A study into the effectiveness of using a novel IT tool to accelerate organisational culture change in an institute of higher education.

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Preface

During my bachelor study “Business Administration” at the Hanzehogeschool Groningen I became interested in international business and other cultures. I had the opportunity to do an internship in Kuala Lumpur and I visited Singapore. Back then I realized that if I ever wanted to be an expat I would love to go to Singapore. After my graduation I worked at the Hanzehogeschool Groningen in a scrum team where I was intrigued by the resistance to change that many of my colleagues there exerted. Therefore I decided to pursue a master degree Business Administration with a specialization in Change Management. When I approached professor dr. Wilderom with the question whether she would consider being my supervisor for a master research on the area of Change Management, she told me about a PhD study in Singapore. This foreign research topic was exactly on the intersection of three areas that I am interested in: change management, psychology and IT. Shortly after, a Skype session and a face-to-face meeting with Jaclyn Lee took place. During the summer break of 2016 I was granted permission to do my research and I was given the opportunity to execute my research from November 2016 until February 2017 on site, at SUTD in Singapore.

The uniqueness of the OCAI-Spilter research of Jaclyn Lee, combined with the organisational culture/ climate survey of this thesis, made this research both challenging and interesting. Living abroad and adjusting to a foreign culture was challenging but rewarding and most of all: a wonderful experience.

I am thankful for the guidance and advice from both of my supervisors, professor dr. Celeste Wilderom and Jaclyn Lee, PhD. The combination of their excellent scientific and practitioner’s perspectives helped me substantially. I would like to thank Adeline Wang, Sharon Yeo, Anthony Keh, Girish Kulkarni and the employees of the HR department at SUTD for their welcoming me in, and helping me with understanding the organisation. Without some of the perspective-changing sparring sessions I had with them this research would have been utterly different. I would also like to thank all participants from the climate survey for taking their time to evaluate this organisation’s climate.

This master thesis could be relevant for managers and employees of an (international) organisation where an OCAI-GDSS tool is used to accelerate organisational change.

Enschede, 2017.

Jorian Bos

Abstract

This case study evaluates how the IT-Tool Spilter, that was developed in the study of Lee (2015), led to an improved organisational culture of the Singapore University of Technology and Design. The topics treated in this study are: change management, organisational and country culture, the Competing Values Framework with the Organisational Culture Assessment Instrument and the steps involved in developing a Group Decision Support Software instrument. These topics were relevant subjects for the study of Lee which forms the base of this longitudinal case study. This study has the following research question: '*What change management efforts led to the current perception of the organisational culture of the Singapore University of Technology and Design?*' This research suggests that the use of the novel Spilter tool led to an efficient way to gather relevant survey data from employees and implement organisational change.

This study is rooted in the base of Lee's study. In that study the university culture in 2013 was found to be a hierarchical culture, the preferred culture was assessed to be a clan culture (N=617). As a result of this gap between current and preferred culture several change management efforts were identified while business process reengineering initiatives were implemented. Early 2016 another culture assessment by the senior management took place and it seemed that the gap between current and preferred clan culture was closing.

Late 2016 an organisational climate survey was administered, as a part of this study, which was meant to measure the innovation level of SUTD's effort towards achieving an adhocracy culture. The highest scoring questions of the questionnaire show that employees (n=418) experience that their work contributes to the performance of the university whilst the lowest scoring questions were related to bureaucratic issues. An exploratory factor analysis identified 7 factors: top management and procedures; immediate supervision; motivators; room to express opinion; departmental satisfaction; hygiene factors and lastly availability of resources. These factors were used in a Multiple Analysis of Variance to assess differences in perception between the Faculty employees, Researchers and the Administrative and Support staff. The differences were mainly attributable to the hierarchy differences between the departments: the Faculty and Researchers staff members felt hindered rather than facilitated by the Management and Support staff departments. Long and slow procedures may lead to this dissatisfaction by the core employee groups of the university.

Besides this, the open comments in the climate survey were analysed. They provide additional evidence on how the organisational culture has improved to a more clan oriented culture. The employees found the that best characteristic of the university was the family-like culture. Bureaucracy and hierarchy were the most frequent mentioned issues that should be improved in the organisational culture. Two possible explanations for this prevalent hierarchical organisational culture are found: the influence of the country culture on changing the organisation and secondly the fact that the university is a relatively young organisation where the need for delegation is the main challenge at the current organisational stage.

To enhance the organisational culture of the university, streamlining of processes should take place in order to achieve a less bureaucratic culture. This can be done by creating standard operating procedures for the routine tasks and by empowering employees in non-routine tasks as so to establish a culture of trust. As successful change management and good leadership are inherently correlated, a role-based leadership style may be the means for this Singaporean university in order to grant lower level employees autonomy and ultimately decreasing hierarchy and bureaucracy.

Table of content

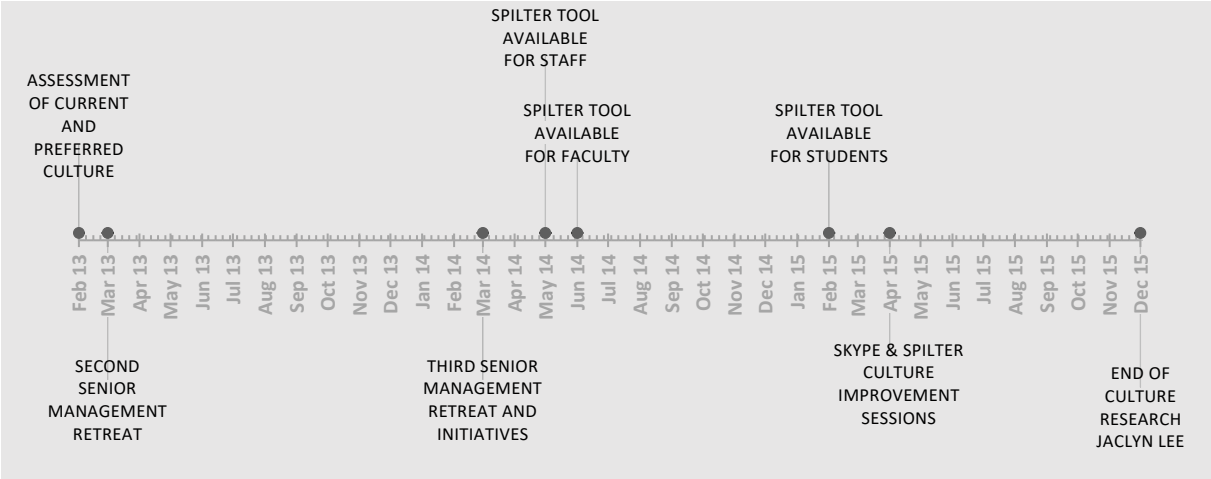
Chapter 1 - Introduction thesis

In 2009, the Singapore University of Technology and Design was set up to add another dimension to the higher education landscape of Singapore. The country of Singapore is unique in its approach towards human capital development of a country (Osman-Gani, 2004, p. 277). An application of this unique HRD strategy of Singapore is that on the area of postsecondary and university education. The government and key public sector agencies determine what the human resource needs are for the country, which leads to the creation of new courses at (new) universities if there is a shortage of qualified professionals (Osman-Gani, 2004, p. 281). An example of that is the Singapore University of Technology and Design, which was designed to produce very high quality education, offering something different from the existing institutions (Lee, 2015, p. 2). The Singapore government collaborated with the Massachusetts Institute of Technology to transfer some of the successful concepts of MIT to Singapore to create SUTD. Where normal universities tend to be hierarchical, have structured faculties and offer theoretical learning, SUTD is designed to have a flat and agile structure with small-size classrooms that combines theoretical learning with practical experiences. This multi-disciplinary approach to problem solving is intended to produce innovative research (Lee, 2015, p. 3). It does so by offering education in pillars rather than having the usual faculties, schools or departments. All students have to undertake courses with the Humanities, Arts and Social Sciences pillar, in order to provide a solid theoretical foundation for developing products, services, and systems that can change the world through design. SUTD offers education in four pillars: Architecture and Sustainable Design, Engineering Product Development, Engineering Systems and Design and Information Systems Technology and Design (SUTD, 2016).

SUTD's culture should be focused on being able to respond to the demands of today's changing world (Lee, 2015, p. 4). Therefore this alternative approach to SUTD's setting requires adaption by almost every single actor within it. While the university strives to be multi-disciplinary and have an innovative approach towards education, the recruited faculty and staff have come from a traditional university environment. The university employs a full administrative team, 160 faculty members, directors of research centres, heads of pillars, associate provosts and a president (Lee, 2015, p. 2). These employees brought with them their assumptions and values that have been successful in a traditional environment (Lee, 2015, p. 4). Adapting to this requires a different and innovative mind-set of every stakeholder.

In 2011 the university's culture journey started with the World Café sessions in which participants came together to discuss about the university's core values. In 2011 the first senior management retreat took place, where the core values of SUTD were refined and articulated. Besides that, the work and people processes were aligned to support the desired SUTD culture. The 5 core values of the university became: Leadership, Integrity, Passion, Collaboration and Creativity. To provide a better understanding of the process, the next section discusses the timeline with key events of SUTD's culture journey.

In 2013 the study of the Senior Director Human Resources and Organisation Development Jaclyn Lee commenced. The objective of the study was "to develop a group discussion instrument that helps the top-management and key stakeholder groups explicate and discuss their respective perceptions of SUTD's current culture and their visions for the desired culture" (Lee, 2015, p. 12). The timeline in graph 1 displays the key events of this study.

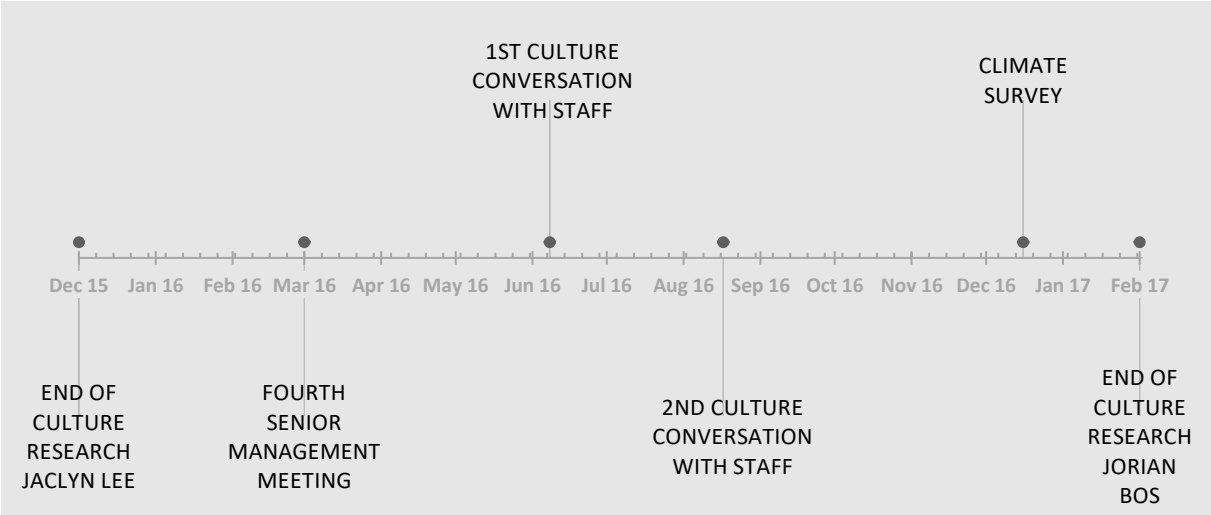


Graph 1 - Timeline study 1

As the university evolved, the need to have a congruent culture evolved as well. As a result of that, the study of Lee started in 2013 with the manual assessment of the current and preferred culture of the university (based on Organisational Culture Assessment Instrument (OCAI) and the Competing Values Framework). After this, the second senior management retreat took place in 2013 with a new assessment of current and preferred culture. Five priorities were identified to refine and align process and systems: social lubrication, reduce paperwork, increase university revenue, implement reward systems and to gather new ideas of admission activities. During the third senior management retreat in 2014 these priorities were specified and more precise activities were identified. In the following year the OCAI tool was developed and combined with a Group Decision Support Software, the so called Spilter tool, to automatize the culture change process. This led to three Skype and Spilter brainstorming sessions that identified the current and preferred culture, as well as a internal stakeholder driven prioritized list of improvements. The stakeholder groups were: senior management staff, administrative staff, faculty staff and students. This PhD study was documented in the thesis of the Senior Director Human Resources and Organisation Development, Lee (2015), and was called: “A computer-based group discussion support tool for achieving consensus and culture change using the organisational culture assessment instrument (OCAI): An action design research study”. The study of Lee is largely treated in the present thesis as well to provide insight in and data for this longitudinal case study report.

The current study continues where the research of Lee stopped. The timeline of the current study, study 2, can be found in graph 2. The first event that took place was another Spilter driven senior management meeting in 2016 where shortcomings in the current culture and the preferred culture of the university were identified. Several change management initiatives were identified, they will be treated in depth later in this thesis. In 2016 two culture conversations took place with administrative staff and faculty members. In the end of 2016 a climate survey was administered which was meant to measure the innovation level of SUTD’s effort towards achieving an adhocracy culture. The themes and questions were created by members of SUTD’s HR team in collaboration with an external consultancy firm. As this process had started before the current study came to existence, the current study merely treats the questions and assesses the results.

The outcome of this study is discussed thoroughly in the current thesis and is supported by descriptive and inferential statistics. This thesis ends with analysing comments of employees that are provided to further support possible change management initiatives.



Graph 2 – Timeline study 2.

The question that this research will provide an answer for, is to examine if the organizational culture of SUTD has been transformed after the use of the OCAI-Spilter tool and the subsequent change-management type interventions that were introduced in the last few years. It will also answer how employees of SUTD perceive the current organisational culture, hereby also providing evidence on how effective the implementations of change management initiatives have been. The three employee groups of SUTD were defined by function: Management and Support staff, Researchers and the Faculty staff. Lastly, by assessing the perceived climate at the end of this study, recommendations can be given on how to decrease the gap between current and desired state of the intended culture.

The research topic for this project is the relationship between the perceived culture by various stakeholder groups, their suggestions on how to improve the organisational culture, and the current perceived climate of SUTD. This topic is relevant because it can provide insights into whether the novel use of the OCAI-Spilter tool, a GDSS technology, together with the culture change interventions, has successfully led to culture change. Organisational change often fails, because an organisational culture or climate is usually hard to change (Smith, 2003). This case study could provide more insights in organisational and cultural change in a institute for higher education. This study can be used as a guideline on how to speed up organizational culture change by using the OCAI-Spilter tool.

The main question and sub-questions of this research are:

What change management efforts led to the current perception of the organisational culture of the Singapore University of Technology and Design?

1 Sub question 1: What was the perceived current and preferred culture of SUTD's internal stakeholders in 2013?
2 Sub question 2: What change management efforts after 2013 can be identified?
3 Sub question 3: What are the employees' perceptions of SUTD's current organisational culture?

The structure of this report can be found below, in table 1.

Chapter	Content
Chapter 1	Introduction

Chapter 2	Literature review – *Change management, Culture, Organisational culture instruments, Group Decision Support Software, Theoretical model*
Chapter 3	Research methodology – Study 1 and Study 2
Chapter 4	Results – *SUTD organizational culture in 2013, change efforts after 2013, results organizational climate survey*
Chapter 5	*Discussion, recommendations for future research, organisational recommendations, limitations*
Chapter 6	Conclusion
Chapter 7	Reference list
Appendices I-VI	

Table 1 - Structure of the report

Chapter 2 - Literature review

This part of this thesis will delve deeper into the background of the concepts that will be discussed. First, change management with specific organizational culture theories will be discussed. After that, the relevance of national culture to this study will be disserted. In addition to that, the relevance of leadership for cultural change management is disserted. The use of culture assessment instruments will be elaborated on in the next chapter, funnelling towards the Competing Values Framework and the Organisational Culture Assessment Instrument. The last part of this literature review will be discussing Group Decision Support Software.

2.1 Change management

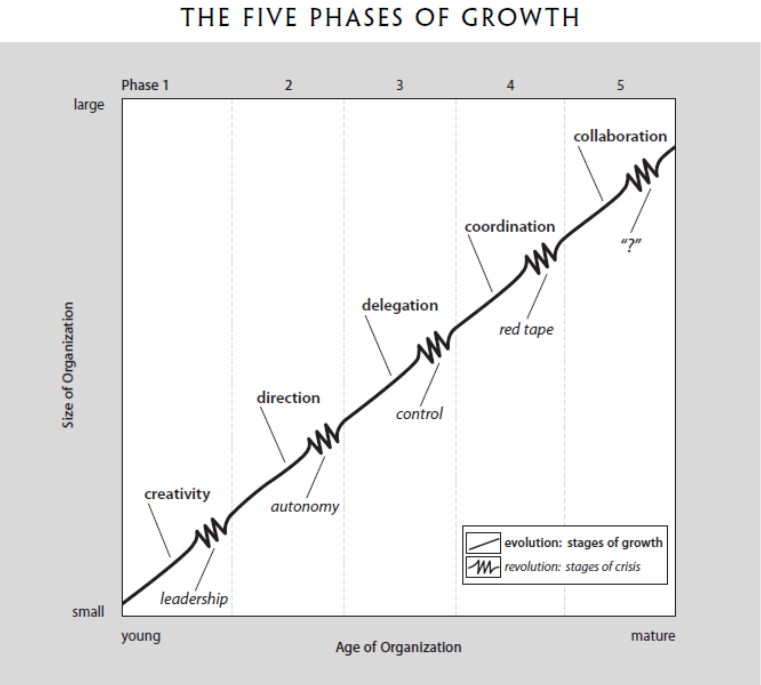
Both private and public organizations face an environment that is rapidly changing. This dynamic and changing environment provides managers with the challenge of becoming or remaining profitable (Kotter, 1996). Change is suggested to start because of failure to adapt to the external environment and it will remain ongoing since the need to adapt to the environment will never stop (Weick & Quinn, 1999, p. 381).

Change can take place in two ways: the one is episodic, discontinuous, intermittent and the other type of change is the one that is continuous, evolving and incremental (Weick & Quinn, 1999, p. 362). According to Weick and Quinn (1999, p. 382) change should rather be seen as a spiral process rather than a linear process, focussing a vocabulary shift from the “change” to “changing”. It is necessary to have acceptance of continuous change in the entire organization in order to have all innovations put in a wider perspective so that everyone can understand the purpose (Weick & Quinn, 1999, p. 381). The equilibrium paradigm argues that organizations are resistant to change in times of stability due to forces of inertia that actively work to maintain the status quo (Gersick, 1991; Hayes, 2014).

Hayes (2014, see also Nadler et al. 1995:24) used a typology of organisational change based on two dimensions: incremental versus transformational change and proactive versus reactive change. Tuning is the type of change that occurs when there is no urgent need to change (Hayes, 2014, pp. 26-28). Adaption on the other hand occurs when there is a need to adapt to an external demand for change. Reorientation takes place when an organisation is in thorough need of redefinition, in anticipation for future issues or opportunities. The most impactful type of change is recreation, which entails a change that can go as deep as changing the core elements of an organisation. In the case of SUTD the initial culture was established with some of the first creators and students. The research of Lee (2015) established the current and desired state of the organisational culture, thus it was focussed on reorientation. Since then several tuning efforts have been identified, they will be highlighted later in this research as well.

A relevant question for this matter is the choice of the person who will facilitate the change in an organisation: an outsider or an insider. Reasons to choose an insider can be, amongst many: cost, confidentiality, internal knowledge of an organisation or a person being a part of the change (Hayes, 2014, pp. 77-78). An outsider can be considered for the sake of appearing to be more neutral than an insider, or because an outsider has knowledge or time that cannot be found internally. In the case of this university, the catalyst for was the head of the HR department.

Another relevant model for this study is the growth model of Greiner (1972), as displayed in graph 3, which identifies five growth stages and its corresponding stages of crisis. This model is applicable because of the different challenges that a certain organisational phase brings along. And as this university is relatively young, it has to cope with other challenges than mature organisations; this demands a different approach for the management and leadership of the organisation.



Graph 3 - five phases of organisational growth as adapted from Greiner (1972).

