decision making outcomes in the decision categories developed from the Salas et al. (2012, p. 94) question series.

It is considered by the researcher, that along with improved decision making utility, the RMTDF approach also has the potential to improve the overall effectiveness and strategic qualities of organisational training decision making. The RMTDF research has created a new theoretical knowledge base where complex issues impacting on training decision making (including political, social, and cultural issues) can be considered in a more logical and methodical way by using ‘risk’ to make decisions in each step of a training decision process.
Using this newly created and improved knowledge base - the effectiveness of the RMTDF could be justifiably researched in a wide variety of organisational settings to further build on the innovative concept that has been established by this research. Longer term studies that measure the actual effectiveness of training programs both with and without the use RMTDF for decision making, would be a useful follow up to the initial research that has been undertaken. It is considered the attributes of the RMTDF are not limited in their application, and can therefore positively influence training management decisions in a wide range of organisations from small to large public/ private entities, through to regional and national governments.

Future research into the use of RMTDF for training decision making could extend into decision making by policy makers, including regional authorities and government. Salas et al. (2012, p. 94) indicated policy makers, like organisational decision makers, need to ensure appropriate skills are developed for countries, for regions and for industries. According to Salas et al. (2012, p. 95), policy makers should use Training Needs Analyses (TNA’s), and use scientific findings about training effectiveness to make good training investments and policy decisions. The RMTDF offers a highly sophisticated approach to TNA’s, and the theory bases of the RMTDF is science based. The RMTDF could therefore be adopted by many levels of government to ensure training policy decisions are, transparent, credible and justifiable to many levels of scrutiny to which they are subjected.

Whilst the attributes of the RMTDF as an organisational training management tool have been highlighted by this research - the researcher acknowledges the research design provided only a limited understanding of the impact of the RMTDF on closely related issues – such as the personal learning experiences of vocational education students.

There is some evidence that current NSW government policies and objectives limit students’ ability to access and engage in quality and meaningful vocational education
and training (SMH, 2015, p.1). In the NSW vocational educational sector, this is evidenced by increased student fees and costs, perceived lower quality courses, lack of student choice and provider collapse (SMH, 2015, p.1). However, because the primary focus of the RMTDF research was on improving the decision making of different levels of training providers (achieved by demonstrating the RMTDF to be an effective training management framework), it is recommended that follow up research/studies are undertaken to further understand how the RMTDF can be used as a framework to improve the quality and outcomes of vocational students’ educational experiences.

It was also reported in the research findings that service delivery personnel (NSW TAFE Trainers) were less enthusiastic about the effectiveness of the RMTDF than were other levels of NSW TAFE training decision makers. Some NSW TAFE Trainers indicated the RMTDF lacked sophistication and flexibility and would not be useful in a complex public service decision making environment such as NSW TAFE. Therefore, further research into the effectiveness of the RMTDF at the service delivery level, incorporating a research design that would deliberately target these issues and concerns, would be useful to understand potential RMTDF service delivery limitations and identify what measures could be taken to overcome such limitations.

In conclusion, the researcher considers that the RMTDF has the potential to make considerable and significant improvements to way organisations make training decisions and manage their training implementation. The incorporation of the RMTDF as a standard organisational training management practice is considered to be the most obvious outcome from this ground breaking research.
## Appendix A: Complete List of Phase 1 Research Questions for NSW TAFE Training Decision Makers - (1of 2).

### Phase 1 questions

<table>
<thead>
<tr>
<th>Role</th>
<th>Questions</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Institute Director</strong></td>
<td>Does your org have an effective method of ranking level of training required? Does your org have effective methods of aligning skill development with key org strategies? Does your org have effective methods to defend training decisions at law? Does your org effectively prioritise training decisions to meet org requirements? Does your org training decision making enable a logical process for auditing requirements? Does your org effectively make decisions on allocation of resources? Does your org have effective processes to predict training outcomes?</td>
</tr>
<tr>
<td><strong>Finance Manager</strong></td>
<td>Does your org have an effective method of allocating training resources to match skill development? Does your org have effective methods of ranking training requirements to prioritised training investment? Does your org have an effective method of allocating training resources in line with corporate goals? Does your org have a logical framework to communicate to other dept decision on resource allocation? Does your org have an effective process for auditing training resource decision making? Does your org have effective processes available to predict training outcomes of training resource allocation and decision making?</td>
</tr>
<tr>
<td><strong>Human Res Manager</strong></td>
<td>Does your org have effective methods of matching corporate goals to skill development requirements of employees? Does your org have effective methods of ranking and prioritising staff training to ensure relevancy of staff skills? Does your org have a logical framework to communicate to other dept on training decisions? Does your org you rank and prioritise your training decision against assessed org training goals? Does your org have effective processes available to predict training outcomes?</td>
</tr>
<tr>
<td><strong>Training Coordinator</strong></td>
<td>Does your org have effective methods that allow you to rank and prioritise your training decision against org training goals? Does your org have an effective process for deciding on types of course structure? Does your org have an effective processes that matches course content to org priorities? Does your org have a logical training decision making framework work that enables effective communication with other depts regarding training decisions? Does your org have processes available to help you predict results of types of training methods that are being implemented?</td>
</tr>
</tbody>
</table>
### Appendix A: - Complete List of Phase 1 Research Questions for NSW TAFE Training Decision Makers - (2 of 2).

<table>
<thead>
<tr>
<th>Course Trainer</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Does your org have an effective method of selecting training approaches and prioritising them to meet targeted org training needs?</td>
<td></td>
</tr>
<tr>
<td>Does your org have effective course assessment and evaluation decision making procedures that establish priorities for future training implementation?</td>
<td></td>
</tr>
<tr>
<td>Does your org training decisions effectively link course content to ranked and prioritised corporate skill development requirements?</td>
<td></td>
</tr>
<tr>
<td>Does your org training enable effective decisions that logically align course structures with key corporate strategies?</td>
<td></td>
</tr>
<tr>
<td>Does your org have a logical training decision making framework that enables effective communication with other depts regarding training decisions?</td>
<td></td>
</tr>
<tr>
<td>Does your org have processes available to help you predict results of types of training methods that are being implemented?</td>
<td></td>
</tr>
</tbody>
</table>
Appendix B: Example of Qualitative Phase 2 NSW TAFE Participant’s Research Question.

