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Mens et Manus et Singapura: Culture, Localization, and Institutional Identity in a Singaporean-American Higher Education Partnership

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A Thesis Presented to the Faculty
of the Graduate School of Education of Harvard University
in Partial Fulfillment of the Requirements
for the Degree of Doctor of Education

2018

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To all of my friends
in the Little Red Dot.

Acknowledgements

First, I would like to express my gratitude to my wonderful dissertation committee – Richard J. Light, Fernando Reimers, and Jon Van Maanen – for their support and thoughtful feedback throughout the process of conceptualizing, researching, and writing this dissertation. I am so grateful and humbled that such an impressive group of scholars were willing to devote their time and energy to helping me grow as a researcher, and the completion of this dissertation certainly would not have been possible without their guidance, support, and eagerness to help me to reach my academic and professional goals. In addition to my dissertation committee members, I am also thankful to James Antony, Elizabeth Dawes Duraisingh, Thomas Hehir, and Howard Gardner for providing me with opportunities to grow as a teacher and a scholar during my time at Harvard. This work would also have not been possible without institutional funding and support from both the Harvard Traveling Fellowship and the National Science Foundation Graduate Research Fellowship.

Although I complete this dissertation as a requirement of the Harvard Graduate School of Education, this work is in many ways a product of my time at MIT, where an amazing group of scholars, mentors, and friends introduced me to the crazy, stressful, and inspiring world of "the university building business." In particular, I would like to express my gratitude to Sanjay Sarma and John Brisson, two amazing mentors who have consistently motivated, empowered, and advocated for me over the last six years. Sanjay, when we met six years ago you changed the course of my life (for the better); John, my family and I so thankful for your guidance and support in getting me to Singapore (and getting me back home again, a bit sooner than expected).

To allow a researcher to poke their nose into one's organization is always a risk, and I am so grateful to the members of the "SUTD Family" who welcomed me to campus with open arms, in particular Tom Magnanti, Martin Dunn, and Pey Kin Leong, my consistent advisors and advocates at SUTD. Over my fifteen months in Singapore, the faculty, staff, and students of SUTD became colleagues, mentors, and friends, and I cannot overstate the gratitude I feel towards both SUTD and the country of Singapore, whose policies enabled both the telling of this amazing story and the continued well-being of my right lung.

When I moved to Singapore to begin the fieldwork for this dissertation, I had no idea that I would build an incredible and inspiring community of friends during my time overseas, finding a group that would ultimately make the tropical island of Singapore feel just as much like home as the wintry streets of Cambridge, Massachusetts. To Lucinda Law, Tara Dankel, Faith Bogue, Rozina Bashir, Nick LaPort, Camille Bouverot, Macauley Kenney, Andrea Abbate, Samson Lim, and all my other friends from the land of the majestic Merlion: thank you for inviting me on your adventures and welcoming me into your wonderful worlds—Singapore would not have been the same without all of you!

As my time as a student (finally) draws to a close, I am blessed to graduate with an incredible group of loving and supportive friends from my (numerous) higher education institutions. Without the Old Wolves from Michigan, the TPP 13's from MIT, and my cohort-mates from HGSE, writing this dissertation would have been a near-insurmountable task, and I am grateful to all of you that shared in my adventures and encouraged me along the way—in particular, I owe a great deal to the members of my dissertation writers' support group – Katherine Bercovitz, Charlotte Lloyd, and Justin Stern – who kept me sane while in the deep, dark hole of dissertation writing. And to Raleigh Davis, who fits into none of the

above categories—thank you for being a wonderful friend, a constant source of love and support, and for helping me get perhaps the most atrocious emergency passport in history.

Finally, I would like to express love and gratitude to my amazing parents, Bill Fisher and Joyce Isen, who consistently respond with patience as I insist on gallivanting all around the world both on both professional and personal pursuits. Completing this dissertation was a process of both physical and emotional trials, and every step of the way the two of you were by my side, doing your best to make a difficult situation as good as you could (and providing delightful and cheery feedback when I was too scared to share this dissertation with anyone else). To Dad in particular: I hope you know how much it meant to me that you made your way to Singapore and allowed me to share a bit of my life there with you.