This graph illustrates the five phases of growth according to Greiner (1972). As an organisation exists for a longer time and increases in size, different stages of growth lead to different stages of crisis. At the beginning of the research of Lee (2015) the organisation could be identified as being in the early stage of creativity. The current stage of SUTD is the second stage: the stage where the autonomy crisis takes places. Organizational issues relating to bureaucracy and hierarchy are a part of this stage, the solution for this over-formalization of procedures would be to grant employees more autonomy. As a growing organisation faces new challenges with every phase, the stakeholders of the university will be influenced by the organisational changes that inherently come with these challenges. Grundy (1998, p. 47) developed a tool for stakeholder analysis which identifies stakeholders' level of influence (low, medium or high) and their attitude towards change (for or against). After identifying stakeholders and placing them on a power and influence grid, several activitities can be identified to influence stakeholders in supporting organisational change. The following activities can be identified (Hayes, 2014, p. 153):

1. Winning support of opposers of change who have the power of influencing the outcome;
2. Increasing the influence of supporters;
3. Reducing the infuence of stakeholders blocking the change;
4. Grouping supportive stakeholders to work together in supporting change;
5. Disintigrate coalitions opposing the change;
6. Bringing new promotors or champions into events.

The following reasons for resistance to change can be identified (Kotter & Schlesinger, 1979): parochial self-interest; misunderstanding and lack of trust, different assessments of situations and low tolerance for change. The expectancy theory of Vroom (1964) argues that valence and expectancy lead to an expected outcome. If the outcome is expected to be of low value to the stakeholder, the value is low and resistance might occur (Hayes, 2014, p. 197). In this formula, expectancy + instrumentality + valence lead to motivational force (MF= V * I * E). Therefore, to overcome resistance to change one (or all) of these variables should be improved. Another theory on overcoming resistance to change is that of Dannemiller and Jacobs (1992): C= (D * V * F) > R; where

Change only happens when the Dissatisfaction with the current situation * Vision of what is possible * First steps towards are higher than the resistance to change. If any of these values is near zero or zero, no change will take place. Therefore the product of Vision, Dissatisfaction and First steps should be higher than resistance to change and only than change can occur.

One of the oldest and basic models for change management is that of Lewin (1947). His three stage model contained the following steps: unfreeze, change and refreeze. These steps would involve breaking the equilibrium; to change the organisation and behaviour of people and to finally make the change a sustainable state. A more elaborate change model is that of Kotter (1996, p. 23). According to Kotter, the following steps should be followed to create major change: 1) establishing a sense of urgency, 2) creating a guiding coalition, 3) developing a vision and strategy, 4) communicating the change vision, 5) empowering broad-based action, 6) generating short term wins, 7) consolidating gains and producing more change, 8) anchoring new approaches in the culture. Even though no scientific consensus on the results have been found (Appelbaum, Habashy, Malo, & Shafiq, 2012), no evidence was found against the model, making it a popular model for practitioners.

The following six strategies, varying in intensity and power base, have been identified to motivate people to change (Hayes, 2014, pp. 202-205; Kotter & Schlesinger, 1979): 1) education and persuasion, 2) participation and involvement, 3) facilitation and support, 4) negotiation and agreement, 5) manipulation and co-optation, 6) direction and a reliance on explicit and implicit coercion.

There are many more theories to change management and overcoming resistance to change, however this study limits the theories to the earlier mentioned theories. The following chapter will focus on explaining organisational culture, country culture and leadership research in cross-cultural management.

2.1 Culture

2.1.1 Organizational culture

Organizational culture can be a source of competitive advantage (Barney, 1986). Culture can have significant impact on an organization's long term financial performance; and corporate culture can be changed to improve organizational performance (Kotter, 2008, pp. 11-12). But changing the culture of an organisation is usually found to be challenging (Smith, 2003, p. 249), one of the reasons why organizational change fails is the length of time that it takes to accomplish culture change. As a culture is often linked to organisational performance, Gregory, Harris, Armenakis, and Shook (2009) measured the effect of culture on organisational effectiveness in a hospital and found that the patient satisfaction and controllable expenses were positively influenced by culture, even though the effect was distal. Their research suggested that culture influences the employee attitudes (employee satisfaction and physician satisfaction) which positively influenced organizational outcomes.

The naissance of the culture stream started in the eighties. In 1983 Smircich was one of the first to treat the concept of culture and organisational analysis. Her article mentions the comparison of organizations with metaphors such as a 'machine' or 'an organism'. She provides an illustration of a manager that wants to 'have this department run smoothly like a well-oiled machine' (Smircich, 1983, p. 340). Until the eighties this was a common occurrence, but in her article Smircich tries to step away from the metaphorical approach of organisations. The definition of culture according to Smircich is: "organizational culture typically is a complex set of values, beliefs, assumptions, and symbols that define the way in which a firm conducts its business" (Barney, 1986, p. 657). In Barney's paper culture can be a competitive advantage when the culture is valuable, rare and imperfectly

imitable. This is in line with the classical competitive advantage view of Porter as unique characteristics of a firm will lead to higher performance.

Another way to look at organizational culture is the view of Hofstede et al. (1990). They studied corporate cultures in 20 organizations in Denmark and the Netherlands. Organizational culture is seen as: 'holistic, historically determined, related to anthropological concepts, socially constructed, soft and difficult to change´ (Hofstede, Neuijen, Ohayv, & Sanders, 1990, p. 286). They conducted their research by surveying people at these organizations and classified culture in values, rituals, heroes and symbols of an organisation. The result of their study was a three factor model featuring work orientation (intrinsic vs. extrinsic), identification (with company vs non-company interest) and ambition (money and career vs. family and cooperation). This model can be used to distinguish one organization from another organization.

Another widely accepted definition of culture is Schein's (1990, p. 111): "culture is a pattern of basic assumptions, invented, discovered, or developed by a given group, as it learns to cope with its problems of external adaptation and internal integration, that has worked well enough to be considered valid and, therefore is to be taught to new members as the correct way to perceive, think, and feel in relation to those problems". In his book he describes a culture as having three levels: observable artefacts, espoused values and beliefs, and basic underlying assumptions. The more intensive and obtrusive the observation of an organization is, the more a researcher will understand of that organisation. Schein (1990, p. 115) states that culture is learned through norm formation around critical incidents and by identification with leaders. Once the culture is established the cultural dynamics will be preserved through socialization of new group members. A culture can change as a result of natural evolution: environmental events which will require the company to adapt to the new situation. Furthermore, the culture can be changed through guidance and management; an example of this would be the theory of unfreeze, change and refreeze (Lewin, 1947).

A few years after his 1990 work, Schein (1996) claimed that the previous quantitative methods of researching culture were, until that point, lacking the connection with observed reality. He came to the conclusion that many of his fellow researchers measured culture by questionnaires, rather than observations, which lead to inaccurate assumptions about groups. He argued that psychologists should do more observational work rather than defining culture as a result of surveys. His new and refined definition of culture became: 'the set of shared, taken-for-granted implicit assumptions that a group holds and that determines how it perceives, thinks about, and reacts to its various environments' (Schein, 1996, p. 236).

Around the same time Denison (1996) wrote his article which examined the difference between organisational culture and climate. This matter is relevant for the researcher at SUTD since the research of Lee (2015) dealt with an Organisational Culture Assessment Instrument, which measures cultures, while this study uses an employee survey to measure climate. The article of Denison (1996) examined how one group of scholars researched person-environment fit and defined it as a climate study (Joyce & Slocum, 1982), while other scholars found it to be a culture study (O'Reilly, Chatman, & Caldwell, 1991). The distinction between climate and culture is summarized in table 2.

Difference	Culture literature	Climate literature
Epistemology	Contextualized and idiographic	Comparative & Nomothetic
Point of view	Emic (Native point of view)	Etic (researcher's viewpoint)
Methodology	Qualitative field observations	Quantitative survey data
Level of analysis	Underlying values and assumptions	Surface-level manifestations
Temporal Orientation	Historical evolution	Ahistorical snapshot
Theoretical foundations	Social construction; critical theory	Lewinian field theory
Discipline	Sociology & Anthropology	Psychology

Table 2 - Contrasting organizational culture and organizational climate (as adapted from Denison, 1996, p. 625).

Denison (1996, pp. 640-643) argued that this paradigm war results in less integration of the perspectives which leads to: 1) a tendency to overplay the implications of each perspective; 2) a lack of legitimacy for research combining the two perspectives; 3) increased distance from the phenomenon culture. The conclusion of the research was that the differences should not be looked at as a phenomenon but can be looked at as interpretative (Denison, 1996).

Another example of a research on the difference between culture and climate is that of Glisson and James (2002). They claim that problems occur when a higher defined variable such as culture is assessed with individual responses without aggregating the lower-level measures (Glisson & James, 2002, p. 773). This is how the authors found that climate is defined as a property of an individual and culture as property of the work unit (Glisson & James, 2002, p. 788); which they found by combining a confirmatory factor analysis; a within-group consistency analysis and between-group differences with Hierarchical Linear Models.

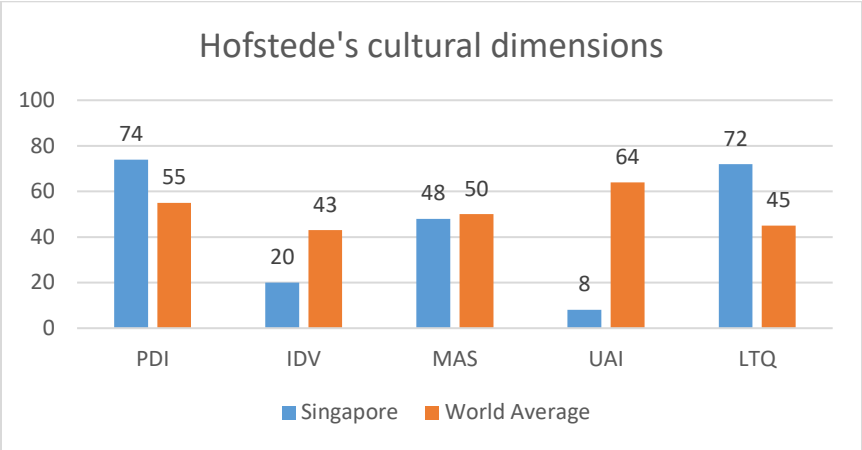
In this dissertation, the culture definition of Van den Berg and Wilderom (2004, p. 571) is followed where culture is defined as: "shared perceptions of organisational work practices within organisational units that may differ from other organisational units". The reason that this definition is chosen is twofold; firstly because of the shared perception component which is used in the Organisational Culture Assessment Instrument, and secondly due to the classification in organisational units which potentially leads to a different perception of the organizational culture per group. *Additionally, this brings the concepts of climate and culture together, since climate is mostly about "perceptions of observable practices" (Denison, 1996, p. 622).*

Cross-national and cross-company research showed that national and organisational cultures are of different orders and should not be compared (Hofstede et al., 1990); values are important parts of organisational culture, but organizations show more differences in practice than in values. National cultures on the other hand showed more differences in values which was explained by the way people were raised, as these values were taught in family setting (Van den Berg & Wilderom, 2004).

2.1.2 National culture

As this research was executed in Singapore it is important to highlight the national culture and its dimensions in comparison with average values of all other countries that were assessed. Another reason for this is the fact that the Senior Management team mainly consist out of non-Singaporeans and the lower level employees are mainly Singaporeans. This will be done to provide a better etic perspective of the research. The two biggest researches on the area of national culture are that of Hofstede and the GLOBE project.

Hofstede's Cultural dimensions (2001) treat the dimensions of the Power Distance Index (PDI); Individualism versus Collectivism (IDV); Masculinity versus Femininity (MAS); Uncertainty Avoidance Index (UAI); Long Term Orientation versus Short Term Normative Orientation (LTQ).



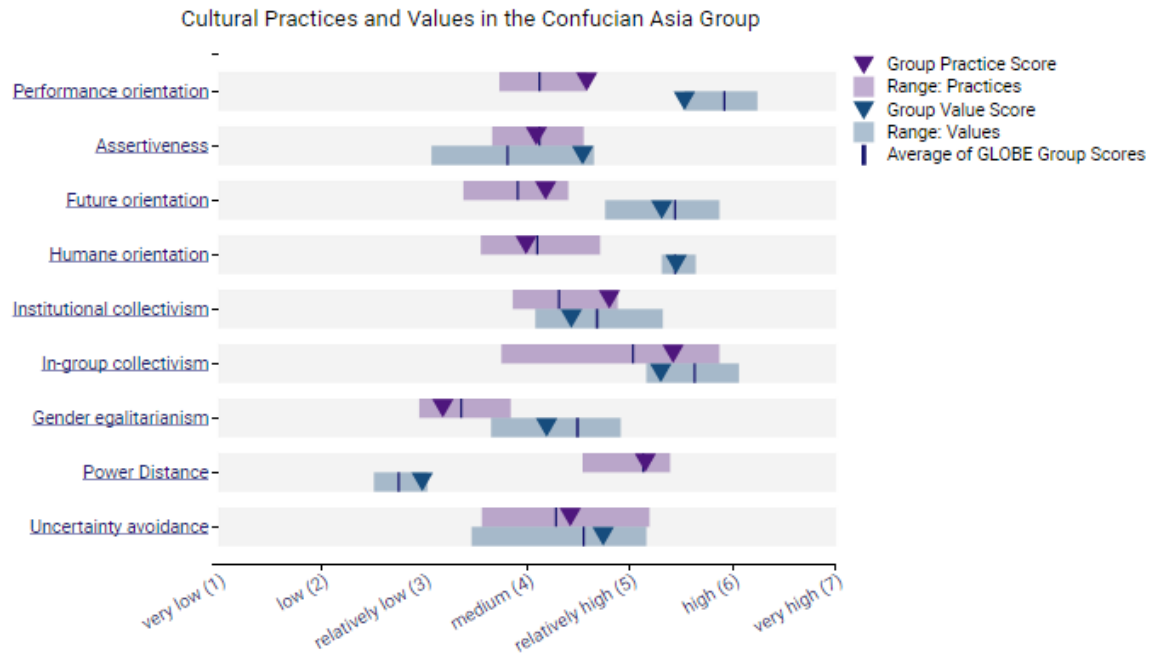
Graph 4 - Singapore's cultural dimensions in comparison with world average (as adapted from Hofstede & Hofstede, 2001).

The above featured graph displays how Singapore's Power Distance is higher than average, Individuality is significantly lower than average, Uncertainty Avoidance is low, the dimension Long Term Orientation is high. These dimensions emphasize the importance of the 'we'- culture and the avoidance of conflicts for harmony. Also, the culture of achievement is visible in these dimensions. Uncertainty avoidance is also amplified in the country as it is governed by an autocratic government. The Long Term Orientation is high, a very visible example is that of the Human Capital Development which is on a macro level established for mid- and long term by the government (Osman-Gani, 2004).

GLOBE

The Global Leadership and Organizational Behaviour Effectiveness (GLOBE) program advanced the national culture and leadership theories to nine dimensions: performance orientation, future orientation, assertiveness, power distance, humane orientation, institutional collectivism, in-group collectivism, uncertainty avoidance, and gender egalitarianism (House, Javidan, Hanges, & Dorfman, 2002). 150 Researchers from 61 cultures were engaged in this long-term project with the objective of exploring cultural values across the world and to identify their impact on organizational practices and leadership characteristics (House et al., 2002, pp. 3-4). GLOBE identified cultural practices and beliefs as well as leadership styles for all clusters.

The GLOBE study identified that Singapore is part of the Confucian cluster, one of the antagonists for this may be Singapore's first prime minister's Lee Kuan Yew's Confucian beliefs. Even though Singapore is geographically located in South East Asia, its culture is more in line with the Confucian cluster (China; Hong Kong; Japan; South Korea and Taiwan). The high performance orientation exemplifies this. See graph 5 for a detailed illustration of the GLOBE practices and beliefs.



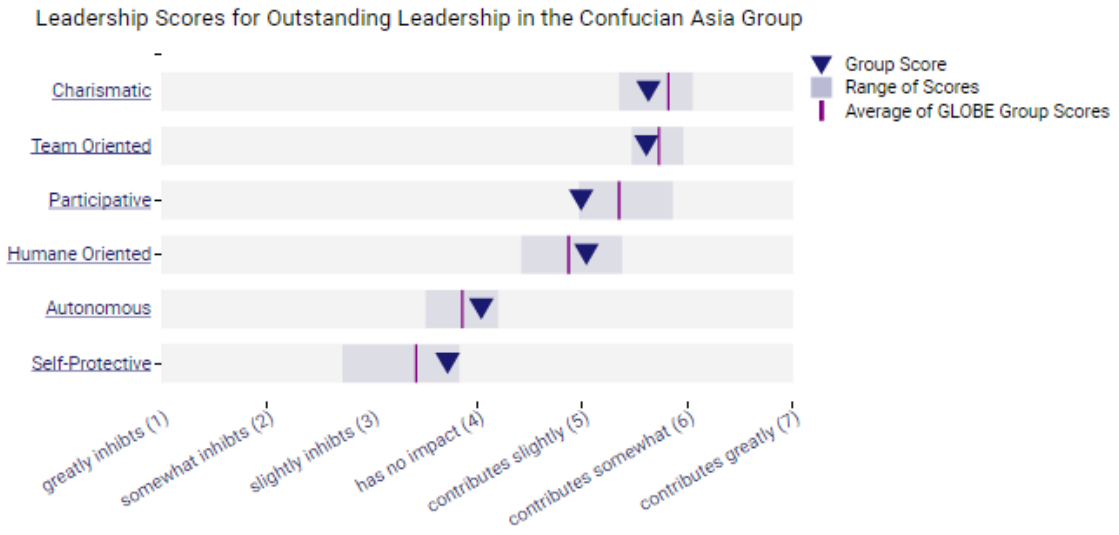
Graph 5 - Cultural Practices and Values for the Confucian Asia Group (House, Hanges, Javidan, Dorfman, & Gupta, 2004)[1].

The Confucian cluster is characterized by the following cultural practices and values: relatively high Performance Orientation, high Power Distance, low Gender Equality, slightly higher than average Future Orientation and Uncertainty Avoidance, high Institutional Collectivism. As for the societal values, which relates to what society believes the values should be like, the following dimensions are identified for the Confucian cluster: more Performance Orientation, higher Future Orientation and a more Humane Orientation. Less power distance is desired and more gender equalitarianism. The same level of In-Group Collectivism is desired, but less Institutional Collectivism is needed. See graph 5 for further details.

2.1.3 Organizational leadership

To elaborate on leadership and country culture, the leader-member exchange (LMX) theory is applied to illustrate the exerted leadership style in a typical Singaporean organization. The key element of LMX theory is that employees' work-related attitudes and behaviours are dependent on how their leaders treat them (Rockstuhl, Dulebohn, Ang, & Shore, 2012, p. 1097). The findings in their meta-analysis corroborated with the findings of the GLOBE research on transformational leadership styles in vertical-collectivistic cultures; leaders in vertical-collectivistic cultures turned out to affect LMX quality as strongly as in horizontal-individual cultures (Rockstuhl et al., 2012, p. 1103). This corroborated in the research of Wasti and Can (2008) executed in Turkish companies, normative commitment proved the only significant antecedent of commitment to the supervisor. Therefore leaders in Confucian countries should exert role-based loyalty rather than affect-based loyalty (Jiang & Cheng, 2008) implying that in Confucian cultures leadership should be exerted based on role obligations rather than emotional bonding with supervisors. This is illustrated in graph 6 as well, the Charismatic/Value-Based and Team-Oriented leadership style is the most desired leadership style in the Confucian cluster. Participative leadership is the least valued of all clusters, whereas Self-Protective leadership is relatively one of the highest scoring clusters of all. As a result of this, a typical well-functioning Confucian manager in Singapore would be Performance-Oriented, Charismatic and Team-Oriented, but not participative in the execution of leadership.

[1] http://globe.bus.sfu.ca/results/clusters/confucian-asia



Graph 6- Leadership score for Outstanding Leadership in the Confucian Asia Group (House et al., 2004)[2].

Even though the relation between leadership, organizational culture and organisational performance is often hypothesized it is rarely researched. Ogbonna and Harris (2000) performed a research in the relationship between leadership, organizational culture and organizational performance (N=322). The results of their study indicated that leadership style is indirectly associated with performance, and as managing or changing a culture is difficult it would be more appropriate to implement leadership-change programs to improve organizational performance (Ogbonna & Harris, 2000). However, this study was merely an association, causation was not proven.