Dear William

Your responses in the phase 1 research questionnaire indicated a mixed change of confidence levels when using risk management decision making logic with five categories indicating higher confidence levels – A, B, C, G & H and one category indicating lower confidence levels - F (responses attached). As a follow up to the initial set of questions can you please provide answers of up to ten lines for the following two questions?

1. Why did the risk management based decision making framework described in the support material give you mixed levels of decision making confidence in the noted categories? Please give examples.

2. In the context of the change in your recorded confidence level do you think training decision making that uses a risk management framework has the potential to impact on the effectiveness of organisational training outcomes? Please give examples and reasons why.
Appendix C: List of Experience & Qualifications of TAFE Expert Panel.

Panel Member 1 – Twenty nine years in adult education including the following;

Corporate training and consultancy.

Business development for TAFE NSW- Illawarra Institute Manager apprenticeship and traineeship for TAFE NSW.

Illawarra Institute Acting Professional Development Manager TAFE NSW – Illawarra Institute Acting Outreach.

Coordinator TAFE NSW Illawarra Institute Government Funded Program Coordinator TAFE NSW.

Work Opportunities Coordinator TAFE NSW – Illawarra Institute Teaching classes and individuals in the workplace.

Panel Member 2 – Twenty four in adult education including the following;

School Based Apprenticeships and Traineeships Institute Coordinator TAFE NSW – Illawarra Institute.

TVET (vocational training for school students for HSC0 College Coordinator TAFE NSW) – Illawarra Institute.

Class Teacher for Business Services including support and coaching TAFE NSW – Illawarra Institute

Teacher of Students with physical disabilities

Panel Member 3 – Twenty three years working in Vocational Educational employment including the following;

Several positons managing TAFE Workforce development

8 years developing workforce leadership models in TAFE and the VET environment

Producing and customising TAFE training development packages

Developing appropriate approaches to technologies to foster improved TAFE business outcomes

Developing programs to support teacher capability

Panel Member 4 – Twenty five years working in the Vocational Education Sector including the following;

Many years face to face teaching

Coordination and implementation of industry approved courses

Liaison with industry to develop appropriate training and curriculum needs

Providing strategic advice to TAFE Institute on TVET programs

Planning developing, and coordinating TAFE NSW apprenticeship and trainee programs
Appendix D: Deputy Director NSW TAFE & Community Services Approval to Undertake RMTDF Research.

DEPUTY DIRECTOR-GENERAL
TAFE AND COMMUNITY EDUCATION

Mr Barry Horton
9 Narrien Place
NORTH NOWRA NSW 2541

Dear Mr Horton

I write in response to your correspondence received on 1 March 2012, to the Director-General of Education and Communities, Dr Michele Bruniges AM, regarding permission to undertake research at a TAFE NSW Institute. The Director-General has asked me to respond on her behalf.

Thank you for your proposal which purposes to test a risk management based education and training model to assist managers and educators in making enhanced training decisions.

Four TAFE NSW Institutes have expressed interest in taking part in your research project, namely:

To proceed further with your Institutes please contact:

- Capability and Development Unit, TAFE NSW - -
- Planning and Performance, TAFE NSW - 208 9205 -
- -
- -

Thank you for submitting this proposal and I wish you every success in your research project.

Yours sincerely

Pam Christie
Deputy Director-General
TAFE and Community Education
March 2012
Appendix E: Combined University of Wollongong and Shoalhaven Health District Research Ethics Approval.

28 May 2013

Mr Barry Horton
Illawarra Shoalhaven Local Health District
Scenic Drive
Nowra NSW 2541

Dear Mr Horton

I am pleased to advise that the Human Research Ethics application referred to below has been approved. Before you can proceed with the project you must first have authorisation from ISLHD. A copy of this advice has been forwarded to them.

Ethics Number: HE13/251
AuRED Number: LNR/13/WGONG/81
Project Title: Can Education and Training Decision Making be Improved Using A Risk Management Decision Making Framework
Name of Researchers: Mr Barry Horton, Dr Michael Hough, A/Prof Narottam Bhindi
Sites Approved: Shoalhaven District Memorial Hospital
Documents Approved/Reviewed: LNR - submission code AU/6/B30215 UOW Ethics Application Form Sydney Business School Conference Paper Response from Deputy Director TAFE indicating interest to proceed with research Acknowledgement of Individual TAFE Institute Directors to participate in research Individual Research Participant Permission Request Form Phase one single factor questions for participants Phase two qualitative questions for participants following collection and assessment of phase 1 data

Approval Date: 28 May 2013
Expiry Date: 27 May 2014
Appendix F: Example of NSW TAFE Institute Ethics Approval.

Form 1
Application to conduct research in TAFE NSW

1. Contact details
Name of principal researcher: Barry Horton
Title: Mr

Contact name (if different from above):
Address:
Telephone: Fax:
E-mail address: barry.horton@sesiahs.health.nsw.gov.au

Title of proposal: Can Education and Training Decision Making be Improved Using A Risk Management Decision Making Framework

2. Precis of proposal (including how the research meets the Criteria for Approval):

Precis of proposal attached and titled “Attachment A”

3. The project proposal is attached. – Yes

4. Have you previously applied to conduct this or similar research in TAFE NSW? - No

5. Have you applied to other TAFE NSW Institutes or Portfolio areas to conduct research related to this proposal? – Yes

   If 'Yes', please provide details

   Approval granted from TAFE Deputy Director to undertake research – initially four TAFE Institutes to be included in research

   * xxxx
   * xxxxx
   * xxxx
   * xxxx

6. I agree to share research findings with the designated TAFE NSW contact person prior to publication – Yes

6. Is the proposed research part of a University course – Yes

   If 'Yes' please complete sections 7.

7. a) Name of university - University of Wollongong
   b) Degree Doctor of Philosophy (PHD)
   c) Supervisor Professor Michael Hough - Associate Professor Narottam Bhindi
   d) Faculty Sydney Business School
   e) Department Wollongong Campus

8. Will the findings of the research be primarily used for commercial gain? – No

   I declare that the above information is correct. I have read the Criteria for Approving Applications and agree to comply with them in carrying out the proposed research. I will ensure that I, and any assistants working with me and/or on my behalf, will maintain the confidentiality of all information collected from participants.