Funding Acknowledgment:

This material is based upon work supported by the National Science Foundation Graduate Research Fellowship under Grant No. DGE1144152. Any opinion, findings, or conclusions or recommendations expressed in this material are those of the author and do not necessarily reflect the views of the National Science Foundation.

Table of Contents

Acknowledgements ii

Table of Contents v

Abstract vii

Introduction 1

Part I: Framing 14

Chapter 1: The Fourth University 15

Chapter 2: Beyond "02139" – MIT and the World 33

Chapter 3: To a Conceptual Design 53

Part II: Founding 70

Chapter 4: The SUTD Pioneers 71

Chapter 5: Getting to "11:1" – Building a Faculty and Research Agenda 93

Chapter 6: Finding the Risk Takers – Campus Building and the "Pioneer Batch" 112

Part III: Formation 143

Chapter 7: Combatting the Paper Chase – Developing SUTD's Pedagogy, Curriculum, and Academic Culture 144

Chapter 8: "Stay Up 'Til Dawn" – Creating the SUTDent Culture 172

Chapter 9: "Its Campus will be in Changi" – Building and Managing a Cross-Border Campus 204

Part IV: Future 228

Chapter 10: ~~Established in Collaboration with MIT~~ 229

Conclusions and Epilogue 245

Appendix A: "Cast" of Characters 260

MIT Faculty, Staff, and Students 260

SUTD Trustees, Faculty, and Staff 260

SUTD Students and Alumni 261

Appendix B: List of Acronyms and Abbreviations 263

Appendix C: MIT, SUTD, and Me – My History with the MIT-SUTD Collaboration ... 265

References 268

Abstract

Over the last few decades, the field of higher education has experienced a rise in the prevalence of cross-border higher education (CHBE) partnerships, including in student exchange, collaborative research, and development of cross-border programs and institutions. The largest CBHE projects are those in which one university aids in development of a new institution in a different national context, either in the form of an international branch campus or a new, degree-granting institution.

In this dissertation, I examine how institutional culture and identity are communicated from the "sending" institution in one such cross-border partnership, as well as the processes by which local actors at the "receiving" institution modify and adapt these practices to fit the local cultural, political, and educational context. The site for this study is the Singapore University of Technology and Design (SUTD), a technical university established in collaboration with the Massachusetts Institute of Technology (MIT). Using the data collection and analysis techniques of organizational ethnography, the findings of this dissertation are based upon 20 months of observational fieldwork on the MIT and SUTD campuses, as well as 95 formal research interviews with 89 stakeholders across the two institutions.

The findings of this study show that the development of SUTD occurred in four distinct stages – framing, founding, formation, and moves towards the future – and that localization processes occurred differently during the university's various stages of development, as well as depending on the extent to which original framers at MIT prioritized different aspects of the collaboration. Across all stages of the university's development, local actors shaped the culture and identity of SUTD to operate and legitimize the institution within the Singaporean higher education ecosystem, aligning the university's practices and institutional narrative with the economic and cultural priorities of Singaporean policymakers, business leaders, and prospective students and their parents.

Introduction

"Universities are singular institutions. They have common historical roots, yet are deeply embedded in their societies."- Philip Altbach (1998, p. 3)

At 9:10 AM on the third Friday of term, Massachusetts Institute of Technology (MIT) Professor Joyce Williams gazes across her largely empty classroom, currently occupied by 19 of the 52 students she expects for her 9:00 AM freshman chemistry-biology class session. Clearly familiar with the characteristic tardiness of undergraduates, Joyce calls to her co-instructors at the back of the classroom, asking if they're fine with beginning the class, despite the morning's poor attendance. After receiving their support, Joyce launches into her prepared slides at a frenetic pace, whipping through an overview of DNA structures in preparation for the class's first exam the following week. At points, her delivery clearly outpaces the students' comprehension, as a few students timidly raise their hands to ask for clarification or rephrasing of key concepts.

As she lectures, Joyce paces around the large classroom, which is filled with small clusters of tables and chairs and designed to enable the MIT-designed pedagogical approach of Technology Enhanced Active Learning (TEAL). White boards and projection screens line the walls of the room and every piece of furniture is on wheels, enabling students to flexibly form groups to tackle in-lecture problems or larger lab activities. At this early hour, the room is scattered with the remnants of the previous day's classes—worksheets and school sweatshirts litter the large tables, and a small 3-D printer hums in the back of the classroom, producing a black shell-like prototype for a student's class project.