Hayes (2014, pp. 161-162) distinguishes management from leadership by stating that management is concerned with 'accomplishing the organisation's agenda by organizing and staffing' while leadership is about 'aligning people, communicating the new direction and creating coalitions of getting there'. He emphasizes that although leadership and management are two different activities, they are complementary and both necessary for successful organisation change.

Schein (2010, p. 205) elaborates on the relevance of leadership for cultures and identified four stages of group evolution. The first step is group formation, where the leader tells what to do. The next step is group building, where fusion of the group happens. The third step is performing, the group can work because of acceptance and knowing of each other. The last step is maturity, where the focus lies on maintaining the groups' culture. These can be compared with the model of Tuckman (1965), where the dimensions are forming, storming, norming and performing.

Organizational cultures originates from three sources (Schein, 2010, p. 219): the beliefs, values and assumptions of the founders of the organization; the learning experience of group members as their organization evolves; and thirdly new beliefs, values and assumption brought in by new members and leaders. The easiest way culture can be embedded and transmitted is by charismatic leadership. A leader can use the following tools, or primary 'deeper' embedding mechanisms, for this: attention of the leader; the reactions to crises; the allocation of resources, role modelling of the leader; the allocation of rewards and finally by their criteria for selection, recruitment and dismissal (Schein, 2010, p. 236). The secondary mechanisms would be: design of organizational structure; design of systems and procedures; design of facilities; stories, legends and myths; formal statements. These secondary mechanisms only function when they are congruent with the primary mechanisms, since

[2] http://globe.bus.sfu.ca/results/clusters/confucian-asia

the secondary mechanisms are the more visible part of organizational culture. These mechanisms can be used to transmit culture to a new employee, and if these mechanisms are congruently used to change assumptions of a group, a manager can become a leader (Schein, 2010, p. 258). Burnes and Jackson (2011, p. 136) state that effective organizations have congruent goals and values which are shared by the leaders of the organization, hereby again highlighting the importance of leadership.

The last subject treated in this chapter is how cultural change at SUTD took place. Cameron (2008, pp. 14-20) identified 7 steps to successful culture change: 1) clarifying the meaning of culture change for the organization; 2) identifying stories to illustrate key values in the new culture; 3) determining strategic initiatives ; 4) identify small wins as so to do small incremental changes; 5) determine KPI's to monitor progress; 6) communicate about the change and develop cultural symbols; 7) develop leaders, champions and owners of the culture change.

For SUTD this meant that the core mission and values needed to be identified (Lee, 2015, pp. 34-37), which was achieved by engaging with key stakeholders. The initial vision for SUTD culture came from the Founding president who as a former Dean of Engineering identified MIT values and stories of successful MIT students to transfer these stories for SUTD's new culture. The next step was determining processes and policies that could be improved, coming up with an action plan an monitoring progress. This action plan could contain small wins for the organisation as well, as so to enhance incremental changes. A data gathering system needed to be designed to monitor metrics and measuring processes. Communication of the culture change plans was done on a regular basis by social media channels and in the group decision support systems part of the Spilter tool. As much information as possible would be communicated about the positive aspects of the environment, the so called spray and pay communication strategy (Hayes, 2014, p. 177), hereby including parts of the past not carried forward. The last culture change step that was identified was the creation of a sense of urgency as a catalyst for change: since SUTD is competing with other universities for the top students and top faculty members there was an imminent need to create an unique culture and vision distinguishing SUTD from other universities.

All in all, this chapter treated the relation between change management and organisational culture change. Since this research was executed in Singapore this chapter elaborated on the relevance of national culture on organisational behaviour and it illustrated how organisational leadership is a crucial part of organisation and cultural change. The next chapter will delve deeper into organisational culture instruments in order to explain how organisational culture was measured at SUTD.

2.2 Organisational culture instruments

In order to choose an instrument that could assess the organisational culture at SUTD in 2013 the following criteria were applicable (Lee, 2015, pp. 24-26):

- Good face validity of the instrument;
- Able to compare current and desired culture;
- Able to examine the most elements of the organisation;
- Easy administrable, automatable and cost effective;
- Relevant to education industry and SUTD's goals at promoting an innovative and collaborative culture.

The following instruments were compared:

- Competing Values Framework;
- Organisational Culture Inventory;
- Harrison's Organisational Ideology Questionnaire;
- Mackenzie's culture Questionnaire;
- Survey of organisational culture;
- Corporate culture Questionnaire;
- Hofstede Organisational Culture Questionnaire;
- Organisational Culture Survey.

The instrument of choice was the Competing Values Framework, which can be assessed with an Organisational Culture Assessment Instrument. This instrument was developed by Cameron and Quinn and it was validated by Cameron and Freeman (1985). The CVF-OCAI instrument can be identified as diagnostic; it diagnoses the current and preferred culture and identifies the gap between the two cultures enabling organizations to improve organizational effectiveness (Jung et al., 2009, p. 1090).

An extensive overview of instruments for exploring organisational culture is provided by Jung et al. (2009). In their review a culture instrument is not a specific assessment tool, it is merely looked at as a broad concept measuring any method of organisational culture assessment. An unusual approach of their meta-analysis was that their unit of analysis was focussed on obtaining an examination of the instruments rather than assessing the quality published articles and its instruments. This resulted in 70 instruments of which 48 were able to do psychometric assessment. The article assessed 48 instruments based on the following Psychometric Quality Assessment Criteria: Internal consistency; test-retest reliability; aggregation; association with outcomes; association with measures of culture; dimensional structure; responsiveness. A key question that needs to be answered according to Jung et al. (2009) is relating to the purpose of exploring the organisational culture. Is its purpose formative, summative or diagnostic? A formative exploration supplies feedback on cultural elements of performance and change (Jung et al., 2009, p. 1093). A summative instrument is cross-sectional or longitudinal oriented and the diagnostic functions can offer insights of cultural elements and the organisation's current performance (Jung et al., 2009). The CVF-OCAI can be used for all of these reasons but in the case of Lee's (2015) research it was used with a diagnostic purpose: to assess the current culture of the organisation so that the elements can be identified which can be changed to reach the desired culture.

2.2.1 Competing Values Framework and Organisational Culture Assessment Instrument

This part of the literature review will go deeper into Cultural Values Framework (CVF) and the Organisation Culture Assessment Instrument (OCAI) as this instrument was used in the research of Lee (2015) at the SUTD.

The CVF cultures are described with four quadrants: clan culture, adhocracy culture, hierarchy culture or market culture. The distinction in cultures can be made on flexibility or discretion and on whether the focus on the culture is internal or external oriented (Cameron & Quinn, 2005, p. 50).

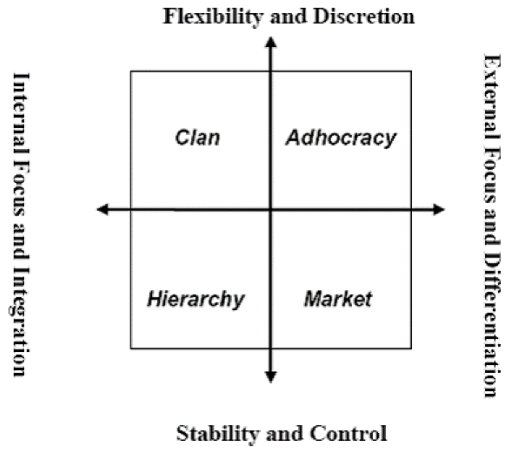


Figure 1 - The Competing Values Framework (Cameron & Quinn, 2005, p. 50).

- Hierarchy culture. In the early 1900's this organization form was described by Max Weber as the ideal form because it would lead to stability, efficiency and standardization of products (Cameron & Quinn, 2005, pp. 37-38). This form is characterized by a formalized and structured place to work. In this organisation leadership is performed by coordination and organisation. The long term goals would be stability-, predictability- and efficiency- oriented. An example of this organisation would be an MNC such as Ford Motor Company.
- Market culture. Williamson (1974) and Ouchi (1981) were scholars that described a market set of activities being the foundation for organizational effectiveness (Cameron & Quinn, 2005, pp. 39-40). It refers to how an organization functions as a market itself, being oriented on external stakeholders such as suppliers and customers. It operates mainly through the economic market mechanism rather than being focusses on internal rules. Profitability is one of the primary objectives of this type of organization, this is achieved by a strong orientation on control and external positioning. GE would be an example of this type of organisation, which aimed at being the number 1 company in their markets.
- Clan culture. The name of this quadrant originates from the Japanese firms that were observed in the 1960s and 1970s. It was found that these organizations showed a more family type of culture with shared values and goals, participation, cohesion and a we-feeling that define these types of organizations (Cameron & Quinn, 2005, p. 41). Typical characteristics of the organization type would be teamwork, employee involvement and corporate commitment to employees. A typical example of this type of organization would be Toyota.
- Adhocracy culture. The Latin words Ad Hoc mean 'for this', suggesting a temporary and in-the-moment type of organization. A goal of this type of culture would be to be able to adapt, to be flexible and to be able to cope with uncertainty and ambiguity (Cameron & Quinn,

2005, p. 43). This type of organization has decentralized decision-making where responsibility is given to an individual. This individuality, risk taking and anticipating demands everyone to be involved with for instance R&D, clients or suppliers. The culture emphasizes on projects, after finishing an assignment individuals take up new tasks and projects. A consultancy firm would be a typical example for this type of organization.

- Another suggested culture is that of the balanced culture (Quinn, as referred to by Gregory et al., 2009). This balanced culture would have the advantage of dynamically handling an environmental shift in a better way. According to Cameron and Quinn (2011, p. 94) it could mean that a culture is well developed in each quadrant, but it is not a goal per se to develop a balanced profile in each quadrant. Too much emphasis on one culture might be counterproductive since it can decrease the performance on a non-emphasized domain (Gregory et al., 2009, p. 675).

An instrument to assess the culture of an organisation is the Organisational Cultural Assessment Instrument. The OCAI is a questionnaire with 6 items containing 4 questions, so a respondent answers 24 questions in total. See Appendix I for details. The first step of the questionnaire is to fill in how the current culture is perceived, the second step of the questionnaire is to determine what the preferred culture of the organisation will look like. There are 6 dimensions: dominant characteristics, organizational leadership, management of employees, organization glue, strategic emphases and the criteria of success. This instrument is the ipsative version of the OCAI: the respondent has to divide 100 points between the four questions, the more a situation is applicable to the organisation, the higher the points given on that dimension. The points per dimension will be calculated by dividing the total points by 6. This will lead to a current perceived culture per person, a preferred culture per person and ultimately the summarized organizational culture. Besides an organization-wide assessment of culture, one can look at sub-groups as well as so to determine what the difference is in for instance business units. As for SUTD, the adhocracy and clan culture have been identified as suitable cultures because of the innovative and family like environment.

Confirmation of CVF

Cameron and Freeman (1985, p. 43) were the first to find confirmation of the CVF while they attempted to find cultural congruence for nine cultural dimensions. The congruence between the nine dimensions and culture turned out to be not correlating, but the scholars did confirm a relationship between culture and effectiveness. Universities with an adhocracy culture were highly effective for the external environment and academic quality dimensions, while the other dimensions were found to be less effective. Cameron and Freeman (1985) validated the four types of organizations with 334 institutions of higher education. The managers of these organizations all filled in these questionnaires, hence the CVF was validated for managing staff. Quinn and Spreitzer (1991) found convergent and discriminant validity by using a multi-trait multimethod correlation matric. Cameron and Quinn (2011) provide a thorough overview in their book to how the validity and reliability of the instrument is proven, they refer to three further researches where reliability of the assessment instrument is proven (Quinn & Spreitzer, 1991; Ulrich, Brockbank, Yeung, & Lake, 1995; Zammuto & Krakower, 1991).

Helfrich, Li, Mohr, Meterko, and Sales (2007) argued that the CVF as an instrument could not be generalized to employees or to non-managers (Helfrich et al., 2007, p. 9). This is the opposite of what the validated original study administered amongst managers of NGOs, as this original study was externally valid. The scholars adapted and developed a shorter version of the CVF and applied these subscales to non-supervisory employees in the Veterans Health Administration (VHA). The outcome of the EFA in their research was that employees did not distinguish between entrepreneurial; team

and rational cultures. The two factors that emerged therefore look like the McGregor's theory X and Y, or mechanistic versus organic organisations (Helfrich et al., 2007, p. 12). The reliability of this study was mediocre, which could mean that their adapted version suffered from internal, external or construct validity.

Another alternative application of an OCAI research in educational setting is that of Fralinger and Olson (2011) at Rowan University, applied at faculty level. They performed a research with a convenience based sample, 50 students, who were enrolled in two health and exercise science courses at that university. The executed research was done only done pre-test without an intervention, so the students did assess the current and the preferred culture. The students filled the OCAI manually and on paper in, which costed about 15-20 minutes to fill in per person. The outcome of this study was that the students perceived the culture to be predominantly clan-oriented and that they would prefer a less hierarchical and less market oriented culture. The students perceived their department as 'a familial feeling, where faculty are seen as mentors or even parental figures' (Fralinger & Olson, 2011, p. 95). However, for this research there were limitations: first of all a lack of statistical evidence of reliability; secondly a narrow group of students; thirdly an absence of staff involved in questioning and lastly the possibility of the Hawthorne effect because of obtrusive research methods.

To measure the relationship between culture and organisation effectiveness Hartnell, Ou, and Kinicki (2011) performed a meta-analysis of 84 studies in which they measured the relationship between 3 culture types and organizational effectiveness (employee attitudes, organizational performance and financial performance). The base of their research was the Competing Values Framework, but due to the limited numbers of relationships the hierarchy culture was not included. The findings were that clan cultures were most strongly correlated to positive employee attitudes; and market cultures to innovation and financial effectiveness criteria (Hartnell et al., 2011, p. 688). The authors thus advice managers to align strategic initiatives and organizational cultures to realize competitive advantage.

Glisson and James (2002) did a research in on predicting measures of constructive and defensive culture. A constructive culture is a positive and proactively oriented culture, the defensive culture shows more protective and reactive behaviour (Glisson & James, 2002, pp. 778-779). Examples of the constructive culture would be that of achievement/motivation norms; self-actualization/ individualistic norms and humanistic/supportive norms (Glisson & James, 2002, p. 777). For the passive culture the following norms were measured: approval/consensus, conventional/conformity and dependent/subservient (Glisson & James, 2002, p. 778). They found that a constructive culture was the most important predictor for positive work attitudes and less employee turnover in the organization.

Another type of research that connected the CVF to cultures and performance was that of Panayotopoulou, Bourantas, and Papalexandris (2003). They suggested a SHRM framework consisting out of four models: the human relations model - flexibility and internal focussed, the open system model – flexibility and external focussed, the internal process model which focussed on internal control; and finally the rational goal model that is characterised by control and external focus. This is illustrated in figure 2. In the case of SUTD, a combination of the internal process model and the open systems model would apply to the role of the HR department.

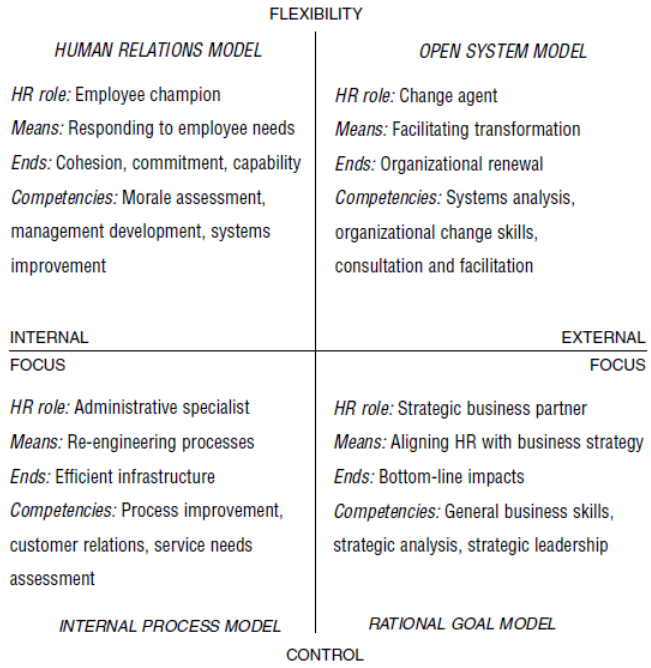


Figure 2 - CVF for SHRM as adapted from Panayotopoulou et al. (2003, p. 684).

The findings of their research confirms the contingency approach, meaning that depending on the organisation a specific HR approach can be used to achieve organisational performance. The findings of the research of (Panayotopoulou et al., 2003) show that the more complex an organisation is, the more HR control is needed to realize growth, but thereby a flexibility will disappear as the role of HR will change.

All in all, this chapter treated why the CVF-OCAI instrument was chosen to evaluate the organisation culture of SUTD. Empirical evidence was provided to illustrate the performance of the instrument for different internal stakeholder groups of organisations. Lastly, the relevance of the HR department for the cultural improvement of an organisation was discussed. The next chapter will elaborate on the use of Group Decision Support Systems to explain how the OCAI-Spilter instrument is an unique and innovative instrument.

2.3 Group Decision Support Software

The first record of Group Decision Support Software (GDSS) in academic environments was in the eighties. Huber (1984) was one of the first to report about the rise of these systems and stated that GDSS was a response to the ever growing gap between decision making and the time available to come to a consensus. The article speaks of GDSS as a combination of hardware, software, language components and procedures with the goal of helping groups of people in charge with decision making (Huber, 1984). A GDSS combines communication, computer and decision technologies to support problem formulation and solution in group meetings (DeSanctis & Gallupe, 1987, p. 589; Watson, DeSanctis, & Poole, 1988, p. 463).

A decision making group can be defined as "two or more people who are jointly responsible for detecting a problem, elaborating on the nature of the problem, generating possible solution, evaluating possible solutions, or formulating strategies for implementing solutions" (DeSanctis & Gallupe, 1987, p. 590). They summarized three goals of decision making group tasks: generating ideas, choosing alternatives and negotiating of solutions (DeSanctis & Gallupe, 1987). All of these tasks can be executed by using a group decision support system ultimately leading to increased efficiency and quality of decision making (Watson et al., 1988). The GDSS supports group decisions with the following four mechanisms: process support, process structure, task structure and task support (Nunamaker, Dennis, Valacich, Vogel, & George, 1991).

The more and varying tasks a GDSS is able to carry out, the more frequent and synergetic the effect of the use GDSS will be (Huber, 1984). A GDSS can be used to support the enhancement of communication, can support more participation and it can be used to contribute as a computational support for a task (Rao & Jarvenpaa, 1991). Further reported advantages of using a GDSS are: social equalization, less restrained behaviour, higher levels of satisfaction with the decision process by the group members. Nunamaker et al. (1991) argued that the use of Electronic Meeting Systems (EMS), a GDSS type of tool, would be benevolent for group work because of simultaneous working abilities, equal participation, enabling large effective group meetings and supporting organizational memory as a result from recording the meeting. If a part of the GDSS process is anonymous, group contributions lead to more objective evaluation, more equal participation and better decision quality (Jessup, Connolly, & Galegher, 1990; Siegel, Dubrovsky, Kiesler, & McGuire, 1986; Watson et al., 1988). Free riding is one of the negative consequences of anonymous voting (Cheng & Deek, 2012).

In a typical GDSS session the steps of the meeting follow the funnel model of figure 3: the first step is the inventory of input into the system, then the categorization of information done by the facilitator, after that the prioritization by participants takes place and the last output of the funnel is the decision (Hillegersberg & Koenen, 2016, pp. 50-51).