Signature of principal researcher
Date 20 Aug 13
Appendix G: Example of Signed Consent Form Research Participants

Research Permission Request Form

Dear Research Participant

As part of my PhD research I am investigating the merits of a risk management training model that may have the potential for improving education and training outcomes in Australian training organisations.

To gather data for the research I am formally requesting your permission to participate in the research by completing the attached questionnaire.

In general terms the questions and data gathering will be reviewing the systems and decision making processes that lead to current course implementation and the means by which those courses are justified and evaluated for effectiveness. The basis of this data gathering is to use the research to compare the existing TAFE education and training decision making processes to the potential benefits that the risk management training model may have.

A structured interview schedule will be used to gather data with specific questions based on the following research areas to be explored:

- What are the existing organisation methods used for determine training objectives – does a risk management approach provide any advantages?
- Are the existing organisational training initiatives optimising training efforts to obtain the most important and relevant outcomes – what role can risk management have in this?
- What are the existing organisational mechanisms that ensure appropriate knowledge is included in training programs - can risk management be used to determine knowledge requirements?
- What current organisational processes are used to justify allocation or non allocation of training resources?
- What are the current organisational approaches to evaluation of training effectiveness? Does a risk management approach provide opportunities for improvements?
- What current organisational systems are in place to justify training implementation and training cost benefits to internal and external stakeholders (i.e. compliance authorities undertaking audits, shareholders of private companies or taxpayers for public service organisations) – would a risk management approach provide any advantages?

To undertake this research permission has been gained from the Wollongong University research ethics committee and the TAFE ethics procedure has been followed.

Can you please indicate your willingness to participate in the data gathering process in accordance with the ethical standards guidelines required by both University of Wollongong and NSW TAFE.

I agree to participate in interviews and data gathering for the research process outlined above.

Name
Date 2/10/13
Signature
Position
### Appendix H: Example of Questionnaire Format Emailed to Participants in Phase 1 of Research (part 1 of 2).

#### Table: Ranking of confidence levels of personnel involved in training decision making - first stage questions

<table>
<thead>
<tr>
<th>Your Name</th>
<th>Human Resources Manager</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>High Confidence</td>
<td>High Confidence</td>
<td></td>
</tr>
<tr>
<td>Not confident</td>
<td>Not confident</td>
<td></td>
</tr>
</tbody>
</table>

#### Instructions for structured training or unstructured training?

A) The training decision making framework that enables ranking of training requirements to the institute's skill development requirements?

B) The training decision making framework that enables ranking of training requirements to the institute's skill development requirements?

C) Decisions involving allocation of training resources are undertaken in a logical sequence?

D) Justifications for structured or unstructured training?

E) The institute's training decision making process logically determine what methods of training are required (i.e.,

F) The training decision making framework you are involved in enables you to determine the outcomes of training methodologies that you have decided to implement.

[Please select one choice which is closest to the level of confidence you believe for each statement.]

---

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### Appendix H: Example of Questionnaire Format Emailed to Participants in Phase 1 of Research (part 2 of 2)

<table>
<thead>
<tr>
<th>Question</th>
<th>Options</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Risk management training decision principles enable you to predict the outcomes of training. Which of the following best describes your organization's approach to risk management training?</td>
<td>4</td>
</tr>
<tr>
<td>2. Risk management training decision principles can identify methods of training that are targeted and specific. Is this true or false?</td>
<td></td>
</tr>
<tr>
<td>3. Risk management training decision principles may propose methods of training that are less effective. Is this true or false?</td>
<td></td>
</tr>
<tr>
<td>4. Risk management training decision principles enable allocation of training resources to be undertaken in a logical sequence. Is this true or false?</td>
<td></td>
</tr>
<tr>
<td>5. Risk management training decision principles enable training requirements to be identified in a logical sequence. Is this true or false?</td>
<td></td>
</tr>
<tr>
<td>6. Risk management training decision principles enable training requirements to be identified in a logical sequence. Is this true or false?</td>
<td></td>
</tr>
</tbody>
</table>

**Please rate the following statements (1-4) by indicating a level of confidence you would have when assuming you are able to apply the risk management logic indicated on the support documentation.**

<table>
<thead>
<tr>
<th>Statement</th>
<th>Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. This logic was adopted and used.</td>
<td></td>
</tr>
<tr>
<td>2. Please rate the following statement: (A) or (B) or (C) or (D)</td>
<td></td>
</tr>
<tr>
<td>3. Assume you are able to apply the risk management logic indicated on the support documentation.</td>
<td></td>
</tr>
</tbody>
</table>

**Ranking of confidence levels of personnel involved in training decision making - second stage questions**

<table>
<thead>
<tr>
<th>Participant</th>
<th>Confidence Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>[Name]</td>
<td>[Level]</td>
</tr>
</tbody>
</table>
Appendix I: Supporting Information Package to Research Participants - 6 page document – (1of 6).

Questionnaire Supporting Information – Please read this before answering your questions

What is risk management?

Risk Management is a process used to make decisions.

Risk management decisions are based on a simple formula of assessing levels of risk (high to low) and matching suitable risk controls to achieve expected outcomes.

Risk management allows organisations to rank all types of organisational risk (high to low) and prioritise the levels of controls required. Risk management theory is supported by an International Standard (ISO 31000:2009).

This research has developed a 3 part framework for Training Decision making that uses risk management as its basis. This framework is shown below.

