Working Paper Proceedings

Engineering Project Organizations Conference
Rheden, The Netherlands
July 10-12, 2012

Organisational Culture in Airworthiness Management Programs: Developing a Measurement Model

Anthony Trew, Vaughan Coffey, and Bambang Trigunarsyah

Proceedings Editors
Amy Javernick-Will, University of Colorado and Ashwin Mahalingam, IIT-Madras

ORGANISATIONAL CULTURE IN AIRWORTHINESS MANAGEMENT PROGRAMS: DEVELOPING A MEASUREMENT MODEL

Tony Trew (Presenter)
PhD Candidate
Queensland University of Technology
E-mail: tonytrew@optusnet.com.au

Bambang Trigunarsyah
Associate Professor
Queensland University of Technology
E-mail: bambang.trigunarsyah@qut.edu.au

Vaughan Coffey
Lecturer in Construction and Project Management
Queensland University of Technology
E-mail: v.coffey@qut.edu.au

ABSTRACT

All civil and private aircraft are required to comply with the airworthiness standards set by their national airworthiness authority and throughout their operational life must be in a condition of safe operation. Aviation accident data shows that over twenty percent of all fatal accidents in aviation are due to airworthiness issues, specifically aircraft mechanical failures. Ultimately it is the responsibility of each registered operator to ensure that their aircraft remain in a condition of safe operation, and this is done through both effective management of airworthiness activities and the effective program governance of safety outcomes. Typically, the projects within these airworthiness management programs are focussed on acquiring, modifying and maintaining the aircraft as a capability supporting the business. Program governance provides the structure through which the goals and objectives of airworthiness programs are set along with the means of attaining them. Whilst the principal causes of failures in many programs can be traced to inadequate program governance, many of the failures in large scale projects can have their root causes in the organisational culture and more specifically in the organisational processes related to decision-making. This paper examines the primary theme of project and program based enterprises, and introduces a model for measuring organisational culture in airworthiness management programs using measures drawn from 211 respondents in Australian airline programs. The paper describes the theoretical perspectives applied to modifying an original model to specifically focus it on measuring the organisational culture of programs for managing airworthiness; identifying the most important factors needed to explain the relationship between the measures collected, and providing a description of the nature of these factors. The paper concludes by identifying a model that best describes the organisational culture data collected from seven airworthiness management programs.

KEYWORDS: program management, organisational culture, continuing airworthiness.

INTRODUCTION

Ultimately it is the responsibility of an airline to ensure that its aircraft remain in a condition of safe operation, and this is done by effectively managing programs that maintain aircraft configuration baselines, and deliver the safety and regulatory compliance benefits mandated by national airworthiness authorities.

There have been significant program failures in aviation history that are linked to the organisational culture of teams and specifically to the quality of decisions being made by project team members. One of the more noteworthy was the Challenger accident in 1986, which was linked to a normalisation of increased risk levels in the NASA decision-making process that led to the destruction of that space shuttle and resultant loss of life of the crew members (Vaughan, 1996). Other significant large-scale project failures where the role of the organisational culture in systemic biases have led to bad project decisions and in turn project failures include the Airbus 380 $6billion loom redesign, and the breakdown of the Denver Airport baggage handling system which delivered a $60m per year liability for United Airlines arising from overconfidence with implementing untried technologies (Shore, 2008). In reality, many routine project decisions are judgement decisions (Strutt, Sharp, Terry, & Miles, 2006) and these judgements are influenced by both the quality of available information and the decision criteria used by team members when making their judgements.

The purpose of this paper is to identify a model that best describes the program organisational culture using data collected from seven airworthiness management programs. These research results form part of a larger research project which is examining the impacts of organisational culture and decision-making on program assurance.

ORGANISATIONAL CULTURE

Three of the most commonly cited perspectives on organisational culture are gained from the fields of sociology, anthropology and business management (Ouchi & Wilkins, 1985). According to Cameron and Quinn (1999), two primary approaches for understanding organisational culture have emerged from these perspectives; culture which comes from the collective behaviour of members from the organisation, and culture found in the individual interpretations and cognitions. These two perspectives are known respectively as functional and semiotic approaches. The functional approach is quantitative and relies on being able to empirically measure the differences between cultures, whereas the semiotic approach is qualitative and relies on gaining understanding from the signs and symbolism within an organisation. The broader research project, which this research is part of, uses both the quantitative and qualitative approaches to understanding the culture of the studied programs. This paper focuses on the development of the measurement model used in the quantitative research on organisational culture. This quantitative approach views culture as an independent, explanatory variable (Ouchi & Wilkins, 1985), that can be studied as a series of comparative traits or dimensions.

Schein (2004, p. 17) defines organisational culture as "a pattern of shared basic assumptions that the group learned as it solved its problems of external adaptation and internal integration, that has worked well enough to be considered valid and, therefore, to be taught to new members as the correct way to perceive, think and feel in relation to those problems". Guldenmund (Guldenmund, 2000, p. 251) performed an extensive review of literature on safety cultures and concluded that "in the way Schein conceives and defines (organisational) culture, there is no need for a specific definition (of organisational culture) for safety". Focusing on the safety culture itself, Guldenmund (2000, p. 251) provided the

following definition of it; "those aspects of the organisational culture which will impact on attitudes and behaviour related to increasing or decreasing risk."