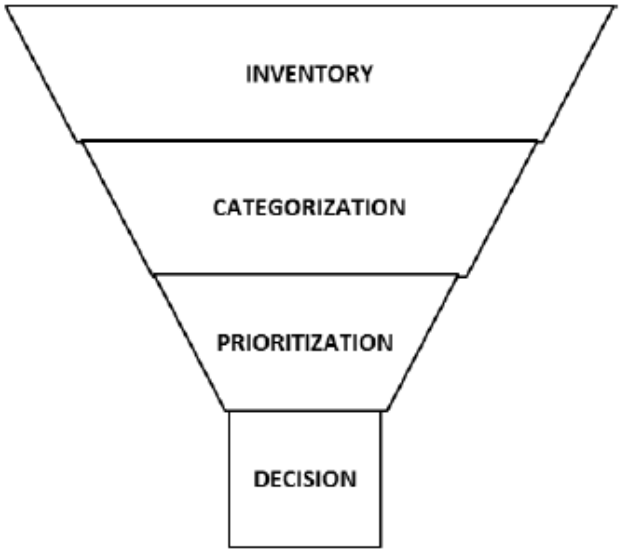


Figure 3 - the funnelling of a GDSS session (as adapted from Hillegersberg & Koenen, 2016, p. 51)

The design of a GDSS depends on three combined factors: group size, dispersed or face-to-face interaction and the task confronting the group (DeSanctis & Gallupe, 1987, p. 590). DeSanctis and Gallupe (1987) discuss four types of decision setting varying in size and proximity: 1) the Decision Room (small group and face-to-face); 2): the Legislative Session (larger group and face-to-face); 3): the Local Area Decision Network (small group and dispersed) and 4): the Computer-Mediated Conference (larger group and dispersed). The Decision Room was the most common method where a time-fixed face-to-face meeting supported by the GDSS leads to consensus. Group members can communicate verbally or by sending messages to the main discussion board where the ideas will be displayed. In a Legislative Session a computer might be shared and the facilitator is the only one that can send information to the screen. A Local Area Decision Network can connect group members in their offices to the session (DeSanctis & Gallupe, 1987). At the time of writing the Computer-Mediated Conference were rather unknown, but nowadays this way of distant decision making via an online conference is both inevitable and on the other hand a solution for the globalized activities many organizations manage.

The facilitation is a core influential factor on the success of a GDSS (Limayem, Banerjee, & Ma, 2006). Facilitation, according to Bostrom, Anson and Clawson, is a 'set of activities that the facilitator carries out before, during, and after a meeting with the objective of helping the group achieve its own outcomes' (as referred to by Limayem et al., 2006, p. 952). In the same article the authors found a positive relation between decision guidance which would lead to more 'faithful appropriation' leading to better decisional outcome and eventually better perceptions of the decision process. The facilitator chairing the meeting provides four functions: technical support, chairing the meeting in terms of maintaining agenda and planning the agenda and the last function of the facilitator would be the maintenance of the system and providing training material for the system (Nunamaker et al., 1991, p. 41). Another GDSS type of tool, the Electronic Meeting System tool "GroupSystems", had three different interaction styles: chauffeured, supported and an interactive style support (Nunamaker et al., 1991). The chauffeured style has a facilitator, one screen and oral communication. The supported style accommodated decision making by every participant having a computer, with both electronic and verbal communication. The interactive style mainly transferred input of participations via the personal computer with little verbal communication. They argued that the last style was the best style as it provided the most advantages (such as anonymity).

One of the last possible steps in the process of GDSS is the decision making based on voting. During the decision making task the voting tool can be used to show patterns of consensus and to compute the average of the group members votes; in this case voting should only be used at the end of the process (Cheng & Deek, 2012, pp. 3-4). The authors described six methods frequently used in voting (Cheng & Deek, 2012, p. 7):

- Plurality method: the most chosen alternative wins.
- Majority rule: a minimum amount of majority votes is needed for the alternative to win.
- Approval voting: one vote per alternative sufficiently deemed alternative. The most voted wins.
- Multiple vote: a *k* chosen number of *k* wins is established and every member can vote the maximum of that number.
- Borda count: each alternative is given a count based on the ranking per member. The alternative with the highest count wins.
- Average score rating: a fixed amount of scores is available per member. Each alternative has a total score by adding the score, the alternative with the highest total score wins.

Cheng and Deek (2012) do point out that many web based GDSS voting tools have limited capabilities; either in limited voting methods, limited amount of rounds to vote or not enough oversight into the outcome of the votes. Therefore, scalability can be an issue with voting.

As earlier discussed, one of the advantages of a GDSS is the anonymity of the instrument. The GDSS type of instrument could be highly suitable for the Singaporean culture. As elaborated in chapter 2.1.2 the Confucian cluster possesses the characteristics of high collectivism and a high power distance (Hofstede et al., 1990; House et al., 2004). This leads to the assumption that Singaporean employees would find it hard to be honest in obtrusive situations of a group and in the presence of a superior/ manager. This was confirmed by the scholars Quaddus and Tung (2002) who compared conflict behaviour of Australian and Singaporean employees in a decision conference. In this decision conference, one single facilitator with one computer would lead the session, the so called chauffeured style of Nunamaker et al. (1991). The outcome of their research was what one would expect: Australian employees were less prone to conflict avoidance. Their behaviour could be described as more masculine and individualistic, whereas the Singaporean employees were more harmonic and collectivistic in their behaviour (Quaddus & Tung, 2002). Therefore, in the SUTD case (Lee, 2015), where the GDSS instrument with anonymous perceptions and improvements to the culture would be gathered, it could provide more valid and reliable results than without the use of this system.

All in all, this chapter treated the concept of Group Decision Support Software and how this can improve group decision making in several ways. Secondly, the relevance and importance of the facilitator was elaborated. The last paragraph analysed why GDSS can be a valuable instrument in the case of SUTD and other organisations in an Asian society.

2.4 Theoretical model

The theoretical model for this research is shown in figure 4. This figure shows the relation between how the first two sub questions lead to the final sub question. After finding an answer to the first two questions, “What was the perceived current and preferred culture of SUTD’s stakeholders in 2013?” and “What business process reengineering efforts after 2013 can be identified?” the outcome of the these questions will be found in the answer of the last question “What are the employees’ perceptions of the organisational climate in 2016?”. These answers combined result in an answer for the main research question of this case study: “What change management efforts to the current perception of the organisational culture of the Singapore University of Technology and Design?”.

Figure 4: the research model

Chapter 3 – Research methodology

In order to answer the main research question: “What change management efforts led to the current perception of the organisational culture of the Singapore University of Technology and Design?” the research methodology of this thesis is split in two parts; the part that covers the design of the research of Lee (2015), and the second part which will provide details on the study that was executed in 2016/2017.

The first part of this research methodology will elaborate on the use of action design research to design an IT-artefact named Spilter as performed by Lee (2015). This part will discuss the methodology that will answer sub question 1: “What was the perceived current and preferred culture of SUTD’s stakeholders in 2013?”. The Spilter tool consists out of two parts: an Organisational Culture Assessment Instrument (OCAI) combined with a Group Decision Support System (GDSS). The OCAI consists out of 6 dimensions: dominant characteristics, organisational leadership, management of employees, organisational glue, strategic emphasis and criteria of success. These six dimensions identify the current organisational culture and the desired culture and hereby assesses the gap between the two. The GDSS facilitates improvement suggestions by employees, facilitates ordering and ranking of suggestions and hereby provides feedback on how to improve the organisational culture. Some of these suggestions by employees were implemented in SUTD, together with more improvements identified by the senior management of SUTD. These suggestions are identified in the results, as so to answer sub question 2: “What change management efforts after 2013 can be identified?”. To evaluate these implementations, an employee climate survey was performed in 2016.

The second study of this thesis elaborates on the climate survey performed in 2016 as so to answer sub question 3: “What are the employees’ perceptions of the organisational climate in 2016?”. An independent consultancy firm collaborated with the SUTD to construct this questionnaire. 44 Questions and 2 open comments were embedded in this survey with the purpose of “measuring the innovation level of SUTD as we work towards achieving the adhocracy culture”. The outcome of this survey will be evaluated with descriptive statistics, followed by a factor analysis and lastly a Multiple Analysis of Variance to assess differences between employee groups. In the end, the comments given by the survey respondents will be analysed using Atlas.ti to provide qualitative evidence for the perceived versus desired organisational climate in SUTD.

3.1 Methodology study 1

The research of Lee (2015) combined the concept of design research with action research: action design research (ADR). Action research, according to McNiff, is a process "that involves the researcher not just being a passive observer, but as an active participant in the research process" (as referred to by Lee, 2015, p. 58). The role of active participant is ideal since the researcher is closely involved with the organisation, any changes can be implemented instantly. Design research "seeks to create innovations that define the ideas, practices, technical capabilities, and products through which the analysis, design, implementation, management, and use of information systems can be effectively and efficiently accomplished" (Hevner, March, Park, & Ram, 2004, p. 76).

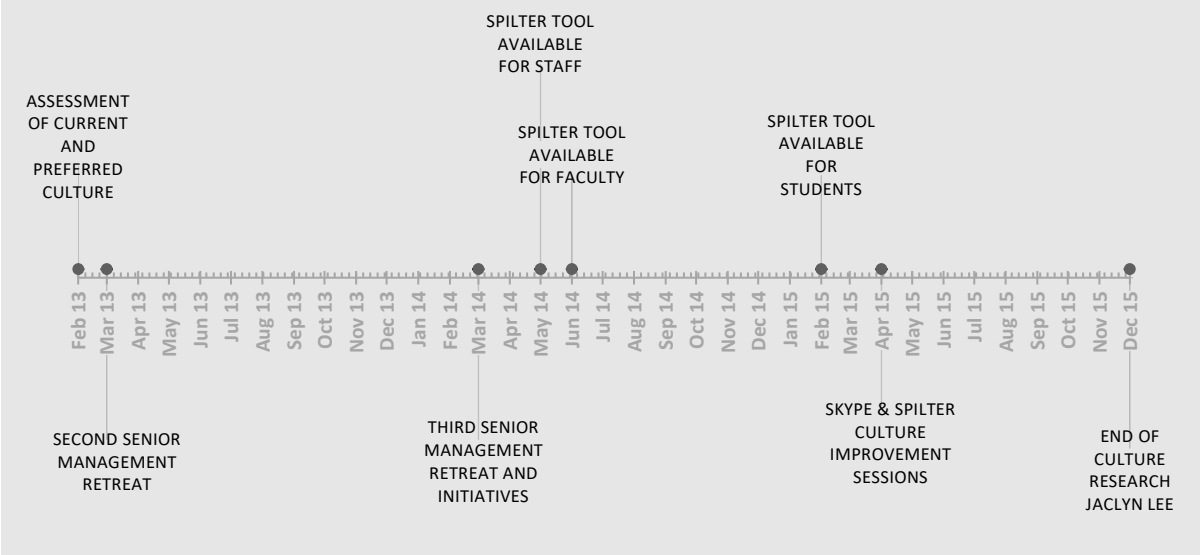
The overlap of action research and design research "occurs when the action researcher is actually also conducting DR where he or she is inventing a new, innovative artefact or solution technology to better address the client's problem solving needs" (Lee, 2015, p. 67). It deals with two different challenges: it focusses on a problem situation in an organization by intervening, evaluating and secondly by constructing and evaluating the IT artefact to engage in the encountered situation (Sein, Henfridsson, Purao, Rossi, & Lindgren, 2011, p. 40). Design thinking projects must go through three stages: inspiration, ideation and implementation (Brown, 2008). The constructed Spilter tool covered four stages of Action Design Research: problem formulation; building, intervention and evaluation; reflection to learning; formalization of learning (Lee, 2015, p. 69; Sein et al., 2011). These stages are iterative, if adjustment is necessary one can loop back to earlier stages. Ultimately, this will lead to an IT artefact: a construct, model, method or instantiation (Hevner et al., 2004, p. 77). In the case of Lee's study it led to an instantiation (or IT-Tool). The design principles for the OCAI-Spilter tool included (Lee, 2015, p. 87):

- Automating the OCAI/CVF survey within Spilter.
- Graphing, collecting and consolidating survey data as so to assess current and desired culture.
- Establishing a common understanding of the current and desired culture by using the group discussion feature of Spilter.
- Using Spilter to brainstorm for ideas to advance culture from current to desired state.

The dependent variable, independent variable, unit of analysis and setting were:

- The dependent variable is the OCAI with the outcome of current and desired perception of culture by internal stakeholders of SUTD.
- The independent variables are the dimensions of the OCAI: dominant characteristics, organisational leadership, management of employees, organisational glue, strategic emphasis and criteria of success.
- Unit of analysis: Culture within SUTD.
- Setting: the Singapore University of Technology and Design.

The below featured timeline shows the milestones in the research of Lee (2015).



Graph 1 - Timeline study 1

The first step in the 2013 study was prototyping the Spilter tool, which implied working with basic specifications of the artefact and continuously improving the artefact (Lee, 2015, p. 73). It was iteratively improved to result in an artefact that combined the OCAI Tool with a Spilter GDSS. The Organisational Culture Assessment Instrument is an already existing tool which was straightforward in its construction. Prototyping the GDSS part was more challenging and involved the following sequential steps (Meador, Guyote, & Keen, 1984): planning, application research, analysis, design, system construction, system testing, evaluation, demonstration, orientation, training, deployment, maintenance, adaptation. The OCAI-Spilter tool was composed by a joint team of Singapore and Dutch members. This resulted in the following steps (Lee, 2015): the Dutch and Singaporean team connected digitally to make a first prototype, it was pilot tested in Singapore with the Human Resource team to give feedback, the tool was fine-tuned so staff and faculty could use it. The final step was to use the OCAI-Spilter artefact in SUTD with the senior management of the university.

<u>Conceptualization, operationalization, indicators & dimensions:</u>

“Conceptualization is the process of specifying the vague mental imagery of our concepts, sorting out the kinds of observations and measurements that will be appropriate for research” (Rubin & Babbie, 2016, p. 189). The first concept of this research is that of the perceived and preferred culture of SUTD. This construct is measured by using the OCAI-Spilter tool. “In operationalization, concrete empirical procedures that will result in measurements of variables are specified” (Rubin & Babbie, 2016, p. 189). As for the specification of the variables, the measured groups education, research and support can be elaborated as the distinction based on functions on the employees’ departments. Culture is defined as: “shared perceptions of organisational work practices within organisational units that may differ from other organisational units” (Van den Berg & Wilderom, 2004, p. 571). “The end product of this conceptualization process is the specification of a set of indicators of what we have in mind, markers that indicate the presence or the absence of the concept we are studying” (Rubin & Babbie, 2016, p. 175). The outcome of the OCAI will shine light on the current and preferred perception of two groups of SUTD employees and students.

Sampling

The entire population of the university's internal stakeholders can be described as: administrative staff, faculty staff, researchers and students. For the Organisational Culture Assessment Instrument three employee groups and students are selected and sampled (N=617). Faculty members (75), staff (183), senior management (18) and students (341). This is almost the entire population of the university, the researchers were excluded. For the students, only students and staff that were in the university for longer than 1 year were included.

Data analysis method

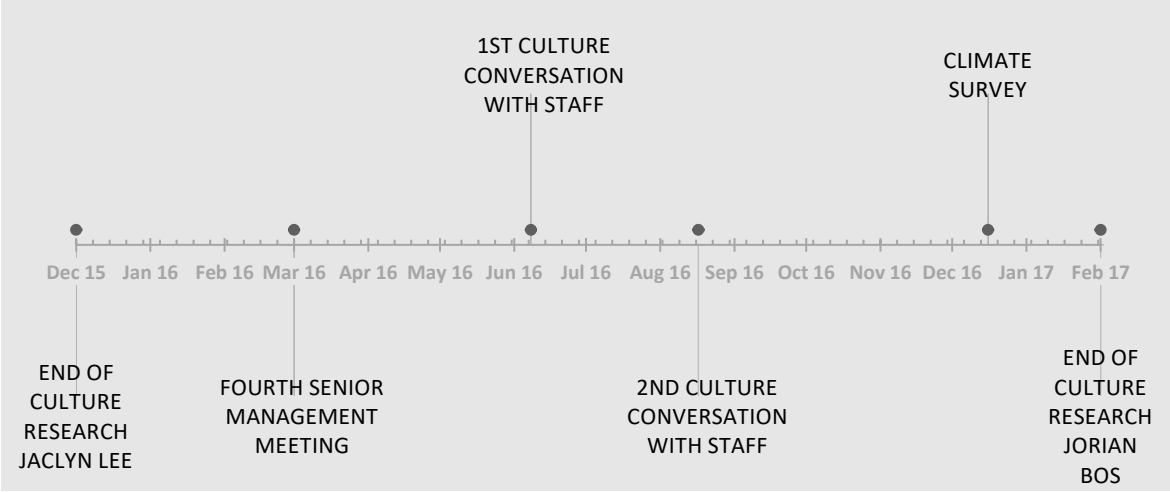
The outcome of the OCAI-Spilter tool will be evaluated in three ways. The manual and automated Spilter way is compared and efficiency increase is calculated. The second result of the research was the actual outcome of the OCAI with the culture gap between stakeholders groups. For every culture the current mean and the preferred mean will be featured. The OCAI per stakeholder groups is displayed where the highest scoring culture is highlighted. Finally the current and preferred culture state per dimensions will be featured. The last outcome is an evaluation of the Spilter tool; it is evaluated in a qualitative and quantitative way. A survey (N=13) was held in combination with a focus group interview to analyse the satisfaction of the user with the tool.

3.2 Methodology study 2

This part of the research methodology will explicate the details of study 2. This study consists of two parts: the identification of the business process reengineering efforts and measuring the employees' perception of the current organisational culture. Sub question 2, *what change management efforts after 2013 can be identified?,* is answered by examining documents that were provided by the university. Besides these documents, the HR director of the university identified that lean six sigma efforts of 2016 were successful in decreasing bureaucracy. These projects will be treated as well.

Sub question 3 '*what are the employees' perceptions of SUTD's current organisational culture?'* will be answered by means of a climate survey. The goal of that climate survey was to "measure the innovation level of SUTD as we work towards achieving the adhocracy culture".

The below featured graph displays the timeline of study 2.



Graph 2 – Timeline study 2

First of all, Schein (2010, pp. 161-162) elaborates on when to use surveys in relation to organisational culture studies:

- Determining whether particular dimensions of culture are systematically related to some elements of performance;
- Giving a particular organization profile to itself to stimulate a deeper analysis of the culture of an organization;
- Comparing organizations to each other on selected dimensions;
- Testing whether certain subcultures that we suspect to be present can be objectively differentiated and defined in terms of preselected dimensions that a survey can identify;
- Educating employees about certain important dimensions that management wants to work on.

For this research the differentiation in subcultures and differences in dimensions are relevant reasons to administer a survey. Besides that, the time constraints limits this research to relatively superficial level of involvement because an emic and more qualitative approach is impossible since it would take months for a researcher to become familiar with an organisation (Schein, 2010).

The dependent variable, independent variables, unit of analysis and setting were:

- Dependent variable: current perception of climate dimensions.
- Independent variables: change and communications; senior management leadership, department/pillar perception, supervisor leadership, my job, perceptions of the organisation, well-being.
- Unit of analysis: education staff, research staff, administrative and support staff.
- Setting: the Singapore University of Technology and Design.

As these questions were composed before the beginning of this study by members of the university's HR team in collaboration with the external consultancy firm ORC. Therefore there was no possibility to adapt questions or themes for the employee climate survey. The themes, or independent variables, were based on the core values of the university: creativity, passion, leadership, collaboration and integrity. The questions originated from the database of the external consultancy firm, its scientific validity was not proven.

Conceptualization, operationalization, indicators & dimensions

"Conceptualization is the process of specifying the vague mental imagery of our concepts, sorting out the kinds of observations and measurements that will be appropriate for research" (Rubin & Babbie, 2016, p. 189). The second concept of the research, perception of organisational climate, is measured by a climate survey. The climate survey has been designed by the SUTD in cooperation with an external consultancy firm. The focus of the survey lies on the core values of the university: collaboration, leadership, passion, creativity, integrity. The questionnaire has 7 dimensions: my job, well-being, immediate supervision, department/pillar/centre, senior management leadership, change and communications, perceptions of the organisation.

"In operationalization, concrete empirical procedures that will result in measurements of variables are specified" (Rubin & Babbie, 2016, p. 189). As for the specification of the variables, the measured groups education, research and support can be elaborated as the distinction based on functions of the employees departments. Climate is defined as a property of an individual (Glisson & James, 2002, p. 788). "The end product of this conceptualization process is the specification of a set of indicators

of what we have in mind, markers that indicate the presence or the absence of the concept we are studying" (Rubin & Babbie, 2016, p. 175). Climate is the main dimension that measures the difference in perception between employees groups and the indicators for climate are the dimensions of it: my job, well-being, immediate supervision, department/pillar/ centre, senior management leadership, change and communications, perceptions of the organisation. An exploratory factor analysis will be executed to assess the correctness of these themes, the factors may result in other names for the indicators.