Part 1- Training Program Risk Assessment Priorities

<table>
<thead>
<tr>
<th>Step 1</th>
<th>Step 2</th>
<th>Step 3</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Curriculum/Course Content</strong></td>
<td><strong>Training Delivery &amp; Assessment Method</strong></td>
<td><strong>Training/Assessment Frequency</strong></td>
</tr>
<tr>
<td>Initial risk assessment must consider relevance and validity of knowledge items to be included in course or curriculum content</td>
<td>Requires risk assessment of most appropriate training and teaching method and associated assessment techniques</td>
<td>Requires risk assessment of how often training &amp; assessment is required.</td>
</tr>
<tr>
<td>Knowledge items risk assessed and evaluated in context of what knowledge is relevant and important to organisation in current and forward thinking Decisions must rank order knowledge content so that content can be included or excluded according to risk level</td>
<td>Training methods need to be risk assessed in context of complexity and level of knowledge required to ensure training outcomes match organisational performance expectations. Decisions required on range of methods from formal classroom with stringent assessment to informal provision of knowledge</td>
<td>Frequency of training courses need to be risk assessed to ensure training methods, assessment techniques and knowledge items are implemented at frequencies that ensure staff knowledge levels are optimised in context of organisation risk environment</td>
</tr>
</tbody>
</table>

Step 4

Training Evaluation

Training evaluation undertaken using risk assessment approach Existing and planned training can be risk assessed with content, method and frequency evaluated and aligned with the existing organisational risk context. Outcomes of evaluation can be defined on a risk management scale of high chance of success – low chance of success
Appendix I: Supporting Information Package (2 of 6)

Part 2 – Training Decision Making Process

2. Core decision requirements to align with organisation strategic goals
   1.1. Why train – decisions required on what knowledge is relevant to org and prioritise what knowledge training is required and what isn’t
   1.2. How / If to train – Decisions required on effective teaching and assessment methodologies
   1.3. When /If to train – decisions required on training frequencies and org skill development and strategic alignment requirements

2. Apply Risk Management Theory
   2.1. Identify organisational risks to use as bases for developing/identifying training needs
   2.2. Use developed risk ranking systems of using/not using staff knowledge and skill requirements (high to low)
   2.3. Rank strategic org goals on risk bases & align training priorities according to risk (high to low)
   2.4. Match ranked knowledge levels to risk assessed training priorities to decide on most effective training priorities
   2.5. Evaluate training decisions on the basis of risk & use framework as a method of communication for org training requirements

3. Developed Matrix tables to assist in RM Decision making sequence and prioritisation of training risk levels

4. Apply as a system to all organisational training requirements
Appendix I: Supporting Information Package (3 of 6)

Part 3 – Use of Matrixes for Training decision making (examples of how to use the risk management matrixes for training decision making provided below).

Example 1

A common use for risk management is for making decisions about Work Place Health and Safety. The example below demonstrates how risk management decision making is undertaken.

A. **Organisation engages workers to install antennae on the roof five storey office block. The decision making to assess the level of risk for this task is undertaken using the standard risk assessment matrix below**

<table>
<thead>
<tr>
<th>Consequences</th>
<th>Likelihood</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fatality/Catastrophic event</td>
<td>Highly Likely</td>
</tr>
<tr>
<td>Major injuries/Serious operational event</td>
<td>High Risk</td>
</tr>
<tr>
<td>Minor Injuries/Moderate Operational event</td>
<td>High Risk</td>
</tr>
<tr>
<td>Negligible Injuries/Minor operational events</td>
<td>Medium risk</td>
</tr>
</tbody>
</table>

Table 1: Standard risk Matrix

The matrix is used to make decisions by matching the likelihood axis against the consequence axis to establish the risk level. In this example it would be highly likely that a worker would fall of the roof and the consequences of the fall would be fatal therefore the activity would be judged as **High Risk**. Decisions can now be made for appropriate controls as they can be ranked according the level of risk (i.e. **high risk activity** – highly structured control – **low risk activity** – lowly structured control). In the example above a highly structured control would include the use a scaffold system or equivalent as opposed to a lowly structured approach of working off a ladder. The advantage of risk management decision making is that identifying risk levels provides an opportunity to rank organisational activities in a framework of **high to low risks** and make decision about the best ways of prioritising risk controls. This enables more effective decision making on a range of factors from organisational goal setting to targeting of organisational resources.

Using Risk Management for Training Decision Making

It considered the advantages of risk management decision making highlighted above can be used by organisations to make their training decision making more effective. The questionnaire you have been asked to complete contains questions that identify key training decision making factors that are important for effective training outcomes. The questions ask you to consider your current decision making processes and then consider if a risk management decision making approach would provide you with any advantages. Example two below is provided to demonstrate how risk management can be used to make training
Appendix I: Supporting Information Package (4 of 6)

decision with the help of a training matrix based on the same methodology used in the standard risk matrix above.

Example 2 - Decisions on types of training structure

B) A Health Service has a finite training budget and is currently planning for its next year of training implementation. Using risk management the organisation has undertaken a risk assessment to prioritise its training requirements. It has developed a risk ranking (high to low) for many of its courses by rating the current operational requirements of the organisation against the appropriate knowledge requirements of employees. It now has to decide on the appropriate methods for undertaking the training according to the risk levels. Shown below is a sample of four courses from the Health Service that have been risk ranked (high to Low)

1. Nurse medication training- **High Risk** – (training method from matrix- highly structured training)
2. Frontline Managers Training- **Medium Risk** – (training method from matrix - medium structured training)
3. Communication Techniques Training –**Low Risk** (training method from matrix –Low Structured training)
4. Obtaining best results from meetings training - **Negligible risk** (training method from matrix –unstructured training)

<table>
<thead>
<tr>
<th>Required employee knowledge level</th>
<th>Evaluation of training requirements in organisational risk context</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>High Risk</td>
</tr>
<tr>
<td>Level 1 Essential knowledge/skill</td>
<td>Highly structured training</td>
</tr>
<tr>
<td>Level 2 Important knowledge/skill</td>
<td>Highly structured training</td>
</tr>
<tr>
<td>Level 3 Basic knowledge/skill</td>
<td>Medium structured training</td>
</tr>
<tr>
<td>Level 4 Associated knowledge/skill</td>
<td>Unstructured training</td>
</tr>
</tbody>
</table>

1.Highly Structured training  | Rigorous test at instruction & follow up rigorous test/assess at regular intervals.
2.Medium Structure training | Rigorous testing at instruction. Sample follow up testing.
3. Low  Structure training | General testing at instruction- sample follow up assessment only
4. Unstructured training | No testing at instruction- general assessment and sample follow up

*Table 2& 3* matrix for deciding on training methods & table showing definition of levels of training structure.

The training decision making matrix above provides a risk management approach for the Health Service Managers to decide on the best training methods.

In this example the types of **training method (defined by level of training structure)** can be judged. This demonstrates an effective decision making process where training decisions
Appendix I: Supporting Information Package (5 of 6)

can be clearly justified and aligned with corporate training goals and training resource allocation.