A project manager faces two immediate challenges when considering the desired culture or character of the project (Andersen, 2003);

- Creating the desired results-orientated organisational culture within the project, and
- Understanding the interfaces with the program's organisational culture.

The Project Management Institute (PMBoK, 2008) advises project managers to understand the different cultures of their stakeholders as the nature of the project culture can impact on decision-making, pace of work and the tendency to react without appropriate planning. Research by numerous authors confirms that broader organisation or program culture impacts the project culture (Andersen, 2003; Elmes & Wilemon, 1991; Gray, 2001; Kerzner, 2009; Morrison, Brown, & Smit, 2008)

Existing Organisational Culture Models

Cameron and Quinn developed a framework that identified four categories of organisations using a combination of two dimensions, flexibility/stability and external/internal focus. This became known as the Competing Values Model and uses the dimensions of change/stability and external/internal focus to measure organisational culture (Cameron & Quinn, 2006, p. 46)**.**

In 1990, Denison published "Corporate Culture and Organizational Effectiveness" that contained the Denison organisational culture model which used some of the same dimensions as the Cameron and Quinn "Competing Values Framework." For example, both describe culture in terms of four characteristics, "flexible," "stable," "internal," and "external," to describe organizational culture. The Denison Model emphasises the importance of "mission", and Cameron and Quinn describe a dimension of "rational goals" that takes a similar position in their model. By taking a more holistic perspective on culture that includes strategic fit and adaptability, a more complete description of the relationship between the organisational culture and performance was developed (Denison, 2006; Denison & Neale, 1996; Kotter & Heskett, 1992). The research proposition from this work is that "organizations that have a strong sense of mission can better direct their people" (Xuejun, 2008).

The organisational culture model used by Denison measures four key cultural traits; involvement, adaptability, consistency and mission. Each trait has three indices each measured with 5 variables for a total number of 60 variables. The key cultural traits are explained in the following paragraphs (Denison, Janovics, Young, & Cho, 2007):

- Involvement is measured by; empowerment of team members to manage their own work, team orientation when working towards common goals, and capability development of individuals in order to meet business needs.
- Adaptability is measured by; creating change to react and anticipate future changes, customer focus to anticipate customers need, organisational learning to encourage innovation, build knowledge and capability.
- Consistency is measured by; core values to provide a clear set of expectations, agreement of team members on critical issues, and coordination and integration of teams in order to achieve the common goals of the organisation.
- Mission is measured by; strategic direction of the organisation, vision of the future state for the organisation, and goals and objectives to provide team members with a clear direction in their work.

The Denison model has been used extensively to link organisational culture with

company effectiveness; specifically profitability and growth, the balance between short term (annual) performances versus the sustainability of the business. There are many similarities with this balance of performance measurement and that needed for assessing both the near and long term program performance. The quadrant view of the key cultural traits is also very relevant for the program context and the objectives of this research. Specifically, programs deliver outcomes but projects deliver outputs, program management is concerned with doing the right projects; successful programs deliver long term improvements to an organisation usually identified through benefits. Programs are focused on delivering change on behalf of the organisation, assuring project success as well as delivering more strategic outcomes. However, some programs may see short term performance as being more important than achieving the strategic benefits, so the broader research project is interested in measuring the different view on how the organisational culture impacts program performance.

The variables and key cultural traits from the Denison model were used as the basis to construct the factor model tested and subsequently extended to best accommodate the organisational culture within the programs tested.

Decision-Making in Organisational Culture

Drawing upon the research on national culture, Hofstede (2005) identified that two questions must be answered when organising:

- Who has the power to decide what? (Power distance within the organisation)
- What rules or procedures are to be used? (The degree which uncertainty is avoided)

Generally, organisations make choices in response to encountering a problem; using standard operating rules, making a series of decisions or choices by evaluating alternatives against explicit or implied goals. These organisational goals are a function of the stated or implied goal, and the organisation's experience with that goal, either direct or learned from other organisations over time. The standard operating rules employed follow three main principles (Cyert, 1992):

- Uncertainty avoidance procedures which are aimed at avoiding future negative consequences from events; for example monitoring the environment or the business outputs to identify hazards which are treated with standardised decision rules.
- Maintaining the rules; by strict adherence to processes and associated decision rules that have proven to work over time.
- Using policy or simple rules, which rely on individual judgement, to provide flexibility for the organisation. Expert judgement, as described by PMI (PMBoK, 2008), is based upon the rapid heuristics (intuition) decision processes, conversely novices may have to rely heavily upon the more analytical decision processes involving standards or rules (Evans, 2007, p. 132).