Sampling:

All 771 employees of SUTD are selected and sampled. These employees are divided in three groups: Faculty members, Researchers, Management and support staff. There were 418, or 54% of the employees, who filled all items of the survey in, the people who did not complete the entire survey were excluded.

Data analysis method

The instrument used in the second part of this research is an employee survey, which was constructed by SUTD in cooperation with an external consultancy firm (ORC). This survey can be found in Appendix III. It was designed with the intention of "measuring the innovation level of SUTD as we work towards achieving the adhocracy culture". According to an employee of the external consultancy organisation (*name undisclosed for anonymity purposes*), 'statistical significance tests are adopted as proxy indications of the reliability of survey results to provide an assessment of the reliability of the surveys'. Another measure for the firm was benchmarking the results with other organisations; it was claimed that the average response rate for employee surveys in the higher education industry was 68% and a response rate below 50% would be problematic.

The questionnaire was partly based on the core values of the university: leadership, integrity, passion, collaboration and creativity. This questionnaire was sent out with a message from the president of the University, this message can be found in appendix II. The survey was originally open for a period of three weeks and resulted in a mere response rate of 46%. To increase the response rate a reminder to fill in the climate survey was send to all employees together with a graph that contained participation rates. This effort to increase response rate was based on evidence found by Edwards et al. (2009, p. 3) whose review identified methods to improve response rates on questionnaires. "The odds of response were increased by more than a half by including a statement that others had responded (1.52; 95% CI 1.36 to 1.70). The odds of response tripled when a picture was included in an e-mail (3.05; 95% CI 1.84 to 5.06; P = 0.27, I2 = 19%) (Edwards et al., 2009, p. 3)". As a result of this reminder the deadline for the survey was extended by one week from three to four weeks. Eventually this resulted in a 54% response rate (N=418). A summary of the questions and themes can be found in table 3. See appendix III for the full questionnaire.

Survey Category	Climate Survey Questions
Demographic questions	Employee group; length of service; age; gender; job code.
My job	Understand job expectations; authority for job; resources for job; information for job; responsible for improving work; opportunity to use personal skills; sufficiently challenged; understand contribution to SUTD's success; feeling of accomplishment.
Well-being	Satisfaction physical working environment; satisfaction employee activities; satisfaction recreational facilities.

Immediate supervision	Supervisor behaviour reflects core values; supervisor provides regular feedback; supervisor motivates and inspires; supervisor communicates effectively; supervisor acknowledges contribution; supervisor creates collegial environment.
Department/pillar/ centre	HOD allows change; HOD acts on improvements; team is encouraged to innovate; department gets cooperation from other departments; co-workers willing to help beyond job function; collegial acknowledgement of efforts; decision making is effective in department.
Senior management leadership	Top management empowers team; behaviour senior management reflects core values; senior management has clear vision; top management manages changes effectively.
Change and communications	Informed for relevant matters; opportunity to contribute opinion to change; can suggest improvement; can make improvements.
Perceptions of the organisation	Procedures streamlined; encouraged to improve processes; safe to challenge procedures; everyone is treated fairly; everyone is respected; opportunity to give opinion; everyone minimizes bureaucracy; recommend SUTD to work; recommend SUTD as educational institute; intention staying in SUTD next 12 months; effort to leave.
Open questions	Best reason for working at SUTD; suggestions for improving working environment.

Table 3: Climate survey categories and questions.

The data outcome of the climate survey will be analysed by assessing descriptive and inferential statistics. The first step of this will be displaying the descriptive statistics to show the average scores of the entire sample. The next step will be to calculate the Cronbach's Alpha to calculate reliability (which should be at least higher than 0,6). All departments will be categorized as: Faculty, Administrative and Support staff or a Research department.

Factor analysis

The next step will be an exploratory factor analysis performed in SPSS that will look at how the 44 questions are loaded on 7 factors. Subsequently these 7 dimensions are then saved as variables in SPSS and a multiple analysis of variance (MANOVA) will be used to assess difference between groups. If there is difference between groups, independent T-tests will be performed to analyse the difference between groups.

An interdependence technique that can be used to find an underlying structure among variables is the exploratory factor analysis (Hair, Black, Babin, & Anderson, 2009, p. 85). The difference between an exploratory (EFA) and confirmatory factor analysis (CFA) is that factors for the CFA are derived from statistical results instead of theory (Hair et al., 2009, p. 603). Factor analysis can be used to find data reduction; it does so by "identifying representative variables from a much larger set of variables for use in subsequent multivariate analyses, or (2) creating an entirely new set of variables, much smaller in number, to partially or completely replace the original set of variables" (Hair et al., 2009, p. 97). According to Hair et al. (2009) the minimum sample size should be 50, but preferably 100 observations. Another rule of thumb is that there should be at least 5 times more observations than variables to be analysed, but again preferably 10 times more. The sample size was sufficient with N=418, and the 44 variables that were examined.

The first requirements to look at are the KMO measure of Sampling Adequacy, which should be higher than 0.6 to be sufficient, and the significance of 5% to assess homogeneity of variance (Hair et al., 2009, p. 107). Since the climate survey contains 7 themes, the amount of factors in SPSS will be limited to 7 (as advised by assistant professor Quin from SUTD). After that the total variance

explained will be looked at, followed by the Scree Plot displaying the 7 factors with an Eigen Value higher than 1. A next outcome will be the component matrix, which is rotated using orthogonal rotation (or Varimax in SPSS). This rotation will result into a clearer negative or positive association of values loading closer to -1 or +1 (Hair et al., 2009, p. 118). Correlations of less than 0.4 will be left out of the correlation matrix as so to minimize the amount of variables loading on one factor. According to Hair et al. (2009, p. 116) between 0.3 and 0.4 is the minimum for significance, so 0.4 is acceptable. Lastly, the 7 factors will be saved as regression scores, these range from -1 to +1 indicating the standard deviation (DiStefano, Zhu, & Mindrila, 2009). The advantages and disadvantages of the computation of regression scores as factors are (DiStefano et al., 2009, pp. 4-6):

- The regression scores are maximal correlated to the estimated factor (indicating validity),
- It is correlated to other orthogonal factors (univocality) which will be avoided by using a cut off score of 0.4 which limits loading on other factors.
- It is correlated to factor scores of from other orthogonal factors (correlational accuracy).
- The factor scores are unbiased estimates of factor score parameters.

Multiple Analysis of Variance

After the underlying factors have been identified, the difference between the three departments will be assessed. This will be done by the statistical technique of Multiple Analysis of Variance (MANOVA), which will compare the regression scores on each factor for the three departments. The reason that a Multiple Analysis of Variance is chosen instead of several single ANOVAs is because of the following (Hair et al., 2009, pp. 677-678):

- MANOVAs can detect differences not found in univariate tests.
- Controlling errors when some degree of intercorrelation between dependent variables is present.
- Provides more statistical power than a single ANOVA when dependent variables are kept relatively low (five or fewer).

The Box's M test with a significance of 5% will be used to assess equality of variance, to assess lack of independence (Hair et al., 2009, p. 684). Pillai's Trace will be used to look at the proportion of variance explained in the MANOVA, as this is the least affected by violations of assumptions (Hair et al., 2009). After this a series of One Way ANOVAs are performed by Levene's Test of Equality of Error Variances, where again a significance of 5% will be used to assess whether there are difference for the One Way ANOVA per factor. After this, post hoc tests will be done to control for statistical significance (α=0.05) per factor.

Qualitative data

The last part of the data that is looked at is the open comments. These open comments are analysed with Atlas.ti. This program will facilitate an the coding of unique comments: "What is the best thing about working here?" (N= 314) and "How would you improve the working environment?" (N=277). The answer to these questions were coded in Atlas.ti.

The first question, "What is the best thing about working here?", is coded based on dimensions of Organisational Culture Assessment Instrument. The six dimensions were: dominant characteristics, organisational leadership, management of employees, organisation glue, strategic emphasis and criteria of success. These questions were divided in the 4 culture types of clan, adhocracy, market and hierarchy. When an employee gave an answer that could be categorized in one of these

dimensions and cultures, it was coded as such. In the end 96 comments were relatable to one of the OCAI dimensions.

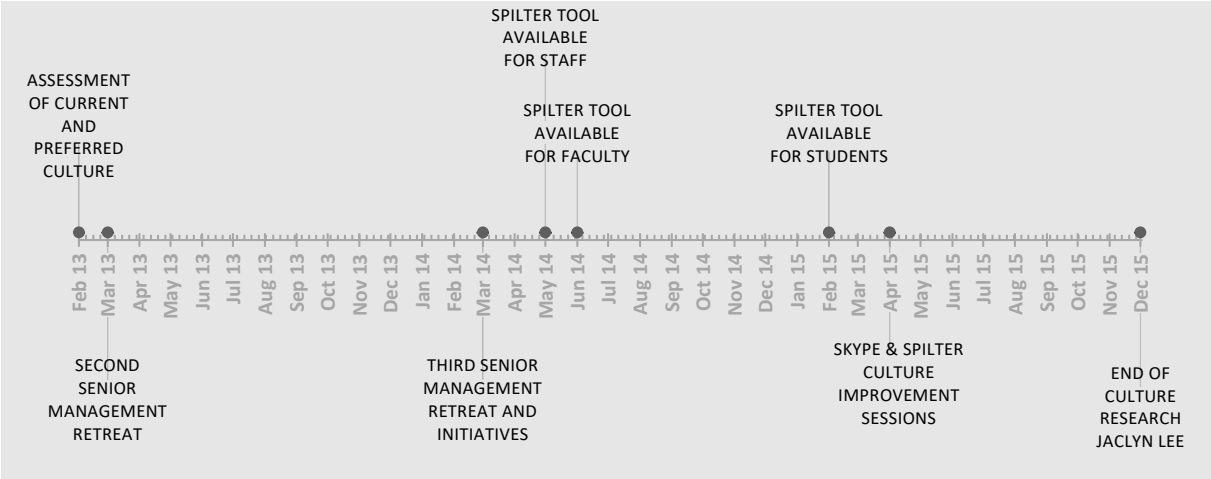
The second question, “How would you improve the working environment?”, is as well coded to refer back to the OCAI cultures. Therefore the distinction was made to look at whether the improvement comments were about enhancing or decreasing the CVF culture types. The comments were coded the following way: more clan culture, more adhocracy, more market or more hierarchy, less clan culture, less adhocracy, less market or less hierarchy. There were 58 comments out of the 277 comments used, since only unique and OCAI related comments were distilled and coded.

All in all, this chapter treated the research methods used in this thesis. The research of Lee (2015) used action design research while this research makes use of SPSS and Atlas.ti to analyse the outcome of the climate survey. The next chapter will elaborate on the results of this research.

Chapter 4 – Results

This chapter will discuss the results of the culture studies in chronological order, starting with the culture study of Lee at the SUTD in 2013, continuing with identifying change efforts during and after that study and ending with the outcome of the climate survey held at the end of 2016.

Results Study 1



Graph 1 - Timeline study 1

4.1 SUTD's organizational culture in 2013

The first sub question was "*What was the perceived current and preferred culture of SUTD's internal stakeholders in 2013?".* First of all, the process of designing and finalising the OCAI-Spilter tool will be elaborated. But before that, the design principles of the OCAI-Spilter tool are summarized (Lee, 2015, p. 87):

1. Automating the OCAI/CVF survey within Spilter.
2. Graphing, collecting and consolidating survey data as so to assess current and desired culture.
3. Establishing a common understanding of the current and desired culture by using the group discussion feature of Spilter.
4. Using Spilter to brainstorm for ideas to advance culture from current to desired state.

The versions of the Spilter tool walked the following course (Lee, 2015, p. 88): version RS0 contained the online OCAI tool. RS1 had initial screens and tools developed for the OCAI culture survey. To illustrate the outcome of the online OCAI-Spilter tool, picture 1 shows a print screen with the OCAI part of the tool.

Picture 1 - Screenshot with an overview of parts of the OCAI tool (as adapted from Lee, 2015, p. 97)

The RS2-version contained the group discussion part of the tool together with the anonymous improvement suggestions and ranking of suggestions (the GDSS part of the tool). The RS3-version was the version that was tested and evaluated with a pilot group.

The OCAI-Spilter tool was evaluated in two ways: a quantitative and online questionnaire survey with questions concerning the usefulness, ease of use, ease of learning and satisfaction with the software was done. The second method was a structured focus group interview to gather qualitative feedback on the best feature of the artefact, the worst feature of the artefact and suggestions for improvement. This was supported by showing a screens of the tool to facilitate structured feedback. The instrument was evaluated with the pilot group (N=13), 92% found Spilter useful, 92% found it easy to use, 92% felt it was easy to learn how to use the artefact and the overall satisfaction of the software was 92%. 12 Out of 13 people evaluated the artefact positively.

Moving from face to face sessions to digital sessions improved participation rates for both administrative staff (25%-73%) and faculty members (45%-67%). Besides the higher participation rates, time savings applied to filling in the survey (from 1 hour to 30 minutes) as well as ideas generation for cultural improvement (from 3 hours to 1).

OCAI Results:

Staff, faculty and senior management with at least one year of service and students in their second or third year were eligible to be a subject in this matter. 341 Students participated (82%), 183 staff members (73%), 75 faculty members (67%), 18 senior management members (60%).

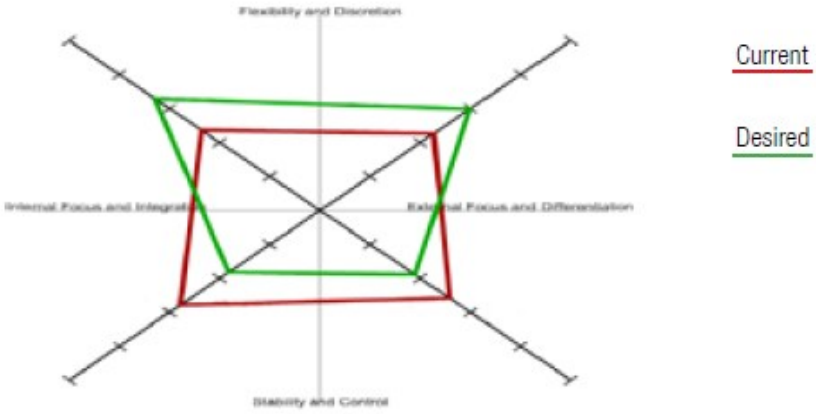
Reliability

The internal reliability was measured using the Cronbach's Alpha (Lee, 2015, pp. 121-122). Every construct measured had a reliability higher than 0.7, which means that the internal reliability is sufficient.

Cronbach's Alpha	Current culture	Preferred culture
Clan	0.80	0.78
Adhocracy	0.79	0.82
Market	0.79	0.74
Hierarchy	0.79	0.79

Table 4: Cronbach's alpha for organisational cultures

OCAI scores of all measured groups



Picture 2 - Displaying the current and preferred OCAI scores (as adapted from Lee, 2015, p. 122).

The above displayed graph shows the difference between the current and preferred OCAI scores. The following table shows the exact score per culture.

Type	Current culture mean	Preferred culture mean
Clan	23.61	32.92
Adhocracy	22.64	29.87
Market	25.81	18.92
Hierarchy	27.85	18.22

Table 5 - OCAI means for all measured groups

The following tables display the perceived current culture mean and the preferred current culture mean per stakeholder group with the highest scores highlighted.

OCAI scores of senior management

Type	Current culture mean	Preferred culture mean
Clan	24.51	30.09
Adhocracy	23.19	33.33
Market	19.54	21.87
Hierarchy	32.45	14.63

Table 6 - OCAI means for senior management

OCAI scores of administrative staff

Type	Current culture mean	Preferred culture mean
Clan	23.61	31.83
Adhocracy	23.04	25.18
Market	26.68	20.35
Hierarchy	26.67	22.64

Table 7 - OCAI means for all administrative staff

OCAI scores of faculty staff

Type	Current culture mean	Preferred culture mean
Clan	22.36	34.56
Adhocracy	22.59	29.68
Market	28.13	17.74
Hierarchy	26.92	18.03

Table 8 - OCAI means for faculty staff

OCAI scores of students

Type	Current culture mean	Preferred culture mean
Clan	23.28	33.62
Adhocracy	21.97	30.48
Market	29.85	17.48
Hierarchy	24.91	18.42

Table 9 - OCAI means for students

Perceptions of each dimension of the OCAI

	Current state	Desired state
Dominant characteristics	Hierarchy	Clan
Organizational leadership	Clan	Clan
Management of employees	Hierarchy	Clan
Organizational glue	Hierarchy	Clan
Strategic emphasis	Hierarchy	Clan
Criteria for success	Market	Clan

Table 10 - OCAI perceptions for OCAI dimensions

4.4.1 Perception and preferred culture SUTD

The first sub question was *"What was the perceived current and preferred culture of SUTD's stakeholders in 2013?".* This can be answered with the outcome of all groups that filled in the OCAI. The perceived current culture was found to be the hierarchy culture, followed by market, clan and adhocracy. As for the culture of the individual dimensions of the organisation; the university's dominant characteristics was found to be the hierarchy culture; organizational leadership was assessed to be a clan culture; the management of employees dimensions was found to be a hierarchy culture; organizational glue was hierarchy as well; strategic emphasis was found to be a hierarchy culture too and finally criteria for success was perceived to be a market culture.

The preferred culture was identified as primarily a clan culture, followed by adhocracy, followed lastly by market and hierarchy. All six OCAI dimensions were preferred to be a clan culture.

4.2 Change efforts at SUTD after 2013

This chapter will treat the business process reengineering efforts that have been identified during the research of Lee (2015) and after. These change management efforts have been identified by examining documents provided by the university. These efforts will be summarized and discussed in chronological order. This chapter can be seen as the intervention after the pre-test (the OCAI) whereas the following chapter will display the current perception of the organisational climate. The sub question for this chapter is the following: "*What change management efforts after 2013 can be identified*?". An more elaborate overview of these activities can be found in appendix IV.

2013

After the OCAI exercise in 2013 the following 5 BPR activities were identified and completed:

1. Social lubrication. Several initiatives to enhance communication amongst hierarchical levels.
2. Reduce paperwork. Several initiatives to automate and speed up processes concerning staff claims.
3. Increase university revenue with several initiatives. Examples are: renting out facilities, research fees and merchandising.
4. Reward systems to promote adhocracy culture. Several awards for excelling employees.
5. New admission activities to strengthen the SUTD's image for the external environment.

2014

In 2014 more activities were identified to enhance the clan and adhocracy culture. For the clan culture the following activity was identified:

1. Streamline activities to decrease bureaucracy. Some of the initiatives included: review the department management schedule, adjust bottoms up faculty projections to align with the financial year, automatization of several application processes for (post-doc) students.

To enhance the adhocracy culture the following activities were executed:

1. Respecting colleagues and their opinions. Collaborative initiatives and sharing of ideas were two examples of activities that were executed.
2. Review and consolidate work activities to remain focussed on the organisational goal. Department retreats and prioritizing of work plans were activities that were a part of this.
3. Develop innovative processes and reengineer existing ones. Horizon scans for senior management were developed, automating more workflows and processes to reduce paperwork with for example online forms.

2015

During the strategic management retreat the following efforts were identified to take place to enhance the clan culture:

1. "Be Happy" Hour at the university, including sports and recreation.
2. Create an intellectually vibrant and open campus for students & faculty.
3. Promote flexible working system.
4. Bringing faculty & staff kids together.
5. Organize a family day.

To enhance the adhocracy culture:

1. Foster innovation by organizing Annual Innovation Festival– including celebrating experiments & entrepreneurial accomplishments.
2. Encourage revenue and resource generation as part of entrepreneurship culture.
3. Design a process of space allocation that is transparent and efficient.
4. Manage fit of scholarship nominees with donor-scholarship.
5. Harmonising the admission process for under-grad and post-grad programmes.
6. Reduce time taken to select and make an admission offer (target 3 to 5 days) after interview.
7. Design a more innovative learning space in the library because it is becoming popular with students and has generated good well amongst parents and visitors.