Further decision making matrix

Risk management can be further applied to training decision making by using a matrix table approach to evaluate potential outcomes of training decisions and judgement of the potential effectiveness of selected training methods. A matrix of this type can be used as evaluation process to help define or predetermine the potential outcomes of training decisions.

<table>
<thead>
<tr>
<th>Expected outcomes</th>
<th>Level of training structure</th>
<th>Level 1 Essential knowledge acquisition</th>
<th>Level 2 Important knowledge acquisition</th>
<th>Level 3 Basic knowledge acquisition</th>
<th>Level 4 Associated knowledge acquisition</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Highly Structured training</td>
<td>Effective outcome highly likely</td>
<td>Effective outcome highly likely</td>
<td>Effective outcome likely</td>
<td>Effective outcome unlikely</td>
</tr>
<tr>
<td></td>
<td>Medium structured training</td>
<td>Effective outcome possible</td>
<td>Effective outcome highly likely</td>
<td>Effective outcome likely</td>
<td>Effective outcome possible</td>
</tr>
<tr>
<td></td>
<td>Low structured training</td>
<td>Effective outcome possible</td>
<td>Effective outcome likely</td>
<td>Effective outcome possible</td>
<td>Effective outcome likely</td>
</tr>
<tr>
<td></td>
<td>Unstructured training</td>
<td>Effective outcome very unlikely</td>
<td>Effective outcome unlikely</td>
<td>Effective outcome possible</td>
<td>Effective outcome likely</td>
</tr>
</tbody>
</table>

Table 4 Matrix to determine likelihood outcomes from training methods.

It must be remembered that risk management is providing a decision making process for trying to determine the most effective training decisions. Therefore the table above in defining *Highly Structured Training* as being unlikely to provide *effective outcomes for associated knowledge* acquisition is not an indicating that learning won’t take place, but is indicating that a more appropriate methods can be used to obtain that knowledge for both organisation and employee.

The final matrix below can be used by training managers wanting to consider and evaluate the cost implications of training course required by their organisations. The matrix follows the same methodology as the other matrixes with the core logic that highly structured training will come with a higher dollar cost needing more time and resource allocation than training at the unstructured end of the continuum.
<table>
<thead>
<tr>
<th>Level of training structure</th>
<th>High risk</th>
<th>Medium risk</th>
<th>Low risk</th>
<th>Negligible risk</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Level 1 Highly structured</strong></td>
<td>High dollar cost, Low financial risk</td>
<td>High dollar cost, Medium fin risk</td>
<td>High dollar cost, High Fin risk</td>
<td>High dollar cost, High Fin risk</td>
</tr>
<tr>
<td><strong>Level 2 Medium Structured</strong></td>
<td>Medium Dollar cost, Medium Fin risk</td>
<td>Medium Dollar cost, Medium Fin risk</td>
<td>Med dollar cost, Med fin risk</td>
<td>Med dollar cost, High Fin risk</td>
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<tr>
<td><strong>Level 3 Low Structured</strong></td>
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<td>Low dollar cost, Low fin risk</td>
<td>Low dollar cost, Low fin risk</td>
</tr>
<tr>
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<td>Very low dollar cost, Medium fin risk</td>
<td>Very low dollar cost, Med Fin risk</td>
<td>Very low dollar cost, Very low fin risk</td>
</tr>
</tbody>
</table>

Table 5 Matrix that evaluates dollar cost effectiveness of training approaches.

Thank you for taking the time to read this background information to my research questionnaire. If you want further help or clarification to help you complete the questionnaire please email me or ring 0434 076 732.

Good luck

Barry Horton
Appendix J: TAFE Expert Panel phase 2 Qualitative Questions (1of 2)

Risk Management of Training Research –

TAFE Specialist Panel Follow Up Questions (Phase 2)

1. One question phase has been undertaken at 5 NSW TAFE Institutions rating the confidence levels of training decision making practitioners’ when existing training decision making approaches are compared to the developed risk management decision framework being researched.

2. The summarised results of phase 1 are provided (pages 2-5) along with the question categories identified as important and “difficult choice” areas for TAFE training decision makers.

3. Also included for TAFE specialist panel reference is the support documentation provided to TAFE respondents explaining the use of the risk management training framework and the theoretical concept underpinning its use.

4. The specialist TAFE panel are asked to consider the researcher’s initial analyses of the TAFE practitioners responses (page 2-5) and provide answers to the three questions below. (Answers of up to ten lines would be appreciated).

Question Preamble:- Of the 38 question categories asked of NSW TAFE respondents (provided on page 2-5) 23 categories indicated a higher mean score in confidence levels when risk management was used for decision making, 7 categories had matching scores and 8 categories had a lower mean score and. Considering the question category responses and the support information provided (page 6-9) can the panel please answer the following three questions.

Question 1 – After reading the support information and comparing this to the trended responses provided, does the panel think their own decision making confidence levels would match the trends indicated by TAFE respondents and be higher in the categories indicated? Please give reasons why

Yes, the panel’s response is that our decision making confidence levels match the trends indicated by TAFE respondents and higher in the categories indicated with two exceptions. The two exceptions are disabilities and school leaver cohorts.

The first exception is the application of the matrix to a cohort of disabilities students, such as sight or hearing impaired, where the student will attract a higher cost due to support required. Intellectually impaired may or may not involve a higher cost dependent on the group and the skills to be learnt. For example an intellectual disability group undertaking retail skills would be able to achieve learning outcomes with one teacher where as the same or similar group undertaking hospitality training would require two teachers to enable the group to safely gain the skills practice required for skill attainment to meet learning outcomes.
Appendix J: TAFE Expert Panel phase 2 Qualitative Questions (2 of 2).

The second exception is the possibility of school leaver’s limited experience with unstructured learning in an adult learning environment. There are notable differences in teaching styles between high school and tertiary education. Moving from one level to the next can be difficult for some students and, with the addition of an unstructured delivery, may inhibit their learning rather than enhance it. In this instance learning often takes more time for a student to gain the self-management required to meet minimal learning required by the provided deadlines.

Question 2 – Does the panel think the TAFE the trend of responses towards higher confidence levels when using risk management could lead to more effective training decision making in TAFE?