Within the ideal project environment, problems and solutions are assumed to be relatively stable allowing linear and well structured decisions, within a climate of clear goals and targets, identified schedules, fixed end products and clear management frameworks. Management of project changes, arising from either external or internal sources, makes the environment more complicated and dynamic. During the course of the project the stakeholders can contribute their own problems and solutions, whilst internal to the project, new scope and project performance are all sources of change (Bruijn, 2002). In reality many organisational forces disturb this ideal environment:

- Poor alignment of the culture with the project strategic boundaries;

- Key information is not shared and not made available to decision makers;
- Change is not anticipated and risks mature in an uncontrolled manner; and
- Non homogenous values create inconsistencies in decision-making, judgements and behaviours.

Governance in Organisational Culture

"Governance involves a set of relationships between a company's management, its board, its shareholders and other stakeholders. Corporate governance also provides the structure through which the objectives of the organisation are set, the means of attaining those objectives and monitoring performance." (OECD, 2004, p.11). More specifically program governance "ensures decision-making and delivery management activities are focussed on achieving program goals in a consistent manner, addressing appropriate risks, and fulfilling stakeholder requirements" (PMI, 2008, p. 243). Both definitions have a common intent for governance as ensuring that a broad set of requirements and interests are fully addressed by the management systems when achieving the program goals and objectives. Furthermore, the PMI definition indicates that the program culture also needs to support the decision-making and delivery management activities.

METHOD

Measurement of Program Organisational Culture

Airline performance can be measured against the objectives of financial, operational and safety performance (Fry, 2004). The context for the research is the continuing airworthiness management program within the airline, which contributes to the airline safety objective. These programs are designed to deliver safety related outcomes, and while the effective management of resources is critical for program success, financial performance is not the primary measure of success for these safety related programs. The seven programs studied all had the common goal of ensuring aircraft remained in a condition for safe operation.

For the purpose of modelling the organisational culture in these airworthiness management programs, Schein's (2004) definition of culture was accepted and the Denison comparative culture model, which uses a competing values framework, was extended to define the cultural traits in programs: how the program makes decisions about performance, how the program objectives are made relevant to all staff, how collaboration occurs to solve program problems, how the program learns and improves, and how the teams deliver results and program outcomes.

Previous research (Coffey, 2010; Coffey & Willar, 2010) has identified that the Denison model is an acceptable model for measuring the internal cultural forces within an organisation. The model also collects data that can be used to determine how decisions are being made within an organisation.

However, this paper aims to identify a model that best describes the organisational culture for programs managing continuing airworthiness and safety. In order to remove potential ambiguity for the survey respondents the Denison model questions were tailored to specifically address the business program goal; realisation of aviation safety outcomes achieved through a program of continuing airworthiness management activities and projects.

The Denison survey questions were modified:

- To clarify the context was a program within the airline as the organisation.
- To clarify the goals were related to the management of continuing airworthiness.

- To clarify the safety regulator was the customer.

Additional Survey Questions

The 72 survey questions used to gather the data consisted of 60 questions from the Denison organisational culture model (Denison & Neale, 1996), which were modified for the airworthiness management program context. To better understand how the program organisational culture impacted the goal realisation, 12 additional questions were structured to determine the agreement respondents had with the program safety goals and how the organisational culture traits impacted the achievement of the safety goals. These 12 additional questions were developed around the following four key cultural traits within the Denison model discussed earlier in the paper:

- How does staff involvement affect the safety goals;
- How does consistency in the teams work affect the safety goals;
- How does adaptability affect the safety goals; and
- How does mission affect the safety goals?

The survey was answered by 211 individuals from seven Australian airline programs with the responsibility for ensuring that all aircraft must, at any time during their operating life, remain in a condition of safe operation. The data was collected using a Likert scale of 1 - 5; strongly disagree, disagree, neutral, agree and strongly agree.

Using these survey results a factor analysis was conducted to determine the model that best describes the organisational culture of the surveyed programs.

RESULTS

Data Collected

The respondents were from a population which had been heavily shaped by a long term and consistent regulatory framework provided by the Australian Civil Aviation Safety Authority, CASA. The potential skewness of the Likert data received from respondents was addressed by also seeking respondents to rate the effect that each group of questions had on achieving the safety goals. This provided a means of differentiating between two respondents who may rate the question at the same level on the Likert scale but differ in their view on the importance of the variable in achieving the safety goals.

The responses to the survey questions are the model input variables and were grouped into five categories; four categories corresponded with the four Key Cultural Traits in the Denison model; Factor 1 is involvement, Factor 2 is consistency, Factor 3 adaptability and Factor 4 is mission. The fifth category included the 12 additional questions. The five categories and variables (Table 1) were used as the input factors in the factor analysis.