8. Enhance performing arts for students.
9. Improve quality of communications amongst the leadership team.

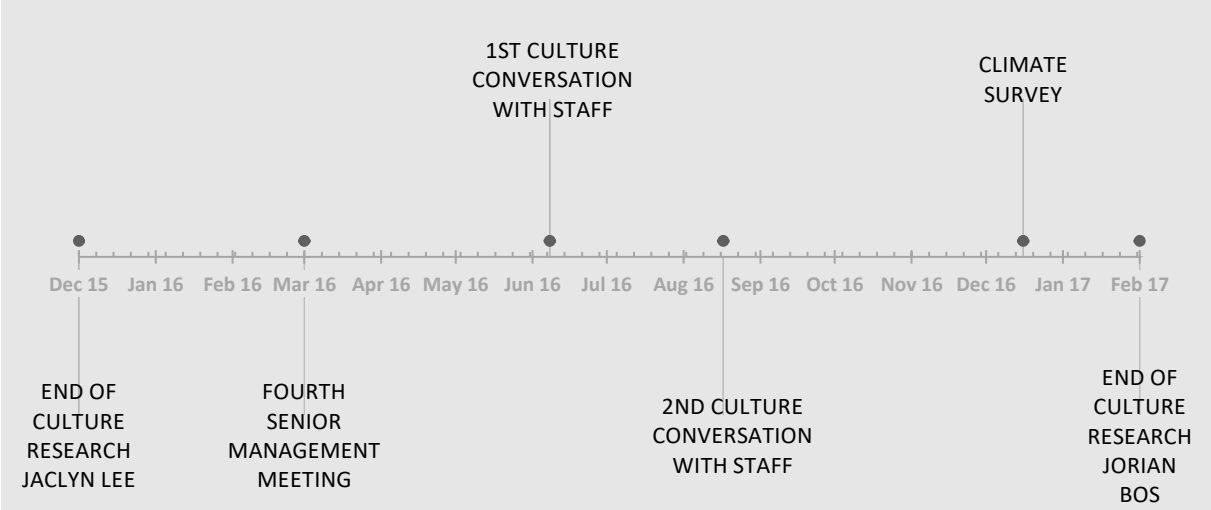
2016

SUTD's HR director identified that the Lean Six Sigma efforts of 2016 were the most successful change management efforts. The following Lean Six Sigma initiatives were successfully implemented in the organisation:

1. Office of Human Resources and Administration: improve the resourcing work flow by shortening the hiring process. Results: a 2-3 weeks shorter hiring process.
2. Office of Education & Fabrication Laboratory: improve booking of rooms and equipment by creating an online and standard reservation format. The shortened the processing time from 1 day to just 9 minutes.
3. Office of finance, Office of procurement & Library: reengineering purchase-to-payment process. Results procurement turnaround time: from 1 month to 3 weeks; and from 2.4 months to 2 months. Results payment turnaround time: from 57 days to 30 days.
4. Office of admissions: improving the undergraduate admission selection process to reduce the time so that more students can receive an offer. For 2016 there were 18% more applicants and thus more shortlisted students. Therefore more students were offered a place and as a result of the business process reengineering there was an 11% higher acceptance rate of students.

Results Study 2

This part of chapter 4 focusses on the business process reengineering and culture improvement efforts that took place after the completion of Lee's study. First of all, early 2016 an OCAI questionnaire was filled in by senior management to assess their perception of current and preferred culture. This OCAI was executed before a strategic management meeting so that the outcome could be discussed during the senior management retreat. During this retreat suggestions on improvement were given and accordingly ranked by the participants. After this management retreat culture conversations with faculty and staff members took place as so to gather more information of what staff members found of the university's culture.

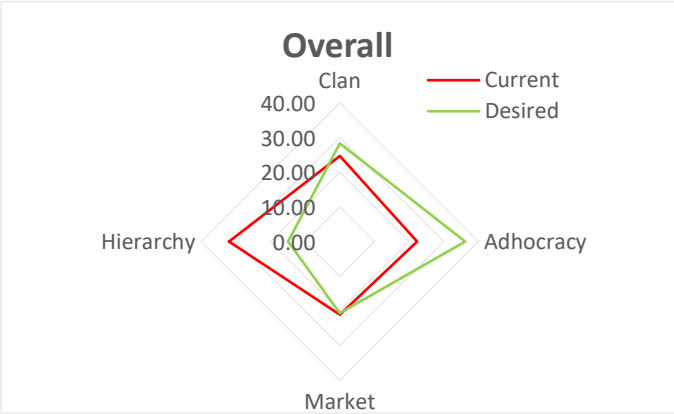


Graph 1 - Timeline study 2

Early 2016, the annual strategic management meeting took place. Before this retreat the senior management members filled an OCAI in. The senior management (N=22) found that the most prevalent SUTD culture was the hierarchical culture, and that the most desired culture is the adhocracy culture. The following tables and graph displays the outcome of the OCAI.

Organisational culture type	Current culture mean	Desired culture mean
Clan	24,70	28,33
Adhocracy	22,32	36,17
Market	21,05	20,61
Hierarchy	31,93	14,89

Table 11 - OCAI means for senior management



Graph 6 - The difference between perceived current and preferred culture.

The gap between current and preferred adhocracy culture is very high. The gap between current and desired market culture is almost negligibly small. The gap between current and desired clan culture is a small gap in the negative sense, but in a small gap nonetheless. The gap between current and desired hierarchy culture is extremely high, showing that there is a two times higher presence of a hierarchical culture than the desired state.

The below featured table 12 shows the perception of perceived current cultural and preferred cultural dimensions. Almost all other dimensions are perceived to be hierarchical whereas all desired cultural dimensions are adhocracy. Only the management of employees is perceived to be managed in a clan way.

	Dominant Characteristics		Organizational Leadership		Management of Employees	
	Current	**Desired**	**Current**	**Desired**	**Current**	**Desired**
Clan	23,91	25,91	28,18	27,73	34,77	32,05
Adhocracy	21,64	37,27	24,77	39,55	17,95	33,64
Market	21,05	21,36	17,05	14,55	18,41	19,09
Hierarchy	33,41	15,45	30,00	18,18	28,86	15,23
	Organizational Glue		**Strategic Emphasis**		**Criteria of Success**	
	Current	**Desired**	**Current**	**Desired**	**Current**	**Desired**
Clan	22,27	29,55	20,91	28,86	18,18	25,91
Adhocracy	21,36	37,05	22,95	35,00	25,23	34,55
Market	22,27	21,59	21,82	22,50	25,68	24,55
Hierarchy	34,09	11,82	34,32	13,64	30,91	15,00

Table 12 - The OCAI values of senior management per dimension.

After this senior management meeting, the second step was identifying why these cultures were so prevalent followed by gathering suggestions on how to improve the identified gaps in the organization. Three main reasons why the hierarchical culture was still prevalent were identified: firstly, the necessity for approval from above is needed too often. Secondly, there is too much centralization. Lastly, the current middle management is too inexperienced to handle bigger tasks.

Three suggestions for reducing the hierarchal culture were identified: business process reengineering should take place inspired by design thinking. Secondly, a culture of trust should be established where authority can be delegated to a lower management level. Lastly, policies need to be developed so that this empowerment of lower level employees can be implemented. To improve the adhocracy culture in the organization, the following suggestions have been made: delegation of decision rights to where the knowledge is. Secondly, employees should be provided with opportunities to provide input for processes without any fear for retribution. The last suggestion is adjacent with this; more tolerance of risk and the implementation of incentives should enhance innovation and should encourage personal initiatives.

After this management retreat in March, an email was send out in June, by the HR department on behalf of the president of the SUTD, which asked the senior management to identify processes that can be improved and to send these suggestions to the HR department. None of the 25 senior managers responded to this message.

Culture conversations with staff and faculty members

In June of 2016, a brainstorming session took place to improve collaboration and innovation amongst the employees of the SUTD. This first brainstorming session resulted in (N=20) employees who provided suggestions which were later ranked by (n=11) staff and faculty members. The following activities, ranked by importance, were identified:

1. More opportunities for interaction amongst staff in all departments.
2. Openness for new ways of thinking by management and staff and critically evaluate effectiveness of current processes.
3. Have HODs (Heads of Departments) show interest in their staff members.
4. Reduce low value adding work and processes.

The second brainstorming session with staff (n=8) provided the following outcome for the first three comments:

1. Develop a SUTD app for both internal and external stakeholders (…) to show that the SUTD embraces technology.
2. Reduce unnecessary paperwork.
3. For flexible benefits, provide a lump sum rather than small payments to simplify the process.

4.2.1 Change Management Efforts

In the last four years several Business Process Reengineering efforts can be identified. In 2013, 2014 and 2015 these efforts were implemented in SUTD and in 2016 another Organisational Culture Assessment took place with the senior management of SUTD. Sub-question 2 was: "*What change management efforts after 2013 can be identified?".*

All BPR efforts that were identified and executed as a result of the OCAI-Spilter tool could largely be categorized in one of the culture quadrants. While some of the efforts could be identified as favouring a culture, other efforts were focusses on decreasing the strength of other cultures, or dimensions of it. It is noteworthy is that some of the employees' suggestions were unspecific, or too

vague, this may be an unexpected cultural issue(Lee, 2015, p. 136). Examples of these suggestions were: social lubrication, reduce paperwork, create an intellectually vibrant campus and for instance respecting of colleagues and their opinions. On the other hand, a couple of the identified improvements were more operational oriented, and not vague. An excellent example of enhancing the clan culture is the family day. As for the promotion of the adhocracy culture the following examples are notable: reward systems with annual awards for staff and the annual innovation festival for both staff and students. These BPR efforts took place during the research of Lee (2015).

The next assessment of the organisational culture took place in 2016 were it became clear that the senior management perceived the gap between current clan culture and the preferred culture to have reduced (24,70 versus 28,33). They assessed the preferred culture to be more clan oriented, just as the adhocracy culture. The adhocracy culture gap was large (22,32 versus 36,17). The difference between perceived and preferred market culture was negligible (21,05 versus 20,61). Lastly, the perceived current hierarchy culture and the preferred hierarchy culture was substantial (31,91 versus 14,89). Three main reasons were identified for the strong hierarchical culture: too often approval is necessary, too much centralization, and inexperienced middle management. Hierarchy could be reduced by: Business Process Reengineering, creating a culture of trust to delegate authority, establishing policies to empower lower level employees. Adhocracy could be improved by delegation of decision power, offer feedback opportunities for employees and lastly to be more tolerant of risk and by implementing incentives to increase innovation efforts.

The Business Process Re-engineering efforts were ultimately executed as a result of the Lean Six Sigma improvements in the organisations. According to the head of HR of the university, these organisational improvements were highly effective in improving the organisation. All of these BPR efforts could be related to procedural improvements that made bureaucratic processes leaner.

Lastly, in the summer of 2016 twenty employees gave suggestions during meetings lead by the HR department. These were, again, relatively generic and vague suggestions. For instance opportunities for interaction, have management show interest in its staff and reduce unnecessary paperwork were identified. These identified improvements were adverse to operational improvements and were rather strategically oriented.

4.3 Results organizational climate survey

This chapter will describe the outcome of the third part of this research. It will provide an answer to sub question 3: "*What are the employees' perceptions of SUTD's current organisational culture?".* It does so by first treating the descriptive statistics of the climate survey, followed by inferential statistics by means of a factor analysis and an ANOVA. Thirdly the open comments of the employees will be coded where the frequencies of appearance together with quotes of employees are discussed.

4.3.1 Descriptive statistics

The Cronbach's Alpha for the 44 questions is 0,966; which is good. Details for the descriptive statistics can be found in appendix V. These questions were scaled from low to high (1-5) and only three questions scored lower than average. All others questions were higher than the average of 3, which implies that on average people are at least neutrally satisfied, or not disagreeing, with the questions. The three questions that scored low were all related to procedural bureaucracy in the organisation. The highest scoring 3 items (N=418) were:

1. I believe that one of my responsibilities is to continually look for new ways to improve the way we work. M 4,30. Σ 0,697.

2. I understand what is expected of me to do well in my job. M 4,18. Σ 0,692.
3. I understand how my work contributes to the success of SUTD. M 4,13. Σ 0,773.

The lowest 3 (N=418) scoring items were:

1. Procedures are effectively streamlined in SUTD. M 2,71. Σ 1,071.
2. Everyone in SUTD tries to minimize or eliminate unnecessary bureaucracy. M 2,74. Σ 1,193.
3. We are encouraged to take risks to improve the effectiveness of SUTD's processes. M 2,94 . Σ 0,992.

4.3.2 Inferential statistics

First of all, an exploratory factor analysis is performed to find whether the variables can be loaded on the factors. The KMO sampling of Adequacy is high (0.951), just as the Bartlett's Test of Sphericity (14163.94). The outcome is significant ($\alpha<0.001$). This implies that there is partial correlation between the variables (Hair et al., 2009, p. 102). The SPSS output can be found in appendix VI.

For the factor analysis the Varimax rotation is used to get a clearer separation of the factors (Hair et al., 2009, p. 113). Since factor loadings of 30-40% are the minimum to be considered the minimum level for interpretation (Hair et al., 2009, p. 115), all correlations lower than 40% are not displayed in the rotated matrix. The rotated component matrix leads to the total variance explained for 7 factors, which is 67,35%.

As the variables do not all load on the same factors as the themes they were initially assigned to, the 7 new dimensions have been re-labelled and saves as regression variables in SPSS. They are discussed in the order of highest Eigen Values to the lowest:

1) Top management and procedures. This factor is the sum of how satisfied employees are with top management and organisational procedures.
2) Immediate supervisor. This factor deals with the satisfaction of the immediate supervisor.
3) Motivators. This is the first factor of Herzberg's 1959 two factor theory of motivation (Herzberg, Mausner, & Snyderman, 2011). This factor treats how intrinsic motivators can lead to job satisfaction. Examples of these motivators are: achievement, recognition, work itself, responsibility, advancement and growth (Pardee, 1990, p. 7).
    - The main limitation is the fact that the critical incident technique (CIT) was used in Herzberg's research. Subjects were given theoretical situations and on the base of their answers, a factor was motivating or the dissatisfying (King, 1970). No evidence for difference between satisfaction and dissatisfaction was proven in Herzberg's theory (Ewen, 1964, p. 162). Neither was validity nor reliability was provided, no measure of satisfaction was tested (Ewen, 1964, p. 162). Nonetheless, the motivator factor of this theory is the most applicable name for the factor found by this factor analysis.
4) Contributing improvements. This factor deals with how safe employees feel about expressing their improvement opinions for their job.
5) Departmental satisfaction. This factor covers how satisfied people are with their department.
6) Hygiene factors. This is factor is the second factor from Herzberg's 1959 two factor theory (Herzberg et al., 2011). This factor treats how environmental factors cannot positively affect employees' feeling of satisfaction and can therefore negatively affect job satisfaction.
    - As mentioned in factor 3, Herzberg's theory has its shortcomings. The CIT type of research lead to the name "hygiene factors" as a result of subjects stating that some factors would negatively affect their job satisfaction. Even though this does not prove

that hygiene factors are dissatisfying per definition (Ewen, 1964, p. 162), the concept "hygiene factors" covers the external factors influencing the employees of SUTD in this research.

7) Availability of Resources. This factor deals how employees regard the satisfaction with the amount of resources they have for their job.

Table 13 shows the distribution of variables on the factors. The italic and underlined variables had cross-loadings higher than 0.4. According to Hair et al. (2009, pp. 117-118) there are several remedies for high cross-loadings: ignore problematic variables, delete variables, employ an alternative rotation method, decrease the numbers of factors and lastly to modify the type of factor model used. All methods were used and cross-loadings still occurred, therefore it was decided to continue and ignore the problematic variables.

Factor names	Climate Survey Questions
1- Top management and procedures	Top management empowers team; behaviour senior management reflects core values; senior management has clear vision; top management manages changes effectively; informed for relevant matters; procedures streamlined; *department gets cooperation from other departments*; encouraged to improve processes; safe to challenge procedures; everyone is treated fairly; everyone minimizes bureaucracy; *recommend SUTD to work.*
2- Immediate supervisor	Supervisor behaviour reflects core values; supervisor provides regular feedback; supervisor motivates and inspires me; supervisor communicates effectively; supervisor acknowledges contribution; supervisor creates collegial environment; everyone is respected.
3- Motivators	Understand job expectations; responsible for improving work; opportunity to use personal skills; sufficient challenged; understand contribution to SUTD's success; feeling of accomplishment; *recommend SUTD as educational institute;* intention staying in SUTD next 12 months; *effort to leave.*
4- Contributing improvements	Opportunity to contribute opinion to change; can make suggestions for improvement; can make improvements; opportunity to give opinion.
5- Departmental satisfaction	HOD allows change; HOD acts on improvements; team is encouraged to innovate; co-workers willing to help beyond job function; collegial acknowledgement of efforts; *decision making is effective in department*.
6- Hygiene factors	Satisfaction physical working environment; satisfaction employee activities; satisfaction recreational facilities.
7- Availability of Resources	Authority for job; *resources for job*; information for job.

Table 13 - new factors names with corresponding questions

MANOVA

The following step in this analysis is performing a Multiple Analysis Of Variance (MANOVA). The SPSS options of Homogeneity test and observed power are ticked as well, for the Post Hoc the option LSD is chosen.

The first step is to assess whether there is any difference between the employee groups. Since the Box M test is significant (P<0.001) there could possibly be a difference between the three groups (Hair et al., 2009, p. 250). Therefore, Pillai's Trace is used too, as so to avoid making a type I error. Pillai's Trace is chosen because the robustness, it is the least sensitive to violations of the assumptions of equality of variance; and it is found to be significant (F=14.333; P< 0.001). The partial eta squared of 0.197 = 19.7 percent of variability of climate is accounted for by the three group

levels. Hereby again rejecting the null hypothesis, implying that there is at least in one of the factors a difference between the groups.

The next step would be to calculate the Analysis of Variance (ANOVA). But prior to the ANOVAs the Levene's Test of Equality of Error Variances are calculated, because Levene's Test is less affected by departures from normality (Hair et al., 2009, p. 181). These One Way ANOVAs show that for factor 7 the value shows homoscedascity: 0.183. As for factor 1, 2, 3, 4, 5 & 6 the $\alpha<0.05$ (1: p=0.048, 2: p=<0.001, 3: p=<0.001, 4: <0.001, 5: p=0.006, 6: p<0.001) hereby showing heteroscadacity implying that there is difference between variance. Since factor 7 is insignificant any difference is rejected for this factor.

After this, the Two Way ANOVAs are calculated using the SPSS Test of Between-Subjects effects which show that: factor 1 is significant at P< 0.001, factor 2 is significant at P< 0.001, factor 3 is significant at P< 0.001, factor 4 is significant at P< 0.003, factor 5 is significant at P< 0.001, factor 6 is significant at P<0.001, factor 7 is not significant at P= 0.08. Factor 7 is still insignificant and therefore rejected.

Finally, the post hoc tests using the LSD multiple comparisons show that:

Significance outcome: department groups versus factor	Faculty vs Management and support staff	Faculty vs Researchers	Management and support staff vs Faculty	Management and support staff vs Researchers	Researcher vs Faculty	Researcher vs Management and support
Factor 1 – Top management and procedures	-0.61 ***	-0.37 *	0.61 ***		0.37 *	
Factor 2 – Immediate supervisor	-0.24 *	-0.95 ***	0.24 *	-0.71 ***	0.95 ***	0.71 ***
Factor 3 – Motivators	0.71 ***	0.50 **	-0.71 ***		-0.50 **	
Factor 4 – Room to express opinion	-0.38 **		0.38 **	0.31 *		-0.31 *
Factor 5 - Department		0.63 ***		0.86 ***	- 0.63 ***	- 0.86 ***
Factor 6 – Hygiene factors	-0.46 *	-0.37 *	0.46 ***		0.37 *	

Table 14 - The post hoc tests showing mean difference between employee groups. Two tailed significant at: *P ≤ 0.05; **P ≤ 0.01; ***P ≤ 0.001.

4.4.3 Qualitative data

The last two questions of the climate survey were open questions; “What is the best thing about working here?” and “How would you improve the working environment?”. The answer to these questions were coded in Atlas.ti.