Please give reasons

Yes, the panel agrees with the trend of responses towards higher confidence levels when using risk management may lead to more effective training decision making in TAFE. Training decisions are based on various aspects including target group, resources, costs, funding models, training package requirements and project deadlines. This is noticeable in specially funded cohorts, such as government funded training with imposed deadlines, where training planning and delivery is required to meet contractual requirements in addition to training package regulations so students may gain the necessary skills and documentation to meet government objectives. By using the matrix a more objective decision can be reached without additional, and sometimes irrelevant, factors influencing the decision making process.

Question 3-

Does the TAFE panel think the risk management training decision framework has advantages /disadvantages as NSW VET moves into the new era of Smart and Skilled Quality Framework.

Please give reasons

The panel believes that decisions based on the training decision framework provide an advantage over NSW VET delivery, regardless of any new or future framework, due to the objectivity and thoroughness provided by the process. This approach applies to any model of VET training, whether corporate or registered training provider planned and delivered, to comprehensively assess risk for an organisation. By using the matrix to identify risk organisations are able to identify the exact nature of any possible risks quickly and effectively and incorporate decisions that alleviate the identified risk. Once alterations have been implemented the matrix would confirm if any further risks exist so that modifications may be conducted until a suitable plan is achieved. This provides a safety net that organisations have previously lacked in their decision making.
Appendix K: Calculations Showing Internal Consistency of Pilot Questions using Cronbach’s Coefficient Alpha - (1of 3).

1. Reliability Internal Consistency Cronbach’s Coefficient Alpha – Likert Scale – Testing Risk Management Decision Categories – Pilot Trainer Category

<table>
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<tr>
<th>Warnings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Each of the following component variables has zero variance and is removed from the scale: Trainer PilQues6</td>
</tr>
<tr>
<td>The determinant of the covariance matrix is zero or approximately zero. Statistics based on its inverse matrix cannot be computed and they are displayed as system missing values.</td>
</tr>
</tbody>
</table>

<table>
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<tr>
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<tr>
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<td>a. Listwise deletion based on all variables in the procedure.</td>
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</tbody>
</table>

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<table>
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<tr>
<th>Item-Total Statistics</th>
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</thead>
<tbody>
<tr>
<td><img src="image" alt="Item-Total Statistics Table" /></td>
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</table>
Appendix K: Cronbach’s Coefficient Alpha Calculations - (2 of 3).

### Scale Statistics

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<th>Std. Deviation</th>
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</table>

### 2. Reliability – Likert Scale - Testing Risk Management Decision Categories – Pilot Course Coordinator Category

#### Warnings

The determinant of the covariance matrix is zero or approximately zero. Statistics based on its inverse matrix cannot be computed and they are displayed as system missing values. Tcoord ques 7.

#### Case Processing Summary

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a. Listwise deletion based on all variables in the procedure.

#### Reliability Statistics

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#### Item Statistics

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<td>Tcoord PilQues4</td>
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### Inter-Item Correlation Matrix
Appendix K: Cronbach’s Coefficient Alpha calculations - (3 of 3).

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<td>.816</td>
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<tr>
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<td>.707</td>
<td>.866</td>
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Summary Item Statistics

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Item-Total Statistics

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<th>Scale Variance if Item Deleted</th>
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<th>Squared Multiple Correlation</th>
<th>Cronbach's Alpha if Item Deleted</th>
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Scale Statistics

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<td>13.250</td>
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Appendix L: Calculations Showing Reliability of Questions Using Spearman's Correlational Bivariate - (1of 4).

Spearman testing reliability of RMTDF pilot questions asked twice (Non Parametric)

Correlation value between times one and two testing **Trainers with RM**

<table>
<thead>
<tr>
<th>Correlations</th>
<th>ScoreTrainer1(post)</th>
<th>ScoreTrain2(post)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spearman's rho</td>
<td>ScoreTrainer1(post) Correlation Coefficient</td>
<td>1.000</td>
</tr>
<tr>
<td></td>
<td>Sig. (2-tailed)</td>
<td>.516</td>
</tr>
<tr>
<td></td>
<td>N</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>ScoreTrain2(post) Correlation Coefficient</td>
<td>.335</td>
</tr>
<tr>
<td></td>
<td>Sig. (2-tailed)</td>
<td>.516</td>
</tr>
<tr>
<td></td>
<td>N</td>
<td>6</td>
</tr>
</tbody>
</table>

Correlation value between times one and two testing **Trainers without RM**

<table>
<thead>
<tr>
<th>Correlations</th>
<th>ScoreTrainer1(pre)</th>
<th>ScoreTrain2(pre)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spearman's rho</td>
<td>ScoreTrainer1(pre) Correlation Coefficient</td>
<td>1.000</td>
</tr>
<tr>
<td></td>
<td>Sig. (2-tailed)</td>
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<td></td>
<td>N</td>
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<tr>
<td></td>
<td>ScoreTrain2(pre) Correlation Coefficient</td>
<td>.367</td>
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<td></td>
<td>Sig. (2-tailed)</td>
<td>.474</td>
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<tr>
<td></td>
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<td>6</td>
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</table>
Appendix L: Calculations Showing Reliability of Questions Using Spearman’s Correlational Bivariate - (2 of 4).

Correlation value between times one and two testing **Training Coordinators with RM**

<table>
<thead>
<tr>
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<tr>
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<td>7</td>
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Correlation value between times one and two testing **Training Coordinators without RM**.

<table>
<thead>
<tr>
<th>Correlations</th>
<th>ScoreTrainercoord1(post)</th>
<th>ScoreTraincoord2(post)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spearman 's rho</td>
<td>Correlation Coefficient</td>
<td>Sig. (2-tailed)</td>
</tr>
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<td>N</td>
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<td>ScoreTraincoord2(post)</td>
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<td>Sig. (2-tailed)</td>
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<tr>
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</tbody>
</table>
**Appendix L: Calculations Showing Reliability of Questions Using Spearman’s Correlational Bivariate- (3 of 4).**

**Training Coordinator Pilot pre RM test**

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<tr>
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<tr>
<td>Sig. (2-tailed)</td>
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<td>.208</td>
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<tr>
<td>N</td>
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<td>8</td>
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</table>

| ScoreTrain Coodpilot2(pre) Correlation | .499 | 1 |
| Sig. (2-tailed) | .208 |
| N | 8 | 8 |

**Training Coordinator Pilot post RM**

<table>
<thead>
<tr>
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<tbody>
<tr>
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</table>

| ScoreTraincoordpilot2(post) Correlation | .455 | 1 |
| Sig. (2-tailed) | .305 |
| N | 7 | 7 |

**Trainer Pre RM ..**

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<thead>
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<tbody>
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<tr>
<td>Sig. (2-tailed)</td>
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<td>.553</td>
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<tr>
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<td>6</td>
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</table>

| ScoreTrain2(pre) Correlation | .308 | 1 |
| Sig. (2-tailed) | .553 |
| N | 6 | 6 |
### Appendix L: Calculations Showing Reliability of Questions Using Spearman’s Correlational Bivariate - (4 of 4).