Table 1: Initial input variables and factors for CFA

Factor 1	Factor 2	Factor 3	Factor 4	Factor 5
Q1.1	Q2.1	Q3.1	Q4.1	Q1A
Q1.2	Q2.2	Q3.2	Q4.2	Q1B
Q1.3	Q2.3	Q3.3	Q4.3	Q1C
Q1.4	Q2.4	Q3.4	Q4.4	Q2A
Q1.5	Q2.5	Q3.5	Q4.5	Q2B
Q1.6	Q2.6	Q3.6	Q4.6	Q2C
Q1.7	Q2.7	Q3.7	Q4.7	Q3A
Q1.8	Q2.8	Q3.8	Q4.8	Q3B
Q1.9	Q2.9	Q3.9	Q4.9	Q3C
Q1.10	Q2.10	Q3.10	Q4.10	Q4A
Q1.11	Q2.11	Q3.11	Q4.11	Q4B
Q1.12	Q2.12	Q3.12	Q4.12	Q4C
Q1.13	Q2.13	Q3.13	Q4.13	
Q1.14	Q2.14	Q3.14	Q4.14	
Q1.15	Q2.15	Q3.15	Q4.15	

The five factors were evaluated using a confirmatory factor analysis to determine how well the initial model described the collected data from the 211respondents in the seven programs.

Factor Analysis of Data

The resultant factors that best described the collected data are shown in the following Structural Equation Model (Figure 1). Compared with the input model which explained 64.9% of variance in the data, the final model explained 74.9% of variance with a GFI of 0.733 and CFI of 0.874. A summary of the final 5 factors of the SEM and the associated variables is included at Table 2.

Table 2: Final SEM factors and variables

Factor 1	Factor 2	Factor 3	Factor 4	Factor 5
Q1.6	Q2.1	Q3.3	Q4.2	Q1C
Q1.7	Q2.3	Q3.5	Q4.3	Q2A
Q1.8	Q2.5	Q3.10	Q4.4	Q2C
Q1.12	Q2.7	Q3.11	Q4.5	Q3A
Q1.13	Q2.9	Q3.12	Q4.6	Q3C
	Q2.10	Q3.13	Q4.7	Q4C
	Q2.11		Q4.8	Q1.2
	Q2.12		Q4.10	Q1.3
	Q2.15		Q4.11	Q1.11
				Q4.9
				Q4.13