Over the next hour, sleepy students walk one by one through the classroom's back door, taking their places in clustered tables around the room, opening their laptops to the week's slides, and logging in on their computers or smartphones to Learning Catalytics (LC),

an MIT-designed real-time assessment system, through which they submit answers to the many competency check questions Joyce asks during lecture. By 10:30, the class has reached near-full attendance – 45 users have logged in to LC – and the class breaks for a hands-on lab activity, in which small groups of students use chemical processes to extract DNA from fruits, filling out worksheets as they progress through the activity's steps.

Although Joyce delivers the class material as if it is well established, this class is, in fact, still largely experimental, and is being taught only for the second time. The brainchild of one of Joyce's MIT colleagues, this course is the result of a faculty initiative to re-think chemistry and biology education, integrating interconnected content from two freshman core classes into a cohesive whole, rather than teaching related concepts within the two distinct subjects. As such, the course's teaching team is still in the process of perfecting the course's content—according to one of Joyce's co-instructors, last year's first-year students struggled to deeply connect some of the biology and chemistry content in the course, issues that she hoped would be corrected by the adjustments they made to the syllabus this year. Regardless of the broader outcomes of the course, today's class has clearly been a success—as the session wraps up just before noon, small groups of students excitedly show me Ziploc bags and test tubes filled with mucus-like banana and strawberry DNA, handing Joyce their completed worksheets as they walk out the door to grab lunch at the campus cafeteria.

This course – designed and delivered by MIT faculty, using MIT technologies and an MIT-developed pedagogical approach – is in many ways a quintessential educational output of MIT, an institution that prides itself on boundary breaking and innovation in both research and education. Perhaps the most boundary breaking aspect of this course, however, is that Joyce Williams is not teaching this introductory chemistry-biology class at MIT;

rather, she is teaching at the Singapore University of Technology and Design (SUTD), at a small start-up university 10,000 miles from Cambridge, Massachusetts.

As will become clear over the course of this manuscript, Joyce Williams' freshman chemistry-biology class is but one small component of an almost decade-long collaboration between MIT, the university that would eventually become SUTD, and the Singapore Ministry of Education. In this dissertation, I examine this collaboration as a whole (from its roots in the Singapore Government as early as 2007 to late 2017, the time of this writing) in an effort to examine how MIT's institutional identity, educational practices, and administrative processes were communicated and transferred to SUTD, and how local actors in Singapore localized and contextualized these ideas from MIT to better fit the Singaporean educational and cultural context. In this introduction, I seek to situate this study in existing theories from the fields of cross-border higher education (CBHE) and organizational behavior, describe my research methods and my rationale for my data collection approach, and provide a blueprint for the structure of this manuscript.

Although MIT has a broad history of international educational engagement beginning well before the SUTD partnership (as described in Chapter 2), it was by no means the first institution to create educational offerings or collaborations overseas. In the early 1930's, Florida State University began to offer its educational programs to American military and civilian personnel living in the American-controlled Panama Canal Zone, the first known offering of an American higher education program at a location outside of the United States (Lane, 2011). In the near century since "FSU" reached the "PCZ," CBHE offerings have expanded and diversified to a remarkable extent, mirroring the trend of globalization in other areas such as economics and telecommunications and in the field of

higher education more broadly (Barber, Donnelly, & Rizvi, 2013; Stromquist & Monkman, 2000). Today, top universities both within and outside of the United States seek to outpace one another's drive towards internationalization, seeing which institutions can recruit the best foreign talent, provide the greatest diversity of overseas opportunities for undergraduate students, or stake university crest-bearing flags of research or public service around the world[1] (Wildavsky, 2010). Furthermore, CBHE endeavors often prove extremely lucrative for universities as they engage in overseas contexts, bolstering university coffers in an era of decreasing public funding for higher education and research, particularly in the United States[2].