**Trainer Post RM.**

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</tr>
<tr>
<td></td>
<td>Sig. (2-tailed)</td>
<td>.506</td>
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<tr>
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<td>N</td>
<td>6</td>
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</table>
Appendix M: Examples of Wilcoxon Signed Rank Significance Testing Across all Levels of NSW TAFE Sample Responses - (1of 5).

Test One – Institute Directors

Question Category C: Training framework would be defendable and logical if questioned at law

NPar Tests

<table>
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<tr>
<th>N</th>
<th>Percentiles</th>
<th>25th</th>
<th>50th (Median)</th>
<th>75th</th>
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<td>3.0000</td>
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</table>

Wilcoxon Signed Ranks Test

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<td></td>
<td>Positive Ranks</td>
<td>3&lt;sup&gt;b&lt;/sup&gt;</td>
</tr>
<tr>
<td></td>
<td>Ties</td>
<td>2&lt;sup&gt;c&lt;/sup&gt;</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>5</td>
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</table>

a. ConfidenceLevel2 < ConfidenceLevel1
b. ConfidenceLevel2 > ConfidenceLevel1
c. ConfidenceLevel2 = ConfidenceLevel1

Test Statistics<sup>a</sup>

<table>
<thead>
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<th>Z</th>
<th>Asymp. Sig. (2-tailed)</th>
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<tr>
<td>-1.732&lt;sup&gt;b&lt;/sup&gt;</td>
<td>.083</td>
<td></td>
</tr>
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</table>

a. Wilcoxon Signed Ranks Test
b. Based on negative ranks.

Statistical Significance is indicated if the Asymp Sig (2 tailed) is equal to or less than .05

The Wilcoxon Signed Rank Test revealed that the increased confidence levels for Institute Directors in the category of “training framework would be defendable and logical if questioned at law” is not statistically significant.
Appendix M: Examples of Wilcoxon Signed Rank Significance Testing Across all Levels of NSW TAFE Sample Responses - (2 of 5).

Test 3 - Finance Managers

Category A: Ability to match training resource allocation to institutes skill develop requirements

NPar Tests

### Descriptive Statistics

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<td>ConfidenceLevel2</td>
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<td>3.0000</td>
<td>4.0000</td>
<td>4.0000</td>
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</tbody>
</table>

### Wilcoxon Signed Ranks Test

<table>
<thead>
<tr>
<th>Ranks</th>
<th>N</th>
<th>Mean Rank</th>
<th>Sum of Ranks</th>
</tr>
</thead>
<tbody>
<tr>
<td>ConfidenceLevel2 - Negative Ranks</td>
<td>0(^{a})</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>ConfidenceLevel1 - Positive Ranks</td>
<td>1(^{b})</td>
<td>1.00</td>
<td>1.00</td>
</tr>
<tr>
<td>Ties</td>
<td>4(^{c})</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>5</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

\(^{a}\) ConfidenceLevel2 < ConfidenceLevel1 \\
\(^{b}\) ConfidenceLevel2 > ConfidenceLevel1 \\
\(^{c}\) ConfidenceLevel2 = ConfidenceLevel1

### Test Statistics

<table>
<thead>
<tr>
<th>ConfidenceLevel2 - ConfidenceLevel1</th>
<th>Z</th>
<th>Asymp. Sig. (2-tailed)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>-1.00(^{c})</td>
<td>.317</td>
</tr>
</tbody>
</table>

\(^{a}\) Wilcoxon Signed Ranks Test \\
\(^{b}\) Based on negative ranks.

Statistical Significance is indicated if the Asymp Sig (2 tailed) is equal to or less than .05

The Wilcoxon Signed Rank Test revealed that the increased confidence levels for Finance Managers in the category of “Ability to match training resource allocation to institutes skill develop requirements” is not statistically significant.
Appendix M: Examples of Wilcoxon Signed Rank Significance Testing Across all Levels of NSW TAFE Sample Responses - (3 of 5).

Test 5 - Human Resource Manager

Category A: Ability to match training resource allocation to institutes skill development requirements.

NPar Tests

<table>
<thead>
<tr>
<th></th>
<th>N</th>
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<th>50th (Median)</th>
<th>75th</th>
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<tbody>
<tr>
<td>ConfidenceLevel1</td>
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<td>ConfidenceLevel2</td>
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<td>3.0000</td>
<td>3.5000</td>
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Wilcoxon Signed Ranks Test

<table>
<thead>
<tr>
<th></th>
<th>N</th>
<th>Mean Rank</th>
<th>Sum of Ranks</th>
</tr>
</thead>
<tbody>
<tr>
<td>ConfidenceLevel2 - ConfidenceLevel1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Negative Ranks</td>
<td>0&lt;sup&gt;a&lt;/sup&gt;</td>
<td>.00</td>
<td>.00</td>
</tr>
<tr>
<td>Positive Ranks</td>
<td>2&lt;sup&gt;b&lt;/sup&gt;</td>
<td>1.50</td>
<td>3.00</td>
</tr>
<tr>
<td>Ties</td>
<td>3&lt;sup&gt;c&lt;/sup&gt;</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
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<td></td>
</tr>
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</table>

Test Statistics<sup>a</sup>

<table>
<thead>
<tr>
<th></th>
<th>ConfidenceLevel2 - ConfidenceLevel1</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Z</strong></td>
<td>-1.414&lt;sup&gt;b&lt;/sup&gt;</td>
</tr>
<tr>
<td>Asymp. Sig. (2-tailed)</td>
<td>.157</td>
</tr>
</tbody>
</table>