The distilled outcome for "What is the best thing about working here?" was (N=314):

OCAI Dimensions and culture	Frequency
Dominant characteristic - adhocracy	25
Dominant characteristic - clan	23
Organisation glue - clan	10
Strategic emphasis - clan	7
Organisational leadership - clan	7
Dominant characteristics - hierarchy	5
Strategic emphasis - adhocracy	5
Management of employees - adhocracy	4
Organisational glue - adhocracy	3
Organisational leadership - adhocracy	2
Management of employees - clan	1
Management of employees - hierarchy	1
Organisational leadership - market	1
Criteria of success - clan	1
Dominant characteristic - market	1

Table 15 - frequency of employee mentioning one of the OCAI dimensions

It should be noted that the other dimensions with corresponding cultures were not found in the answers of employees. The dominant characteristic appearing most frequently is the adhocracy, which is in line with the SUTD values, as one of the university goals is to be innovative/creative. Besides that, the 'best thing' of the university was often referred to as a 'family feeling', referring to a clan culture. One of the employees illustrated the adhocracy culture in the following way:

"*As a young university that is growing rapidly, there are ample opportunities to build and implement projects / systems. There is never a dull moment as the projects are different with varying degree of complexity. Working at SUTD at this stage of its development is meaningful as we get to lay the foundation for the future and this is exciting*".

The following comment is an example of how one employee experiences the university to be a clan culture:

The best part of working at the SUTD is that "*Colleagues who are on the same floor. There are no discipline/pillar/department boundaries and exchange of ideas happen frequently. Hierarchy doesn't matter either. People look out for one another (e.g. our floor is quite open to students and the general public) and are considerate. Interacting with students. It's a fairly close-knit community in SUTD and I enjoy the lack of formality between staff, faculty and students*."

Room for improvement

The next question, "How would you improve the working environment?", was in general more negatively answered by the employees (n=276). This question was again coded to be related back to the OCAI cultures, therefore the distinction was made to look at whether the improvements were about enhancing or decreasing certain culture types. There were more comments than this, but only unique and relevant comments were distilled and coded. The comments were coded the following way: more clan culture, more adhocracy, more market or more hierarchy, less clan culture, less adhocracy, less market or less hierarchy.

OCAI coded	Frequency
Less hierarchy	40
More clan	12
More adhocracy	6
More hierarchy	5
More market	2
Less market	2
Less adhocracy	1

Table 16 - frequency of unique improvement comments based on a culture quadrant.

Less hierarchy, with bureaucracy being one of the underlying variables as well, was a common factor found in the improvement comments. Some comments were plainly "*less bureaucracy*". Some employees only complained about hierarchy, others had opinions on how to improve the culture in a certain direction. One of the improvement comments that summarizes the general opinion of the majority of employees was the following comment on the area of hierarchy and bureaucracy :

"*Inform the staff about long-term changes in management and policies. Faculty and staff are generally informed once decisions have been made. Sometimes I feel that this approach to decision-making is too structured and top-down oriented. Bureaucracy is still a bottleneck. For instance, why do I need my HoP (Head of Pillar) signature to switch the AirCon on in my office if I want to work during the weekend? This is an unnecessary waste of time and resources"*

An example of an employee that favoured a more clan oriented culture was the following comment:

"*Bonding activities are not strongly happening from department to department. Not all bosses think it is important to bring the team together.*"

This is an example of an often described issue; a lack of communication between departments was repeatedly described. A mentioned solution for this was the bonding of people, where again communication is the key to cooperation. Another respondent argued the following:

"*Define clear ownership of responsibilities. Many critical areas are not taken care of as the departments involved are not clear who is responsible*."

These three comments were common themes in answers of the employees. Firstly reducing bureaucracy and hierarchy, secondly better communication between departments and thirdly defining responsibilities for processes or products has to be more clear.

4.3.4 Current perception of SUTD's organisational climate

The answer to sub question 3 *"What are the employees' perceptions of SUTD's current organisational culture?"* is twofold. On one hand the findings of the descriptive statistics suggest that the lowest scoring items on the climate survey were procedural bureaucratic questions. The highest scoring questions were how people perceived their job or the way they work. But as these questions were only descriptive in its essence, an exploratory factor analysis has been executed to examine the difference between department groups in the SUTD.

It was found that when the Faculty department was compared with the Management and support staff, the department scored on average significantly lower on the theme top management and procedures (-0.61), are less content with their immediate supervisor (-0.24), contribute less suggestions (-0.38) and experience the working environment less positively (-0.46). They felt more motivated in their job than Management and support staff (0.71).
When the Faculty department was compared with Researchers, they scored significantly lower on

the theme top management and procedures (-0.37), are less content with their immediate supervisor (-0.95) and experience the working environment less positively (-0.37). They felt more motivated in their job than the Researchers (0.50), and experienced their department better (0.63).
As for the Management and support staff department versus Researchers, immediate supervisory is experienced in a worse way (-0.71). The Management and support staff department does feel like they can give more suggestions for improvements (0.31) and they experience a better department (0.86).

The qualitative part of the results analysed the open comments that were gathered in the survey. The outcome of positive aspects of the organisation was that the employees value the innovativeness of the organisation highly, hereby showing a dominant characteristic of the adhocracy culture. The characteristics of the organisation that were found to be positive were mainly clan culture related characteristics. The dominant characteristics, organisational glue, strategic emphasis and organisational leadership were experienced in a family style. The improvement suggestions for the organisation were predominantly focussed on decreasing hierarchy (and bureaucracy) in the organisation as well as increasing collaboration, and thus the clan culture, and finally the adhocracy culture. This corroborates with the outcome of the descriptive data where procedures and improvement was found to be the lowest scoring variable of the climate survey.

Chapter 5 – Discussion, recommendations and limitations

5.1 Discussion

The main purpose of this longitudinal case study was to examine if the organizational culture of SUTD has been transformed after the use of the OCAI-Spilter tool and the subsequent change-management type interventions that were introduced in the last few years. In order to examine this the following research question was formulated: "What factors can be identified that lead over the last few years to the current perception of the organisational climate of the SUTD?"

This thesis started with embedding the research of Lee (2015) in describing the development of the IT artefact Spilter that could help by speeding up organisational change. The Spilter tool resulted in an efficient and effective way in explicating organisational culture and in identifying gaps between perceived current organisational culture and the desired culture. All internal stakeholder of the university that participated in the 2013 OCAI perceived the organisational culture to be hierarchical but they preferred a family-like culture: the clan culture. The outcome of the 2016 OCAI with senior management of SUTD assessed that the gap between current and preferred clan culture has closed in comparison with 2013 implying that there is indeed a more family-like culture in the university. However, the gap between the current and preferred hierarchical culture has increased in the same time span. There still is a prevalent gap between the current and preferred adhocracy culture, whereas the preferred market culture is almost in the preferred state. Based on this outcome, the university's clan and adhocracy culture should be improved and the amount of amount of hierarchical culture should be decreased in the future.

The results of the climate survey of late 2016 show that the employees are dissatisfied with the bureaucracy of the university. When the inferential statistics are examined, it becomes clear that there are differences between how the 3 employee groups experience the organisation. It was found that when the Faculty department was compared with the Management and Support staff, the department scored on average significantly lower on the theme top management and procedures, are less content with their immediate supervisor, contribute less suggestions and experience the working environment less positively. Their internal motivators were higher than that of the Management and Support staff group. When the Faculty department was compared with Researchers, they scored significantly lower on the theme top management and procedures, they were less content with their immediate supervisor and experience the working environment less positively. They scored higher in their internal motivators than the Researchers group, and experienced their department better. The Management and support staff department value their immediate supervisor less than the Researchers. The Management and support staff group does feel that they can give more suggestions for job improvements and they are more satisfied with their department than the researchers.

Even though no statistical causation or correlation between organisational climate and business reengineering efforts can be inferred, both the workforce and senior management finds the clan culture to have improved over the last few years. The current organisation is however still experiencing a high level of bureaucracy and hierarchy.

A first possible explanation for this is the lack of depth in the business process reengineering efforts that were suggested by employees in the inventorizing stage of the Spilter tool as well as in the 'culture conversations' of June 2016. Two examples of this are the following improvement suggestions: *'openness for new ways of thinking by management and staff and critically evaluate effectiveness of current processes'* and '*reduce unnecessary paperwork'*. These suggestions on processes could have been more specific concerning what department, which people or what

process specifically can be improved. Therefore, the role of the facilitator in a Spilter session is important, as this person can create the right depth for the BPR solutions. The OCAI-Spilter tool was designed to gather anonymous data which could have provided a solution for the cultural differences in decision making, mainly because conflict avoidance is in general exerted in Asian societies (Quaddus & Tung, 2002). This lack of depth in improvements could have been prevented by appropriate guidance by the facilitator in the GDSS session. This same situation happened in the summer of 2016 with the culture conversations that took place. These culture conversation were not anonymous and therefore it did not contribute to the openness and experience of trust by employees. Therefore the generic improvements that were suggested by employees could have been anticipated and prevented: both by proper facilitation and by using the Spilter tool differently. Another explanation for this could be the unforeseen strength of the Confucian culture in the organization and in Singapore as a country (Lee, 2015, p. 136) as explicated by Hofstede and Hofstede (2001) and by House et al. (2004). The hierarchical distance from employees to management is high, just as the collectivism which entails harmony and agreement as opposed to assertiveness in organisation. This hierarchical distance could withhold employees of opening up to their superiors if they see potential for innovation. A repetitive use of the Spilter-tool could give more insight as to how and whether the anonymity function of the tool will improve future improvement efforts in the university.

Elaborating on the hierarchy culture, the influence of country culture on the organisation's culture is in line with other findings in this study as it became clear that participative leadership is not the right type of leadership for an organisation in a Confucian society. The first illustration of this is the fact that senior management did not respond to the HR department's request to provide BPR suggestions for the organisation. According to the HR director of SUTD, the nonresponse can be explained by lack of the appropriate type of leadership by the president of SUTD. The leadership style of the university's president was identified as being participative. This is however the least preferred leadership style in a Confucian society (House et al., 2002; Jiang & Cheng, 2008). Paradoxically however, the participative leadership style (see chapter 2.1.3) is the type that is compatible with the clan culture that SUTD *was* aiming for. This type of high-quality LMX relationships is however more effective in horizontal-individualistic cultures (Rockstuhl et al., 2012, p. 1105). The need for this role-based type of leadership corroborates with the current stage of the university in organisational growth model of Greiner (1972). As the university is a relatively young organisation the current stage of SUTD would be one where growth through direction is needed (see graph 3). As the organisation expands, there is more need for management and clear guidance. Besides that, clear policies and standardization of processes are needed. Therefore the current situation of the university is one where growth through direction and the delegation of responsibilities to lower levels is needed.

The third topic in this discussion is about the employee group 'Researchers', which is not a distinction by department but by employee function. As this employee group consists of several departments there may be a difference amongst the researchers groups, but for the purpose of anonymity these smaller groups cannot be identified. However, there is a general division in two sections; one is the research group that works in an independent research centre and the other one is the group of researchers that work in a research department embedded in a pillar (EPD, ESD, ASD, ISTD). While the reporting channels for the independent research centres go directly to the respective Head of Department (HOD) of research centres, the researchers working under a pillar have to report to the head of the faculty, and the faculty then reports to assistant provost. Therefore a plausible and first explanation for the dissatisfaction by many of the faculty members: they are displeased with the hierarchical reporting procedures. This corroborates with the longitudinal research of Snizek and Bullard (1983), according to their study an increase in hierarchy of authority leads to a decline in job

satisfaction. The second explanation for the differences in satisfaction between the researchers department and the faculty department is that the researcher can do their own research since they take care of their own funding. The faculty's influence on their job is lower since they have to educate the students and are bound to the parameters set by the university's standards.

5.2 Recommendations for future research

Due to the fact that this research operated on the intersection of business management, psychology and IT there are several opportunities for future research. First of all, the OCAI-Spilter tool should be tested and re-tested in other organisations as well as so to assess the longitudinal effectiveness of the tool. By assessing the organisational culture, applying the BPR suggestions and retesting the organisations improvements in a systematic way the effectiveness of the OCAI-Spilter tool can be truly assessed. Secondly, the OCAI-Spilter tool should be tested with all employee groups rather than specific groups. Even though the OCAI has been validated by Cameron and Freeman (1985), it was validated for the management of an organisation. It could be interesting to validate difference in perception between management and work-floor employees. Another recommendation for future research is to examine how effective the Spilter tool is in larger organisations with more employees. This should examine how scalable the BPR suggestions are when combined with prioritization. Finally, the effectiveness of the OCAI-Spilter tool should be validated in more countries to assess differences between country cultures. In that case the outcome of an OCAI can be generalized to a broader population than for instance specifically a young university operating in a Confucian society.

5.3 Organisational recommendations

First of all, the model of Panayotopoulou et al. (2003), as treated in Chapter 2.2, will be used to advise on organisational recommendations. The first recommendation, based on the Human Relations Model/ clan culture, is to achieve more empowerment in the lower levels of the organisation as this will improve the clan culture. The second recommendation is based on the Open Systems Model/ adhocracy culture and applies to the research departments: allocate them with the purchasing of external resources (with less approval from above) as so to empower them. The third recommendations based on this model is that for the Internal Process model/ hierarchy culture. Since the hierarchical culture is the most prevalent culture, the HRM department should focus on continuous improvement of processes. By re-engineering internal procedures many of SUTD processes' can become more efficient with for instance more standard operating procedures. Finally, the Rational Goal Model/ market culture can be applied to the faculty members in SUTD as so to make the organisation more Market culture oriented. Productivity measurements on performance by monitoring faculty's output, for instance student results, can be put in place as so to gain productivity and efficiency increase. This can be achieved by incentive rewarding as so to stimulate this behaviour.

For the next organisational recommendation, the role of leadership for culture change in a Confucian society is stressed. As elaborated in 2.1.2 and 2.1.3 the president of SUTD should be a Performance-Oriented leader, both Charismatic and Team-Oriented, but should not exert a participative leadership style. Employees should be managed to follow the role obligations that are expected of them. Although this is contrary to the clan oriented culture that the organisation aspires, and moreover is opposing the hierarchy improvement efforts of SUTD, it is in line with the second stage of the organisation growth model of Greiner (1972). In phase two of this model the expending organisation is in need of direction and new structures of delegation need to be in place. Therefore, as a result of the perceived bureaucracy and hierarchy in the organisation, it is recommended to follow a contingent approach on the formalization of tasks. The formalization of highly repetitive tasks should result into satisfaction of employees (Snizek & Bullard, 1983). And vice versa, when non-

routine tasks are too formalized this can result into negative outcomes: this lack of empowerment can lead to dissatisfaction and demotivation (Adler & Borys, 1996, p. 65).

The climate survey of 2016 anonymously assessed employee's perceptions of the organisations. But the OCAI of 2016 was only administered under senior management. This means that no objective measurement of organisational culture was administered amongst the lower level employees. The Spilter tool could have contributed by anonymously providing the prioritization of change management initiatives from a bottom-up perspective. Because of cultural differences, an employee may be agreeable and avoid other opinions in obtrusive and face to face situations with superiors (Hofstede & Hofstede, 2001). In future assessments of organisational culture it is recommended to (make more) use (of) the anonymous function of the OCAI-Spilter tool, so that employees may feel safer to contribute change initiatives. By administering an OCAI on a frequent basis under all employees, for example once every quarter or every half year, it may be possible to enhance the organisational culture in a faster and more reliable approach.

5.4 Limitations

The first and most important limitation of this study was the fact that the first study of Lee (2015) had already taken place, the business reengineering efforts had taken place as well and the content of the climate survey had been designed beforehand too. Due to fear of survey-fatigue this research was executed with the climate questionnaire that was already planned, rather than designing a new questionnaire or using another organisation-wide OCAI. A scientifically developed and proven questionnaire could have contributed to test-retest reliability, external validity and other types of validity. This research could have been more elaborate but because of time restrictions it was limited to working with this available questionnaire and its outcome. Besides this, Schein (2010, pp. 159-161) summarizes the following reasons to why the use of employee surveys as culture measures can be a problem:

- Not knowing what to ask;
- Employees may not be motivated to be honest;
- Employees may not understand the questions or interpret them differently;
- What is measured may be accurate but superficial;
- The sample of the employees surveyed may not be representative of the key culture carriers;
- The impact of taking the survey will have unknown consequences, some of which may be undesirable or destructive.

A second and very relevant limitation was that, due to the fact that anonymity was guaranteed by outsourcing the climate questionnaire to the external consultancy firm ORC, the data was collected and distributed by them. As a result of that anonymity commitment to the university, the external firm did not provide all available data for this research/ thesis. The gender, tenure, age and unique department variables were missing variables in this study. Besides this, according to an employee of the external consultancy firm ORC (*name undisclosed for anonymity reasons*), 'statistical significance tests are adopted as proxy indications of the reliability of survey results to provide an assessment of the reliability of the surveys'. This implies that the survey used in this research has not been validated. The reliability of the survey was confirmed by means of the Cronbach's Alpha (0,966). The same limitation applies for the reliability of the questions as well: these were selected from a questions database as provided by the external consultancy firm. Therefore it is unknown what the scientific base is for these questions. A further limitation is the fact that this thesis deals with two different measurement concepts: the validated culture measurement instrument OCAI and a climate

survey that *was meant to measure the progress of the university towards achieving an adhocracy culture*. However, the concept climate survey is not a scientific validated instrument. Therefore objectively measuring the culture difference between 2013 and 2016 was a impossible since it deals with different concepts.

Another limiting factor for the climate survey is that of non-response. Even though 54% person of SUTD's employees responded to the survey, it is plausible that unsatisfied people avoided answering the questions. As non-respondents can experience a lower job satisfaction, supervisor satisfaction and even possess greater intentions to quit (Rogelberg, Luong, Sederburg, & Cristol, 2000), it can heighten the probability of statistical biases (Tomaskovic-Devey, Leiter, & Thompson, 1994). However, Baruch and Holtom (2008) reported a stabilized response rate in employee surveys of 48%. When the 54% response rate of this study is compared with the average response rate of 48% reported by these authors, the response rate in SUTD was higher.

Another limitation of this study was the descriptive statistics of the climate survey that showed how employees experience bureaucratic issues as the most negative part of the organisation. However, the outcomes expressed in absolute numbers was still relatively modest: there were no extreme low or extreme high outcomes on average. The mean scores of these questions were between 2,71 and 4,30. Therefore the response of the employees may have been conservative, this corroborates with Rockstuhl et al. (2012), who noted that surveys filled in by Asian cultures have less extreme rating scale outcomes than Western cultures that complete surveys.

Lastly, since this research is a case study the external validity of this research is unknown as the generalizability of the findings are not researched. The reliability of the climate survey's measures was confirmed by the Cronbach's alpha. The construct validity of this research is low since the factor analysis found that several variables could be loaded on other factors. Cross-loadings in the factor analysis remained inevitable regardless of the solutions suggested by Hair et al. (2009, pp. 117-118). Therefore, it was decided to continue working with cross-loaded variables. And finally, the test-retest reliability of this research is unknown even though this case study had a longitudinal dimension. In order to determine the test-retest reliability it is needed to test and re-test the OCAI-Spilter tool in more organisations in a methodical and longitudinal procedure.

Chapter 6 - Conclusion

This paper provides empirical evidence of an unique IT-tool that can ameliorate and speed up organisational change in an institute of higher education. By combining an Organisational Culture Assessment Instrument (OCAI) with a Group Decision Support Software into an online tool, the culture of an organisation together with organisational improvement can be assessed in a scalable and efficient way. This OCAI-Spilter tool was developed in the study of Lee (2015) at the Singapore University of Technology and design, that study formed the baseline for this current paper.

The findings of this study provide support that between 2013 and 2016 the gap between the current and preferred *clan* culture of the university decreased. This finding is supported by an OCAI that was filled in by the senior management of the university in 2016. Also this is supported by statements provided by the university's employees in the climate survey. Further findings were that the gap between the current and preferred *adhocracy* culture increased. The gap between current and preferred *market* culture is still small, however, the gap between the current and preferred *hierarchical* culture is substantial. Table 17 summarizes the OCAI results and differences.