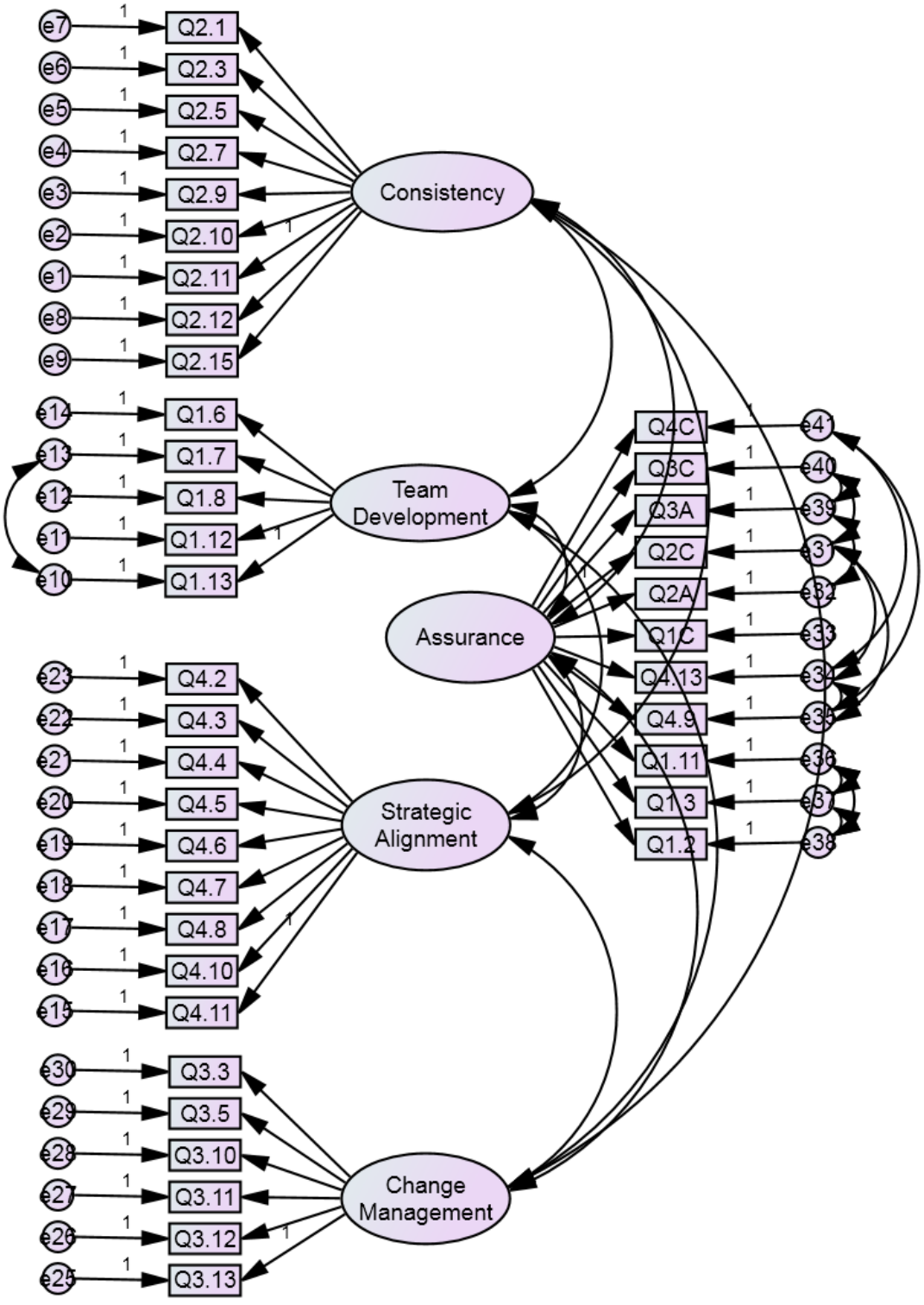

Figure 1: Structural Equation Model (SEM) for Program Organisational Culture

Reliability Statistics for Model Factors

The Cronbach's Alpha figures for each of the SEM factors are provided below in Table 3. The results show strong internal consistency for the model, with all factors showing Cronbach's Alpha figures greater than 0.8 (George & Mallery, 2011).

Table 3: SEM Factor reliability values

SEM Factor	Factor Name	Cronbach's Alpha
1	Team Development	.896
2	Consistency	.941
3	Change Management	.905
4	Strategic Alignment	.950
5	Assurance	.907

DISCUSSION

Comparison of Program Organisational Culture SEM and Denison Model

The following paragraphs compare the Denison Model key cultural traits with the final SEM factors (Factors 1-5) derived from the confirmatory factor analysis.

SEM Factor 1

The input variables used for Factor 1 are questions related to empowerment, the team orientation, and capability development; these correspond with the Denison model key cultural trait of involvement. The final variables in Factor 1 showed strong covariance between questions related to the team orientation and capability development; the input variables related to empowerment did not show a relationship with the other variables in the proposed model. The SEM Factor 1 variables are focussed on how teams work together to solve problems, and the factor is labelled team development.

SEM Factor 2

The input variables used for Factor 2 are questions related to values, agreement and integration; these align with the consistency cultural trait in the Denison model. The final variables in Factor 2 showed strong covariance across the range of questions related to values, agreement and integration in the Denison model. The SEM Factor 2 variables are focussed on how the program delivers results, and the factor is labelled consistency.

SEM Factor 3

The input variables used for Factor 3 are questions related to creating change, customer focus and organisational learning; these correspond with the adaptability cultural trait in the Denison model. The final variables in Factor 3 showed strong covariance between questions related to creating change and organisational learning; the input variables related to customer focus did not show a relationship with the other variables in the proposed model. The SEM Factor 3 variables are focussed on how the program learns and improves, and this factor is labelled change management.

SEM Factor 4

The input variables used for Factor 4 are questions related to strategic direction, goals

and vision; these correspond with the mission cultural trait in the Denison model. The final variables in Factor 4 showed strong covariance across questions related to the strategic direction and the program goals; the input variables related to vision did not show a relationship with the other variables in the proposed model. The SEM Factor 4 variables are focussed on how the program goals are made relevant to team members, and the factor is labelled strategic alignment.

SEM Factor 5

There is no equivalent factor in the Denison model. The final variables in Factor 5 showed a strong covariance across questions related to decision-making about the program performance, and this final factor is labelled assurance.

Program Management Organisation Culture Model

The five factors derived from the SEM at Figure 1 can be arranged in a competing values framework where quadrants are used to diagonally describe potentially competing organisational behaviours and hemispheres identify opposite characteristics of the organisation; stable/flexible and internal focus/external focus (Cameron and Quinn, et al). The SEM result includes a fifth dimension for assurance which acts as the glue holding the competing organisational culture forces in balance. The basic elements of the program management organisational culture model, also referred to as "the proposed model", are presented graphically in Figure 2.

The dynamics of the model specify the bidirectional influence of certain pairs of organisational culture factors on the overall cultural environment which members of a program will work, along with the role of assurance as a key part of program governance in creating the environment for success. The multiple interactions between the model's 40 organisational culture variables and the dynamic processes of the five organisational culture factors affecting the program objectives are detailed in the model, with attention to how program members solve problems and make decisions.