Although cross-border higher education may take a variety of forms, perhaps the most visible (and costly) manifestation of this trend is the development of new cross-border academic institutions, either operating as international branch campuses (IBC's) of a "home" institution or as independent, degree-granting institutions themselves (Wildavsky, 2010). The earliest development of American IBC's dates back to the 1950's, when Johns Hopkins University opened an outpost of its School of Advanced International Studies in Bologna, Italy, a campus which is still in operation today (Lane, 2011). Although a few universities developed and maintained IBCs and cross-border institutions in the 1950's, 60's, and 70's, the first major wave of American IBC development occurred in Japan during the 1980's, when American universities sought to leverage opportunities to expand into the world's

---

[1] Looming over this internationalization arms race, of course, is yet another product of higher education's trend of globalization: worldwide rankings of colleges and universities (Wildavsky, 2010).

[2] It has been reported, for example, that New York University (NYU) received an initial gift of $50 million from the government of Abu Dhabi to begin talks to create a branch campus in the United Arab Emirates, in addition to the funding it received to actually construct and operate this institution after an agreement to do so had been reached (Redden, 2014).

then-fastest growing economy (Lane, 2011; Umakoshi, 1997). In the 1990's, the number of IBCs experienced tremendous growth, as French, Australian, Mexican, Chilean, Irish, Canadian, Italian, British, and Swedish higher education institutions began to export their campuses abroad (Lane, 2011). This trend in growth has continued in the first two decades of the 21st century, and as of 2011, over 183 IBCs were in operation worldwide (Lane, 2011).

In addition to these IBC's, over the last 50 years higher education institutions have also aided to develop new, independent colleges and universities outside of their national borders, another example of large-scale CBHE engagement. In these cases, a college or university in one country helps a foreign government – or another nongovernmental entity – create a new, degree-granting institution in another country. One of the earliest examples of this phenomenon was in the 1950's and 1960's, when MIT collaborated with the U.S. Department of State to create new higher education institutions in India and Iran (Leslie & Kargon, 2006). Today, perhaps the best known developer of cross-border institutions is New York University, which has developed two independent, degree-granting "portal" campuses in Abu Dhabi and Shanghai, with plans for future development of a fourth portal institution in Europe (Redden, 2014). Given that these independent institutions don't always bear the names of their collaborative founders, this type of large-scale CBHE is often less visible than the development of IBC's; however, the impact of these institutions is also substantial (Wildavsky, 2010).

Traditional theories of the globalization of higher education paint Western colleges and universities engaging in large-scale CBHE projects such as IBC or cross-border university development as dominant, imperialist actors levying "Western" educational ideals upon their foreign collaborators, who stand at the periphery of the global cultural space (Shils, 1972; Ziguras, 2008). Under this "center-periphery" model, Western institutions sit at

the center of the global higher education marketplace, imposing their values, ideas, and scholarship on less influential countries in a form of educational neocolonialism (Altbach, 1998). In this system, institutions in the countries at the periphery act as consumers of knowledge delivered by the central actors without consideration of the "otherness" of uniquely local ideas, approaches, and methodologies (Altbach, 1998; Young, 1997). Furthermore, this model reinforces a sense of inferiority in the communities at the periphery, which "feel the necessity and obligation to acknowledge the standards – moral, cultural, intellectual and political" of the central actors in lieu of their own (Shils, 1972, p. 357).

In recent years, however, scholars have developed numerous critiques of the center-periphery model, and theoretical – and practical – discussions of CBHE have experienced a shift away from this rhetoric to a post-structural understanding of the processes of and motivations for CBHE partnerships (Amthor & Metzger, 2011). Under this new understanding – which emphasizes difference rather than the hegemony of the Western approach to education – CBHE scholars posit that local actors have individual agency to interpret and modify the Western educational model to fit their local context (Amthor & Metzger, 2011; Montgomery, 2014). Furthermore, under this perspective faculty, staff, and students at an IBC or cross-border institution have agency to actively respond to the homogenizing pressures of globalization, creating a bridge between the norms of the global system and local needs, traditions, and understandings (Amthor & Metzger, 2011; Djerasimovic, 2014; Telafici, Martinez, & Telafici, 2014). As these actors assume these spanning roles, they then, in turn, help to create a unique culture at the IBC or cross-border institution spanning both the global and the local by adapting foreign educational systems and norms to the local context (Amthor & Metzger, 2011; Scott, 1998). This process –

referred to by Appadurai (1999) as "indigenization" – not only provides local actors with agency within the IBC or cross-border college or university, but also serves to create a campus culture and structure compatible with local customs and norms (Amthor & Metzger, 2011). While this process has been theorized in existing conceptual literature, limited empirical work has been conducted to examine this phenomenon in practice.