<sup>a</sup> a. ConfidenceLevel2 < ConfidenceLevel1
<sup>b</sup> b. ConfidenceLevel2 > ConfidenceLevel1
<sup>c</sup> c. ConfidenceLevel2 = ConfidenceLevel1

The Wilcoxon Signed Rank Test revealed that the increased confidence levels for Human Resource Managers in the category of “Ability to match training resource allocation to institutes skill development requirements” is not statistically significant.
Test 7 - Training Coordinator

Category B: Ability to rank and prioritise training based on institute’s needs

NPar Tests

<table>
<thead>
<tr>
<th></th>
<th>N</th>
<th>25th</th>
<th>50th (Median)</th>
<th>75th</th>
</tr>
</thead>
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<td>3.0000</td>
<td>3.5000</td>
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<tr>
<td>ConfidenceLevel2</td>
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<td>2.5000</td>
<td>3.0000</td>
<td>4.0000</td>
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</table>

Wilcoxon Signed Ranks Test

<table>
<thead>
<tr>
<th></th>
<th>N</th>
<th>Mean Rank</th>
<th>Sum of Ranks</th>
</tr>
</thead>
<tbody>
<tr>
<td>ConfidenceLevel2 - ConfidenceLevel1</td>
<td>0(^a)</td>
<td>.00</td>
<td>.00</td>
</tr>
<tr>
<td>Negative Ranks</td>
<td>2(^b)</td>
<td>1.50</td>
<td>3.00</td>
</tr>
<tr>
<td>Positive Ranks</td>
<td>3(^c)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ties</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>5</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

a. ConfidenceLevel2 < ConfidenceLevel1
b. ConfidenceLevel2 > ConfidenceLevel1
c. ConfidenceLevel2 = ConfidenceLevel1

Test Statistics\(^a\)

<table>
<thead>
<tr>
<th></th>
<th>ConfidenceLevel2 - ConfidenceLevel1</th>
<th>Z</th>
<th>Asymp. Sig. (2-tailed)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Z</td>
<td>-1.414(^b)</td>
<td>.157</td>
</tr>
</tbody>
</table>

\(^a\) Wilcoxon Signed Ranks Test
\(^b\) Based on negative ranks.

Statistical Significance is indicated if the Asymp Sig (2 tailed) is equal to or less than .05

The Wilcoxon Signed Rank Test revealed that the increased confidence levels for Training Coordinators in the category of “Ability to rank and prioritise training based on institute’s needs” is not statistically significant.
Appendix M: Examples of Wilcoxon Signed Rank Significance Testing Across all Levels of NSW TAFE Sample Responses - (5 of 5).

Test 10 - Course Trainer

Category E: Ability to pre determine the outcomes of training methods

NPar Tests

Descriptive Statistics

<table>
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<tr>
<th></th>
<th>N</th>
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<th>50th (Median)</th>
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<tr>
<td>ConfidenceLevel2</td>
<td>51</td>
<td>3.0000</td>
<td>3.0000</td>
<td>4.0000</td>
</tr>
</tbody>
</table>

Wilcoxon Signed Ranks Test

Ranks

<table>
<thead>
<tr>
<th></th>
<th>N</th>
<th>Mean Rank</th>
<th>Sum of Ranks</th>
</tr>
</thead>
<tbody>
<tr>
<td>ConfidenceLevel2 - ConfidenceLevel1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Negative Ranks</td>
<td>1a</td>
<td>6.00</td>
<td>6.00</td>
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<tr>
<td>Positive Ranks</td>
<td>10b</td>
<td>6.00</td>
<td>60.00</td>
</tr>
<tr>
<td>Ties</td>
<td>40c</td>
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<tr>
<td>Total</td>
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</table>

a. ConfidenceLevel2 < ConfidenceLevel1
b. ConfidenceLevel2 > ConfidenceLevel1
c. ConfidenceLevel2 = ConfidenceLevel1

Test Statisticsa

<table>
<thead>
<tr>
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<th>ConfidenceLevel2 - ConfidenceLevel1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Z</td>
<td>-2.714b</td>
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<tr>
<td>Asymp. Sig. (2-tailed)</td>
<td>.007</td>
</tr>
</tbody>
</table>

a. Wilcoxon Signed Ranks Test
b. Based on negative ranks.

Statistical Significance is indicated if the Asymp Sig (2 tailed) is equal to or less than .05

The Wilcoxon Signed Rank Test revealed that the increased confidence levels for Course Trainings in the category of “Ability to pre determine the outcomes of training methods” is statistically significant.
Appendix O: Calculations Showing Effect Size of Wilcoxon Significance Levels

Example Showing How Effect Size is calculated.

Example Trainer Category B

<table>
<thead>
<tr>
<th></th>
<th>N</th>
<th>25th</th>
<th>50th (Median)</th>
<th>75th</th>
</tr>
</thead>
<tbody>
<tr>
<td>ConfidenceLevel1</td>
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<td>3.000</td>
<td>3.000</td>
<td>4.000</td>
</tr>
<tr>
<td>ConfidenceLevel2</td>
<td>51</td>
<td>3.000</td>
<td>3.000</td>
<td>4.000</td>
</tr>
</tbody>
</table>

| Test Statisticsa |          |          |            |          |
|------------------|-----------------|-----------------|-----------------|
|                  | ConfidenceLevel2 - ConfidenceLevel1 | z                | .001           |
| Z                | -3.317b         | .001            |

a. Wilcoxon Signed Ranks Test
b. Based on negative ranks.

Calculations for the effect size are undertaken by dividing the z value shown in the Wilcoxon example table above by the square root of the value of N (Pallant 2013, P. 230).

N = number of observations over the two time points 51 x 2 = 102
And Z = 3.317

Therefore the effect size = 3.317 divided by 3.16 = .32

The outcomes of the Wilcoxon testing are therefore expressed as follows:

The Wilcoxon Signed Rand Test revealed that the increased confidence levels for Course Trainers in the Category of 'Logical assessment of existing course training for relevance of future training methods' is statistically significant with a medium effect size (r=32) on the Cohen scale.
List of References


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Australian Chamber of Commerce & Industry (ACCI) 2011, ‘Employers’ commitment to training- key findings from the ACCI national workplace skill survey 2010’, ACCI, Canberra.


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