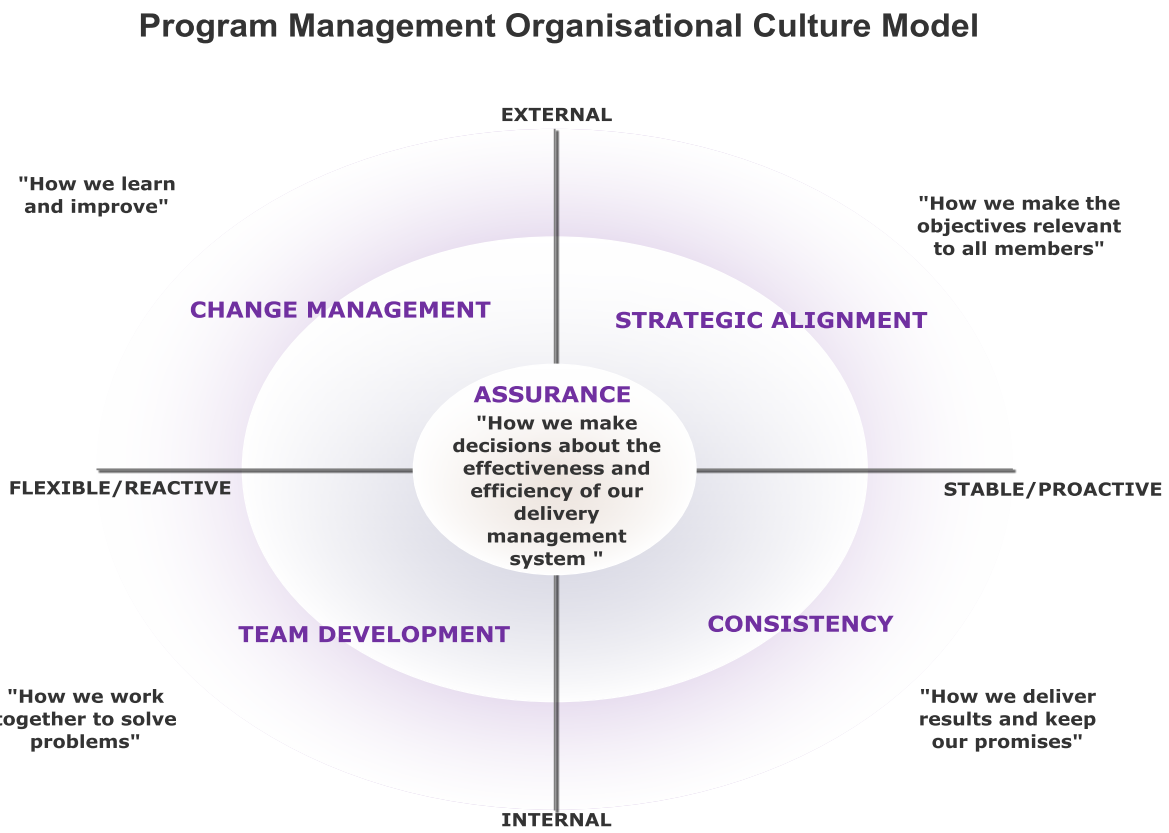

Figure 2: Program Management Organisational Culture Model

The remaining sections of this paper describe the components of the model, delineating the inter-action of organisational culture and program performance, and illustrating the comparative differences between the organisational cultures of the seven programs evaluated.

Strategic Alignment

The executive leadership of an organisation shapes the perception of the daily routines which help define the organisation culture (Hofstede, 2005). Incorporating the flow downs from the organisational culture project leadership must shape the shared perceptions of project work practices to provide alignment with the organisation's goals and objectives, and in doing so create the project culture (Müller & Turner, 2007). Research has confirmed that by taking an holistic perspective on culture that includes strategic fit and adaptability a more complete description of the relationship between the organisational culture and performance can be developed (Denison & Neale, 1996; Kotter & Heskett, 1992).

Specifically the assumptions and behaviours in place within the program ensure that the program objectives are relevant to all members. This factor includes variables associated with:

- Clear and well communicated strategies exist for achieving the program goals.
- Ambitious but realistic objectives support these strategies.
- Each team member knows how they will help the program achieve its goals.

Team Development

Reason (1998), studying the commercial aviation industry identified the main organisational traits that affect a safety culture; trust is high and working together is

acknowledged as the way to solve problems. Specifically the assumptions and behaviours in place within the program that ensure program team members work together to solve problems. This factor includes variables associated with:

- People work as though part of a team.
- Good collaboration is encouraged by program leadership who understand the work done by the teams.
- The capabilities of teams are important in achieving the goals. This belief is reflected in the training and skills of individuals.

Change Management

Successful programs deliver change for their organisation in a controlled manner. Change is a source of both new scope and either risk or opportunity. Specifically the assumptions and behaviours related to increasing or decreasing risk (Guldenmund, 2000), and the ability to learn from events in order to improve the program effectiveness. This factor includes variables associated with:

- Adapting and taking a proactive approach to risk management and change. Staff shares safety information, and the results from its analysis.
- Anticipating issues and risks creates the ability to draw the right conclusions from the safety information which is linked to better performance and the avoidance of the unwanted consequences of risks.
- Innovation is encouraged and rewarded.

Consistency

The project work practices are characterised by the way in which project planning, execution, and control stages of the project are exercised (Shore & Cross, 2005). Researchers in the project and program management domain have also proven relationships between the task orientation of the culture with performance (Andersen, 2003). Specifically, the part of the culture which shapes the assumptions and behaviours within the program that ensures consistent delivery of results and keeping of promises. This factor includes variables associated with:

- Leadership are consistent with what they say and what they do.
- The program has a clear and consistent set of values.
- Program has a homogenous culture.
- Clear agreement exists about the right way and wrong way to do things in the program. Processes guide decision-making and the approach towards business which is very consistent and can easily be anticipated.
- People from different parts of the program share a common perspective.