While limited rigorous empirical scholarship examining localization and indigenization exists in the higher education literature, sociologists and organizational theorists have researched and theorized on these processes for many years, albeit in organizations outside of the higher education space. In her book *Imitation and Innovation: The Transfer of Western Organizational Patterns to Meiji Japan*, for example, D. Eleanor Westney describes how Japanese actors localized and modified Western organizational models for policing, postal systems, and newspapers as they imported these institutions into Meiji Japan, asserting (1987, p. 6):

> Where cross-societal organizational emulation is concerned, the distinctions between copying and inventing, between imitation and innovation, are false dichotomies: the successful imitation of foreign organizational patterns requires innovation. All organizations must draw on the surrounding environment for resources and must respond to the external demands for their products or services. Since the environment in which the organizational model was anchored in its original setting will inevitably differ from one to which it is transplanted, even the most assiduous emulation will result in alterations of the original patterns to adjust them to their new context, and changes in the environment to make it a more favorable setting for the emerging organization.

DiMaggio and Powell's seminal work on institutional isomorphism in organizational fields similarly supports the idea of indigenization and localization processes in cross-border higher education, as the isomorphic mechanisms posited by these scholars would theoretically serve to drive CBHE institutions towards the institutional norms of the local higher education system (DiMaggio & Powell, 1983). Thus, theoretical justification for the existence of these

processes similarly exist in the organizational and sociological literature, further supporting the rationale for empirical work in this realm.

In this manuscript, I seek to empirically illuminate these processes of localization and indigenization in cross-border higher education through a deep examination of a cross-border partnership between MIT and the Singapore Ministry of Education to create SUTD, the university described in the opening pages of this manuscript. To this end, I seek to address the following research questions: *During the creation of a new cross-border higher education institution, how are the culture and identity of the sending institution: (a) communicated to and adopted at the new cross-border institution, and (b) adapted to fit the local cultural and educational context?* By illuminating these processes, I hope to both contribute to theoretical understanding of localization and indigenization in the realm of CBHE as well as to inform good practice in global higher education moving forward.

Given the scope and nature of my research questions, I turned to the qualitative research method of organizational ethnography (Ybema, Yanow, Wels, & Kamsteeg, 2009), utilizing the research strategies of this method to study the MIT-SUTD Collaboration. Over a 20-month period – from January 2016 to August 2017 – I lived, worked, and observed on MIT and SUTD's campuses, attending and participating in classes, meetings, campus gatherings, coffee dates, and any other event to which I could wrangle an invitation. The episodes and environments described in these pages are drawn from my field notes documenting these observations and informal conversations, as well as from 95 formal research interviews conducted with 89 stakeholders across the two campuses (see Table 1 below). In addition, I also collected numerous documents pertaining to the collaboration and the development of SUTD, including planning documents, press coverage, syllabi,

student work, and advertising materials, among many others—in time, these archival materials would guide my work as it shifted away from traditional ethnography and towards the discipline of social history, as described in the paragraphs below. All of these varying data sources contributed to and are represented within the final narrative presented here.

Table 1

MIT and SUTD Stakeholders Participating in Formal Research Interviews

Institution	Trustees	Senior Administrators*	Faculty** & Lecturers	Administrative Staff	Students & Alumni
SUTD	2	15	15	7	18
MIT	0	3	12	6	11
Total (N = 89)	2	18	27	13	29

Note. Of the MIT stakeholder interviews, data from a previous research study (see Fisher, 2015) were incorporated for 8 interviewees (5 faculty, 2 senior administrators, and 1 staff member); in addition, two of these individuals were also re-interviewed for this project.

*Those listed as "Senior Administrators" held titles such as President, Vice President, Provost, or Associate Provost or served as the head of departments or academic units (designated as "Senior Management" at SUTD).
**Two individuals designated as "SUTD Faculty" were in fact former faculty when interviewed, having moved on from SUTD to positions at other universities.