Type	Current culture mean 2013	Current culture mean 2016	Preferred culture mean 2013	Preferred culture mean 2016
Clan	24.51	24,70	30.09	28,33
Adhocracy	23.19	22,32	33.33	36,17
Market	19.54	21,05	21.87	20,61
Hierarchy	32.45	31,93	14.63	14,89

Table 17 - difference between OCAI values 2013 and 2016 of senior management.

The outcome of a factor analysis combined with an MANOVA shows that there are differences between how the three department groups experience the organisation. A possible explanation for the difference between the Faculty staff, Researchers staff and the Management and Support staff is bureaucracy and hierarchy: the core of the organisation feels limited by the support department which has too many processes and management layers in place to do their job effectively. It was found that despite the business reengineering efforts that took place at the university, the hierarchical culture is still prevalent. One of the remaining questions is whether this hierarchy is due to the culture of the university, or a result of the Confucian country culture. For future efforts focused on improving the organisational culture a role-based type of leadership can be suitable because of the Confucian society (Jiang & Cheng, 2008). Another solution can be found in the organisational growth model of Greiner (1972): to grant employees more autonomy. The following comment made by one of the employees' in the climate survey illustrates the issue that was caused by the expansion of the organisation: "d*efine clear ownership of responsibilities. Many critical areas are not taken care of as the departments involved are not clear who is responsible*." This comment supports the argument of ambiguity in the organisation leading to the fact that processes take a substantial amount of time because of issues going from department to department without being solved.

All in all, this case study provides a fundamental basis for further research on the OCAI-Spilter tool. For further research the scalability of the tool should be examined together with longitudinal research to assess how the assessment of culture, inventorizing of improvements and implementation of improvements influences the organisational culture. Finally, this longitudinal case study provides a basis for and illustrates how organisations can enhance organisational culture by using a novel IT-tool in combination with change management.

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Appendix I – The OCAI:

The Organizational Culture Assessment Instrument (Cameron & Quinn, 2005)

1. Dominant Characteristics		**Now**	**Preferred**
A	The organization is a very personal place. It is like an extended family. People seem to share a lot of themselves.		
B	The organization is a very dynamic entrepreneurial place. People are willing to stick their necks out and take risks.		
C	The organization is very results oriented. A major concern is with getting the job done. People are very competitive and achievement oriented.		
D	The organization is a very controlled and structured place. Formal procedures generally govern what people do.		
	Total		
2. Organizational Leadership		**Now**	**Preferred**
A	The leadership in the organization is generally considered to exemplify mentoring, facilitating, or nurturing.		
B	The leadership in the organization is generally considered to exemplify entrepreneurship, innovating, or risk taking.		
C	The leadership in the organization is generally considered to exemplify a no-nonsense, aggressive, results-oriented focus.		
D	The leadership in the organization is generally considered to exemplify coordinating, organizing, or smooth-running efficiency.		
	Total		
3. Management of Employees		**Now**	**Preferred**
A	The management style in the organization is characterized by teamwork, consensus, and participation.		
B	The management style in the organization is characterized by individual risk-taking, innovation, freedom, and uniqueness.		

C	The management style in the organization is characterized by hard-driving competitiveness, high demands, and achievement.		
D	The management style in the organization is characterized by security of employment, conformity, predictability, and stability in relationships.		
	Total		

4. Organization Glue		**Now**	**Preferred**
A	The glue that holds the organization together is loyalty and mutual trust. Commitment to this organization runs high.		
B	The glue that holds the organization together is commitment to innovation and development. There is an emphasis on being on the cutting edge.		
C	The glue that holds the organization together is the emphasis on achievement and goal accomplishment. Aggressiveness and winning are common themes.		
D	The glue that holds the organization together is formal rules and policies. Maintaining a smooth-running organization is important.		
	Total		
5. Strategic Emphases		**Now**	**Preferred**
A	The organization emphasizes human development. High trust, openness, and participation persist.		
B	The organization emphasizes acquiring new resources and creating new challenges. Trying new things and prospecting for opportunities are valued.		
C	The organization emphasizes competitive actions and achievement. Hitting stretch targets and winning in the marketplace are dominant.		
D	The organization emphasizes permanence and stability. Efficiency, control and smooth operations are important.		
	Total		

6. Criteria of Success		Now	Preferred
A	The organization defines success on the basis of the development of human resources, teamwork, employee commitment, and concern for people.		
B	The organization defines success on the basis of having the most unique or newest products. It is a product leader and innovator.		
C	The organization defines success on the basis of winning in the marketplace and outpacing the competition. Competitive market leadership is key.		
D	The organization defines success on the basis of efficiency. Dependable delivery, smooth scheduling and low-cost production are critical.		
	Total		

A Worksheet for Scoring the OCAI

NOW Scores

	1A
	2A
	3A
	4A
	5A
	6A
	Sum (total of A responses)
	Average (sum divided by 6)

	1B
	2B
	3B
	4B
	5B
	6B
	Sum (total of B responses)
	Average (sum divided by 6)

	1C
	2C
	3C
	4C
	5C

	1D
	2D
	3D
	4D
	5D

	6C
	Sum (total of C responses)
	Average (sum divided by 6)

	6D
	Sum (total of D responses)
	Average (sum divided by 6)

PREFERRED Scores

	1A
	2A
	3A
	4A
	5A
	6A
	Sum (total of A responses)
	Average (sum divided by 6)

	1B
	2B
	3B
	4B
	5B
	6B
	Sum (total of B responses)
	Average (sum divided by 6)

	1C
	2C
	3C
	4C
	5C
	6C
	Sum (total of C responses)
	Average (sum divided by 6)

	1D
	2D
	3D
	4D
	5D
	6D
	Sum (total of D responses)
	Average (sum divided by 6)

Appendix II – Climate survey, invitation to participate

Dear colleagues,

We have come a long way since our inception from the early days of 2009. We have created, from whole cloth, an innovative curriculum and teaching approach, a first class research program, attracted top flight students, faculty, and staff, and developed and populated a wonderful campus. We are at the brink of securing accreditation for our undergraduate programs, and we have worked collectively to create a strong and supportive Clan and Innovative Culture. I hope that, like me, you are proud of what we have accomplished.

On occasion, it is good to take stock, in particular concerning our work environment. What is working and what we could do better? In this spirit, we would like to hear from all of our faculty and staff through an employee climate and satisfaction survey. We would benefit by learning how you feel about working in SUTD, and to understand your level of satisfaction and engagement with every facet of the university. To ensure that the survey is as meaningful as possible, we would like to hear from everyone. So, please take a few minutes to provide your input.

We are aware that confidentiality in completing a survey is important to everyone. To that end, we have employed an independent research organisation, ORC International, to collect and analyse the data. ORC International belongs to the Market Research Society and is bound by their strict Code of Conduct and confidentiality rules. ORC International will not report back results that could be traced to an individual or groups of less than 5 respondents. We encourage you to be honest and open when completing the survey.

Once the data and reports are ready in January 2017, we will share the results with everyone so you can see for yourself how we are doing. In the months after the survey, based on its feedback, we will work with you to build upon what is working, improve problematic areas, and continue to refine our culture.

We would like to obtain 100% participation in order to ensure every person's voice is heard. The survey will be open for 3 weeks from 21 November to 9 December 2016. So when you receive the survey request at the end of the month, please give it your prompt attention.

Thank you for devoting your time and providing candid input.

My very best,

Tom Magnanti

Appendix III – Climate survey questions

	Core Values	Category	Questions
1a		My job	I understand what is expected of me to do well in my job
1b		My job	I have necessary authority to do my job effectively
1c		My job	I have the resources (equipment, training, budget, etc) I need to do my job well.
1d		My job	I have access to all the information I need to do my job effectively
1e	Creativity	My job	I believe that one of my responsibilities is to continually look for new ways to improve the way we work
1f	Passion	My job	I have the opportunity to make good use of my skills and abilities
1g	Passion	My job	I am sufficiently challenged and motivated in my work
1h	Passion	My job	I understand how my work contributes to the success of SUTD
1i	Passion	My job	My work gives me a feeling of personal accomplishment
2a		Well-Being	I am satisfied with my physical working environment at SUTD
2b		Well-Being	I am satisfied with the various employee activities and events that are organised to promote my well-being
2c		Well-Being	I am satisfied with the recreational facilities available at SUTD
3a	Leadership	My immediate supervisor	My immediate supervisor behaviour consistently reflect core values (Leadership, Integrity, Passion, Collaboration, Creativity)
3b	Leadership	My immediate supervisor	My immediate supervisor provides regular feedback that helps me improve my performance.
3c	Leadership	My immediate supervisor	My immediate supervisor motivates and inspires me to be more effective in my job
3d	Leadership	My immediate supervisor	My immediate supervisor communicates effectively
3e	Leadership	My immediate supervisor	My immediate supervisor acknowledges my contribution
3f	Leadership	My immediate supervisor	My immediate supervisor creates a collegial and supportive environment.
4a	Leadership	My department/pillar	In my department/pillar, my HODs/HOPs allows me to change the way we do things in order to become more effective
4b	Creativity	My department/pillar	Head of department/pillar is willing to act on suggestions to improve how things are done
4c	Creativity	My department/pillar	My team is encouraged to come up with innovative solutions to improve the way we work

4d	Collaboration	My department/pillar	My department/pillar gets the cooperation it needs from other departments to achieve its work objectives
4e	Collaboration	My department/pillar	In my department/pillar, everyone are willing to help each other even if this means doing something outside their usual activities
4f	Collaboration	My department/pillar	In my department/pillar, we generally acknowledge one another's efforts and achievements
4g		My department/pillar	Decision making processes work effectively in my department/pillar
5a	Leadership	Leadership	Top management (i.e. Provost/President/BOT) challenges the status quo by empowering the team to make improvements in processes and policies
5b	Leadership	Leadership	I believe that the decisions and behaviours of senior management (i.e. HOD/HOPs and above) are consistent with the organisation's core values (Leadership, Integrity, Passion, Collaboration, Creativity)
5c	Leadership	Leadership	I believe the senior management team (i.e. HOD/HOPs and above) has a clear vision for the future of this organisation
5d	Leadership	Top management (i.e. Provost/President/BOT) manages change effectively	
6a		Change & Communications	I am kept well informed about matters affecting me
6b		Change & Communications	I have the opportunity to contribute my views regarding changes that affect my job
6c		Change & Communications	I can make suggestions for improvement
6d		Change & Communications	I am given room to make improvements happen
7a		Perceptions of the Organisation	Procedures are effectively streamlined in SUTD
7b		Perceptions of the Organisation	We are encouraged to take risks to improve the effectiveness of SUTD's processes
7c	Integrity	Perceptions of the Organisation	I think it is safe to speak up and challenge the way things are done in SUTD
7d	Integrity	Perceptions of the Organisation	I feel that everyone is treated fairly
7e		Perceptions of the Organisation	In my workplace, everyone is treated with respect.
7f	Integrity	Perceptions of the Organisation	I am given opportunity to voice my opinion
7g	Leadership	Perceptions of the Organisation	Everyone in SUTD tries to minimize or eliminate unnecessary bureaucracy

7h		Perceptions of the Organisation	I would recommend this organisation as a great place to work
7i		Perceptions of the Organisation	I would be happy to recommend SUTD as a place to pursue continuing education
7j		Perceptions of the Organisation	I intend to be here the next 12 months
7k		Perceptions of the Organisation	It would take a lot for me to leave this organisation
		Open Comment	What is the best thing about working here?
		Open Comment	How would you improve the working environment?

Appendix IV – Change Management Efforts

Yearly update 2014:

OCAI Tracker 2014- Strategic Management Meeting updates after retreat

To enhance Clan Culture:

- Streamline activities because of too many demands on staff and faculty time
    1. Consolidate the number of audit sessions
    2. Re-org R&R for better allocation of load
    3. Review department management schedule
    4. Learn to work with limited headcount
    5. Incorporated BOT UG Taskforce follow-ups into SMM to minimize the need for additional committee(s)
    6. Adjusted the bottoms up faculty projections to be aligned with FY
    7. Refine internal review process for SUTD-ZJU research proposals by involving senior faculty members instead of Pillar Heads which is currently practiced
    8. Further automate and revamp online mailing list system to include CV upload of interested PhD students and direct access of database by Pillar reps
    9. Refine postdocs application process by having 2 deadlines in the yearly call
    10. Refine PhD admission process in the selection of shortlisted candidates by having predefined guidelines
    11. Automate process of subject selection and iProject by ZJU students by working with our webmaster to create online form for students to select their inputs
    12. Create an IT FAQ in SUTD Central

To enhance Adhocracy Culture:

- Respect for views of others and respect others
    1. Encourage sharing & ownership of ideas, e.g. at department Meetings; Administrative Taskforce
    2. Listen to users
    3. Collaborative initiatives, e.g. new joint graduate program website
    4. Worked with MOE to provide PRF requirements as early as possible, which were then disseminated to Divisions immediately so that they are kept updated
- Review and consolidate work activities to remain focused on goals
    1. Set clear admissions strategy
    2. Discussions at department meetings
    3. Worked with MOE to provide PRF requirements as early as possible, which were then disseminated to Divisions immediately so that they are kept updated
    4. Department retreat to brainstorm on innovative ideas and foster team bonding
    5. Prioritize projects and work plans according to university's needs and resources
- Foster innovation by developing innovative processes & reengineering existing ones to build an innovative culture
    1. Automate processes to reduce paperwork, e.g. automate the Performance Appraisal Framework and Talent Management Framework.
    2. Do away with submission of hard copy MC to HR.
    3. Staff only needs to apply through HRMS.
    4. To shorten AP payment turnaround time
    5. Improve application process

6. Enhance interview experience
7. Develop new ideas to engage offerees
8. Keeping up with changes & demands of users
9. Provide Horizon Scans to SMM so that we can keep closer watch on the university landscape and develop innovative responses
10. Foster innovative spirit and independence in students, e.g. getting students to make logistical arrangements for exchange in ZJU on their own under broad guiding parameters
11. Allocation of PhD scholarships with an objective and systematic framework and reward faculty/Pillars for excellent research achievements as well as secure strong SC PhD students
12. Automated work-flows using online forms

2015 Yearly update

OCAI Tracker 2015: during the retreat employees who volunteered to champion efforts

To enhance Clan Culture:

6. "Be Happy" Hour, including Sports & recreation
7. Create an Intellectually vibrant & Open campus for students & faculty
8. Promote flexible working system
9. Bringing faculty & staff kids together

To enhance Adhocracy Culture:

10. Foster innovation by – Organizing Annual Innovation Festival (for All) – including celebrating experiments & entrepreneurial accomplishments
11. Encourage revenue & resource generation as part of entrepreneurship culture
12. Design process of space allocation that is transparent and efficient
13. Manage fit of scholarship nominees with donor-scholarship
14. Harmonising the admission process for under-grad and post-grad programmes.
15. Reduce time taken to select and make an admission offer (target 3 to 5 days) after interview
16. Design a more innovative learning space in the library because it is becoming popular with students and has generated good well amongst parents and visitors
17. Performing Arts
18. Improve quality of communications amongst the Leadership Team

OCAI Tracker 2015 – Reminder of progress from last year

The only new activity on the schedule to enhance Clan Culture:

- Streamline activities because of too many demands on staff and faculty time.
  1. Re-organised the shared services for some of the HR processes, e.g. application of EP, etc.

Appendix V - Climate survey descriptive statistics

Number	Question	Mean	Standard deviation
1a	I understand what is expected of me to do well in my job	4,18	0,692
1b	I have necessary authority to do my job effectively	3,77	0,938
1c	I have the resources (equipment, training, budget, etc) I need to do my job well.	3,63	0,928
1d	I have access to all the information I need to do my job effectively	3,57	0,927
1e	I believe that one of my responsibilities is to continually look for new ways to improve the way we work	4,30	0,697
1f	I have the opportunity to make good use of my skills and abilities	3,96	0,808
1g	I am sufficiently challenged and motivated in my work	3,91	0,872
1h	I understand how my work contributes to the success of SUTD	4,13	0,773
1i	My work gives me a feeling of personal accomplishment	4,01	0,794
2a	I am satisfied with my physical working environment at SUTD	3,77	0,936
2b	I am satisfied with the various employee activities and events that are organised to promote my well-being	3,63	0,931
2c	I am satisfied with the recreational facilities available at SUTD	3,51	1,021
3a	My immediate supervisor behaviour consistently reflect core values (Leadership, Integrity, Passion, Collaboration, Creativity)	4,04	0,871
3b	My immediate supervisor provides regular feedback that helps me improve my performance.	3,82	0,933
3c	My immediate supervisor motivates and inspires me to be more effective in my job	3,83	0,962
3d	My immediate supervisor communicates effectively	3,89	0,967
3e	My immediate supervisor acknowledges my contribution	4,03	0,896
3f	My immediate supervisor creates a collegial and supportive environment.	4,00	0,923
4a	In my department/pillar/centre, my HOD/HOP allows me to change the way we do things in order to become more effective	3,86	0,836
4b	My HOD/HOP is willing to act on suggestions to improve how things are done	3,90	0,869
4c	My team is encouraged to come up with innovative solutions to improve the way we work	3,86	0,834
4d	My department/pillar/centre gets the cooperation it needs from other departments to achieve its work objectives	3,42	0,959
4e	In my department/pillar/centre, everyone is willing to help each other even if this means doing something outside their	3,83	0,929
4f	In my department/pillar/centre, we generally acknowledge one another's efforts and achievements	3,87	0,863

4g	Decision making processes work effectively in my department/pillar/centre	3,61	0,923
5a	Top management (i.e. Provost/President/BOT) challenges the status quo by empowering the team to make improvements in processes and policies	3,40	0,944
5b	I believe that the decisions and behaviours of senior management (i.e. HOD/HOPs and above) are consistent with the org	3,55	0,915
5c	I believe the senior management team (i.e. HOD/HOPs and above) has a clear vision for the future of this organisation	3,58	0,921
5d	Top management (i.e. Provost/President/BOT) manages change effectively	3,46	0,887
6a	I am kept well informed about matters affecting me	3,39	0,959
6b	I have the opportunity to contribute my views regarding changes that affect my job	3,51	0,930
6c	I can make suggestions for improvement	3,72	0,899
6d	I am given room to make improvements happen	3,62	0,927
7a	Procedures are effectively streamlined in SUTD	2,71	1,071
7b	We are encouraged to take risks to improve the effectiveness of SUTD's processes	2,94	0,992
7c	I think it is safe to speak up and challenge the way things are done in SUTD	3,08	1,051
7d	I feel that everyone is treated fairly	3,25	1,045
7e	In my workplace, everyone is treated with respect.	3,80	0,908
7f	I am given opportunity to voice my opinions	3,73	0,868
7g	Everyone in SUTD tries to minimize or eliminate unnecessary bureaucracy	2,74	1,193
7h	I would recommend this organisation as a great place to work	3,60	0,834
7i	I would be happy to recommend SUTD as a place to pursue continuing education	3,76	0,826
7j	I intend to be here the next 12 months	3,96	0,860
7k	It would take a lot for me to leave this organisation	3,48	0,930

Appendix VI - Rotated Component Matrix PCA with component loadings

Factor	1	2	3	4	5	6	7
Number	Top manage-ment and procedures	Immediate supervisor	Motiva-tors	Room to express opinion	Depart-ment	Hygiene factors	Resource availability
5d	,782						
5c	,771						
5a	,762						
5c	,759						
7g	,696						
7b	,672						
7a	,643						
7c	,621						
6a	,504			,411			
7d	,502						
7h	,465		,443				
7k	,437		,507				
4d	,408					,404	
7i	,403		,505				
3f		,834					
3d		,826					
3c		,823					
3a		,831					
3b		,813					
3e		,766					
4g		,443			,529		
7e		,403					
1i			,751				
1g			,690				

1h			,684				
1f			,675				
7j			,629				
1a			,498				
1e			,480				
1c			,435				,470
6c				,793			
6d				,729			
6b				,705			
7f				,658			
4a					,715		
4b					,703		
4c					,605		
4e					,582		
4f					,560		
2c						,717	
2b						,678	
2a						,552	
1d							,500
1b							,404
Eigen-value:	**18,145**	**3,833**	**2,158**	**1,696**	**1,488**	**1,203**	**1,112**
% of Variance	**41,239**	**8,712**	**4,904**	**3,854**	**3,381**	**2,734**	**2,528**