Assurance

Where an organisation employs a program of concurrent and interrelated projects to achieve a common business objective, then the program leadership has a role in establishing the organisational culture, practices and behaviours, which optimises the benefits sought from the program. Program governance is about ensuring "decision-making and delivery management activities are focussed on achieving program goals in a consistent manner, addressing appropriate risks, and fulfilling stakeholder requirements" (PMI, 2008). Assurance is a key part of governance and represents the behaviours and assumptions to ensure that program decisions are made about the effectiveness and efficiency of the delivery management systems in the program using the right information. The features of this factor

include variables associated with:

- Goal systems define the program objectives.
- Agreement exists that program goals are correct.
- Performance and progress is measured against goals.
- Systems that gather, process, share and store information.
- Clear accountability exists for making decisions.
- Decision-making is focussed on goals.
- Decisions are balanced to meet short term demands without compromising long term goals. Noting that the use of judgement and standards are the key decision practices adopted in stable situations, and analytical processes aimed at avoiding unwanted risk consequences are adopted in situations involving change (Strutt, Sharp, Terry, & Miles, 2006).

IMPLICATIONS FOR PROGRAM GOVERNANCE

There have been significant program failures in aviation that have been linked to decision-making practices of teams (Shore, 2008), and so understanding how the organisational culture relates to the decision-making practices employed by the program is essential information for program governance.

Using the program management organisational culture model outlined in this paper, the organisational cultures of the seven programs were compared, and the chart (Figure 3) shows the different profiles for the seven programs (A-G). The information available from this program organisational culture model allows management to understand the strengths and weaknesses of decision-making within their programs.

While each program has its own strengths and weaknesses across the competing values of team development, consistency, change management, and strategic alignment all programs rated relatively strong or homogeneous cultural indices in assurance. The way that assurance is measured in this model indicates high levels of agreement from team members that program behaviours and practices support the judgement decisions made in their teams.

The other four factors; team development, consistency, change management, and strategic alignment all had relatively weaker or less homogeneous results across all seven programs. Weaker cultural indices in change management may indicate less mature uncertainty avoidance processes which should be aimed at avoiding future negative consequences of events within the program. Additionally, weaker cultural indices in consistency indicate there is not clear agreement about the way things are done within the program; this may result from immature standards or underdeveloped processes within the program.

While team members in these programs report high levels of agreement that program practices and behaviours support their judgement decisions the relatively lower scores in team development and strategic alignment indicate potential issues for the program. The weaker results in team development may indicate that some information is not being shared across team boundaries. Furthermore, while team members may believe their judgements are focussed on the program objectives, the strategic alignment index indicates that communication about the alignment of the objectives with the program goals and strategies is relatively weak.

Finally, the overall results show that the seven programs are mainly focussed on the stable “business as usual” environment, relying heavily on individual judgement decisions of team members. This imbalance in program organisational culture may also indicate an imbalance in the decision-making practices required to deliver balanced outputs that meet both short term demands without compromising the longer term goals.

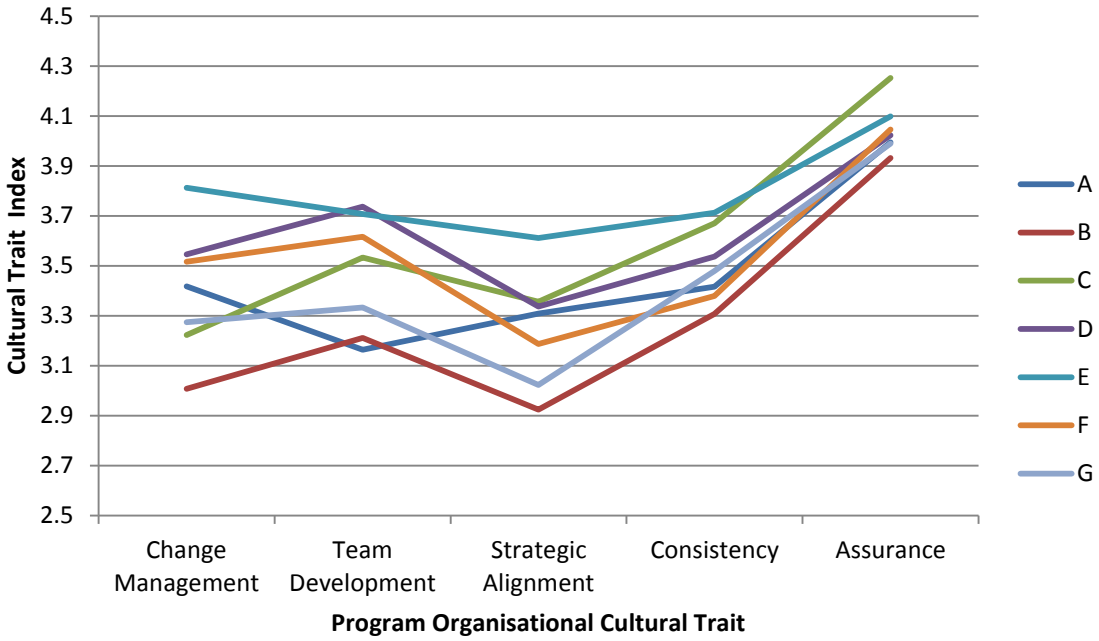

Figure 3: Cultural traits and Indices for 7 programs

CONCLUSIONS

There is a number of competing values frameworks for measuring organisational culture, but these models may not provide the best fit when analysing the organisational cultures in specific programs. Unique external environmental forces, such as regulations and industry standards, impacting on programs mean that some cultural dimensions or traits in these models do not help in describing the program organisational culture.