In the story of SUTD, there are numerous characters – faculty, staff members, and students – who played important roles in shaping SUTD to the university it would ultimately become. In this manuscript, I include a subset of these characters, most of whom have been assigned a pseudonym (see Appendix A for a full list of these names), with the exception of several public figures[3] whose real names are used in this manuscript, given that their identities could be easily determined by even the most casual of Internet searchers. As stakeholders familiar with SUTD would likely recognize descriptions of many of the

[3] These public figures are: Singaporean Prime Ministers Lee Kuan Yew and Lee Hsien Loong, Singaporean President Tony Tan, Singaporean Education Minister Ng Eng Hen, MIT Presidents Rafael Reif and Susan Hockfield, founding SUTD President Thomas Magnanti, and founding Chairman of the SUTD Board of Trustees Philip Ng.

individuals closely involved with the project (not all of whom participated in formal research interviews), in some cases I have also developed "composite" characters, comprised of several individuals with similar roles within MIT or SUTD. In all cases when direct quotes are attributed to individuals in this manuscript, these characters are composites—this strategy was used in an effort to protect the identities of those who participated in formal interviews for this study, per my approval conditions set by the Harvard and SUTD Institutional Review Boards (IRBs)[4]. In addition, in some cases the quotes have been lightly edited to remove any identifying information that may have compromised the confidentiality of my informants. Finally, it is also worthwhile to note that not all individuals who contributed to the founding of SUTD appear in this manuscript, as practical considerations in constructing a logical narrative limited the extent to which I could mention or describe all individuals important to this project, particularly in the case of SUTD's early students.

As with any qualitative research, throughout the processes of data collection, data analysis, and composition of this manuscript, I have been forced to confront my role and perspective in both the environments in which I performed observations and within the MIT-SUTD Collaboration as a whole[5]. In line with accepted qualitative research methods, I included reflexive memos within my field notes, and also sought opportunities to reflect on my experiences with other stakeholders from both MIT and SUTD. To ensure that the findings of this study are firmly grounded in my particular perspective, I have also sought to

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[4] In addition, the SUTD IRB also required that I provide my interviewees with the option to have neither their role nor their institution identified in this manuscript—in these cases, the individual is referred to as an "affiliate."

[5] For various periods from 2012 to 2016, I served as an official staff member of the MIT-SUTD Collaboration office, first as a graduate research assistant and instructor and then as a program manager for one of the MIT-SUTD summer exchange programs. To ensure transparency in my reflexive process in performing this research, I have included a full account of my formal involvement with the MIT-SUTD Collaboration in Appendix C.

place myself as a character within this manuscript, attempting to avoid the tempting but problematic construct of the "objective" researcher. Furthermore, as a qualitative researcher I did not view my role as one of judge or assessor of what I observed; rather, I sought to integrate myself into the SUTD community as much as possible in an effort to best represent the experiences of the members of the institution. Thus, while I shy away from judgments or evaluations of the practices I describe in the body of this work (firmly believing it is not my place to make such assessments), I have included a set of key takeaways my research in this manuscript's conclusion, which might be of particular interest to practitioners of CBHE.

Finally, unlike with many organizational ethnographies, the story of the development of SUTD cannot be told entirely in the present; rather, as my data collection progressed I discovered that one must go back to 2007 – two years before the agreement to develop SUTD was signed by MIT and the Singapore Ministry of Education – to understand how the Singaporean context modified MIT's approach to undergraduate education as it was transferred across the Pacific. Thus, during my period of fieldwork this project evolved from a pure organizational ethnography to a blended social history, and the early chapters of this thesis were developed primarily through document analysis and retrospective interviews with stakeholders familiar with that period of SUTD's development. When possible, I triangulated interviewees' recollections with archival documents and press coverage; however, this type of formal documentation was not always available, and in some cases the narrative presented here relies solely on informants' recollections of the past.

This manuscript is organized into four parts, corresponding to the stages and processes of development of SUTD. Developed through emic analysis of my data informed

by literature on organizations, these parts chronicle SUTD's history, from its original conception to the present day (and beyond). As with most ethnographies and social histories, the sections of this dissertation are meant to be read as a full manuscript, rather than as independent articles or parts.

Part 1 of this manuscript, "Framing," examines how the priorities of both the Singapore government and stakeholders at MIT combined to create a plan for Singapore's fourth university, which would ultimately become SUTD. In the chapters of this section, I discuss how both Singaporean and MIT values and interests shaped the vision for SUTD, demonstrating how indigenization and localization processes affected this project even before the SUTD-MIT partnership was born. Ending with the signing of the official agreement between MIT and the Singapore University of Technology and Design, this section chronicles decisionmaking as it occurred in both Singapore and the United States, illuminating the factors that went into both institutions' decisions to engage in a CBHE partnership.

Part 2, "Founding," turns to the individuals who lived and worked at SUTD in its first years, from 2009 (when the first SUTD staff were hired by the Ministry of Education) to 2012 (when the first class of undergraduate students matriculated at the institution). Founders play an integral role in the formation of organizational culture, often leaving such a strong legacy that their impacts on organizational culture may prove unchangeable over time (Schein, 2010). This section chronicles the faculty, staff, and students who comprised the SUTD community at the very beginning, exploring how these individuals were brought to SUTD and how they sought to shape the new university, further localizing the SUTD vision to fit the Singaporean context.

Part 3, "Formation," provides three examples of how localization and indigenization processes occurred as Singaporean actors modified the MIT approach to better fit the particularities of the Singaporean context. The three aspects of the university described in this section's three chapters – curriculum and pedagogy, student life and culture, and the design and operation of the physical campus – illustrate how localization occurred at SUTD differently depending on the extent to which MIT planners prioritized a particular aspect of developing the campus. In high priority areas such as the technical curriculum and the school's pedagogical approach, MIT faculty provided a hands-on, collaborative role as local actors modified and adapted practices; in contrast, in low priority areas such as the development of the physical campus, MIT actors left decisionmaking to their Singaporean colleagues, only attempting to modify practices after it became clear that they were misaligned to the values of MIT.

Finally, Part 4, "Future," examines how SUTD aims to build legitimacy within the Singaporean institutional context as it gradually reduces its formal partnerships with – and reliance on – MIT. As SUTD moves forward without the full weight of its prestigious international partner – as well as without many of its founding intellectual leaders – the university is now faced with the reality of developing an independent identity within the Singaporean higher education ecosystem, competing with far more established institutions in the fight for undergraduate enrollees. Part 4 concludes with a brief conclusory epilogue, in which I provide key takeaways and some comments on the scope and potential impact of this work on the field of cross-border higher education.

Part I: Framing

Chapter 1: The Fourth University

"Singapore has adopted an approach of growing our university sector in tandem with and meeting the needs of our economy." – *Singapore Ministry of Education* (2008, p. 9)

> Whereas it is the inalienable right of a people to be free and independent, I, Lee Kuan Yew, prime minister of Singapore, do hereby proclaim and declare on behalf of the people and the government of Singapore that as from today, the ninth day of August in the year one thousand nine hundred and sixty-five, Singapore shall be forever a sovereign, democratic and independent nation, founded upon the principles of liberty and justice and ever seeking the welfare and happiness of her people in a more just and equal society. (K. Y. Lee, 1998, p. 13)

With this short radio address, Singapore's founding Prime Minister Lee Kuan Yew announced to the people of Singapore that the country was – suddenly and unexpectedly – its own sovereign nation. In truly unique circumstance, on this day of independence Singapore did not "gain" nor "win" independence; rather, Singapore experienced a forced expulsion from the Federation of Malaysia, ending a two-year merger between the two former British colonies. Alarmed by racial tensions and ethnic differences between the mainland and Singapore[6], by mid-1965 the leadership of the parliament in Kuala Lumpur had deemed the union too fraught to survive, and voted to expel Singapore on the morning of August 9. In the words of Lee Kuan Yew in his 1998 memoirs: "Some countries are born independent. Some achieve independence. Singapore had independence thrust upon it." (K. Y. Lee, 1998).