The development of the proposed model for organisational culture in airworthiness management programs started with the Denison model as the basis for measuring the input variables, but the final model did not incorporate the Denison cultural traits of vision, empowerment and customer focus. Only 57% of the input variables used to collect the data for this research remained in the final model that best describes the organisational culture for the seven airworthiness management programs; explaining 74.9% of variance. Removing these redundant cultural traits from the final model allowed a more focussed analysis of the organisational culture of the seven programs.

Different industries have unique external forces acting on their programs. When studying the organisational cultures in programs, industry specific models similar to that proposed in this paper should be considered.

The organisational culture of a program reflects the practices and behaviours used when making decisions that impact on the effectiveness and efficiency of delivery management systems. The proposed measurement model reported in this paper provides the best fit for measuring the organisational culture of the airworthiness management programs investigated. The proposed model could be used by airlines when seeking to improve the decision-making and overall performance of their airworthiness management programs.

This proposed model will be used for further research investigating which cultural traits act as predictors to performance in achieving the program goals.

REFERENCES

Andersen, E., S. (2003). Understanding your project organization's character. Project Management Journal, 34(4), 4-11.

Coffey. (2010). Understanding Organisational Culture in the Construction Industry Retrieved from http://QUT.eblib.com.au/patron/FullRecord.aspx?p=481075

Coffey, & Willar. (2010). Construction performance and organisational culture. Paper presented at the In CIB World Congress 2010: Building a Better Tomorrow the Lowry, Salford Quays.

Cyert, R. M., March, J.G. (1992). A behavioural theory of the firm (2nd ed.). Massachusetts, USA: Blackwell.

Denison, D. R., Janovics, J., Young, J., & Cho, H. J. (2007). Diagnosing Organisational Cultures: Validating a model and method. International Institute for Management Development, Lausanne Switzerland.

Denison, D. R., & Neale, W. S. (1996). Denison Organizational Culture Survey: Facilitator's guide. Ann Arbor, Michigan.

Elmes, M., & Wilemon, D. (1991). A field study of intergroup integration in technology-based organizations. Journal of Engineering and Technology Management, 7(3-4), 229-250.

Evans, J. S. B. T. (2007). Hypothetical Thinking: Dual Processes in Reasoning and Judgement Retrieved from http://QUT.eblib.com.au/patron/FullRecord.aspx?p=308707

Fry, J. F., G. Humphreys, I. (2004). An international survey of performance measurement and benchmarking by airlines

George, D., & Mallery, P. (2011). SPSS for Windows step by step: a simple guide and reference (18.0 update ed.). Boston, MA: Allyn & Bacon/Pearson.

Gray, R. J. (2001). Organisational climate and project success. International Journal of Project Management, 19(2), 103-109.

Guldenmund, F. W. (2000). The nature of safety culture: a review of theory and research. Safety Science, 34(1-3), 215-257.

Hofstede, G., H. Hofstede, G, J. (2005). Cultures and organizations: software of the mind: McGraw-Hill.

Kerzner, H. (2009). Project management case studies (3rd ed.). Hoboken, New Jersey: John Wiley & Sons.

Kotter, J. P., & Heskett, J. L. (1992). Corporate culture and performance New York: Maxwell Macmillan International.

Morrison, J. M., Brown, C. J., & Smit, E. v. d. M. (2008). The impact of organizational culture on project management in matrix organizations. South African Journal of Business Management, 39(4), 27-36.

Müller, R., & Turner, R. (2007). The Influence of Project Managers on Project Success Criteria and Project Success by Type of Project. European Management Journal, 25(4), 298-309.

Ouchi, W. G., & Wilkins, A. L. (1985). Organizational Culture. Annual Review of Sociology, 11(Article Type: research-article / Full publication date: 1985 / Copyright © 1985 Annual Reviews), 457-483.

PMBoK, P. (2008). A guide to the project management body of knowledge (Vol. ANSI/PMI 99-001-2008). Pennsylvania: Project Management Institute

PMI. (2008). The Standard for Program Management (2nd ed.). Pennsylvania: Project Management Institute.

Schein, E. H. (2004). Organizational culture and leadership (3rd ed.). San Francisco, CA: Jossey-Bass.

Shore, B. (2008). Systematic biases and culture in project failures. Project Management Journal, 39(4), 5-16.

Shore, B., & Cross, B. J. (2005). Exploring the role of national culture in the management of large-scale international science projects. International Journal of Project Management, 23(1), 55-64.

Strutt, J. E., Sharp, J. V., Terry, E., & Miles, R. (2006). Capability maturity models for offshore organisational management. Environment International (32), 1094-1105.

Vaughan, D. (1996). The Challenger launch decision: Risky technology, culture, and deviance at NASA (Paperback ed.). Chicago: The University of Chicago Press.