[6] The Singapore population's ethnic distribution is majority Chinese, with sizeable Indian and Malay minority groups (Singapore Department of Statistics, 2016); in contrast, peninsular Malaysia and Sabah and Sarawak in Borneo – the other states of the 1960's-era Federation of Malaysia – are majority ethnic-Malay, and stakeholder groups from both Malaysia and Singapore experienced tensions related to racial issues during the short-lived period of unification (The Economist Explains, 2015). Perhaps most influential in the Malaysian Parliament's decision to expel Singapore were a series of Chinese-Malay race riots that occurred in the city in 1964, which further aggravated Kuala Lumpur's existing concerns concerning the ethnically and culturally diverse city.

At its time of independence, Singapore was by no means the economic giant that it is today—to the contrary, Singapore was, in essence, a small trading port with no natural resources and little industry to speak of (Chua, 1995). Furthermore, the means by which Singapore had gained independence in itself fostered uncertainty and the potential for instability, as the country suddenly found itself to be an independent nation with no military, no national government, and no formal diplomatic relations with any other country (K. Y. Lee, 1998). Under the guidance and leadership of Lee Kuan Yew's People's Action Party (PAP), however, in its first half century as a sovereign nation Singapore transformed itself into one of the most prosperous economies in the world, and as of 2016 had the world's 5th highest GDP per capita (Central Intelligence Agency, 2017). Through infrastructure, transportation, education, and housing policies designed first and foremost to promote economic growth (Chua, 2006), the PAP was able to transform Singapore – in the words of Lee Kuan Yew – "from third world to first" (K. Y. Lee, 2000).

Every year since 1965, Singaporeans gather together on August 9 to celebrate Singapore—what it is and what it has been, from its tumultuous beginnings to its current economic dominance. Singaporeans hang the country's red and white flag out of their Housing Development Board (HDB) flat windows and watch the National Day Parade – a spectacle of music, artistic performance, and, perhaps most importantly, military might – either live or on television. As part of this celebration, the Prime Minister also uses National Day as a time to address the country, updating Singaporeans on the status of the nation and the prospects of the year ahead.

On the eve of National Day 2008, the Office of Prime Minister (PM) Lee Hsien Loong – Singapore's third Prime Minister and the son of Lee Kuan Yew – released the PM's

annual National Day Message on television and radio stations across the country, undertaking his yearly task of updating Singaporeans on the country's progress and prospects moving forward. Clad in a grey suit, beige shirt, and pink and grey tie, Lee recorded his 2008 address standing on the grounds of the Istana, a lush colonial complex now repurposed as the home of the Singaporean President and the working space of the Singaporean Prime Minister. With the sun-bathed Istana Villa behind him and the faint sounds of birds in the background, PM Lee spoke firmly to the camera, assuring the people of Singapore that despite the looming global financial crisis, Singapore remained economically strong, citing the nation's 4.5% growth in the first half of 2008 and its unemployment rate of 2.3%[7]. Furthermore, Lee emphasized how the Singaporean government's prudent planning in the past would secure continued prosperity in the future, seeking both to quell potential uneasiness brought on by the crisis and reinforce the widely held belief that the government would continue to work thoughtfully and responsibly to ensure the prosperity of its people.

Midway through his remarks, PM Lee turned to Singapore's tertiary education system. In the words of the Prime Minister (H. L. Lee, 2008):

> To upgrade our economy, we must invest in our people, especially through education. We are improving our polytechnics and ITEs [Institutes of Technical Education], where most of our students go. We are also expanding university places. The Government has approved plans for a new publicly funded university. Its campus will be in Changi, with good bus and train access from around the island. It will admit its first intake in 2011. This new university will open up more opportunities for Singaporeans to develop themselves and to advance.

With these words, PM Lee formally announced the commitment of the Singapore government to pursue an initiative that had begun years earlier, and which would ultimately

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[7] A high rate for modern Singapore, albeit astonishingly low for most other countries.

lead to the creation of the Singapore University of Technology and Design. Like most governmental initiatives in Singapore, this original proclamation was framed in terms of the economic opportunities of a new university both to Singaporean citizens individually and to the society as a whole. To fully understand this motivation, however, one must return back to the first years of Singapore, when its early leaders chose to inextricably tie the nation's policies and identity with its potential for economic growth.

When Singapore became independent in 1965, Lee Kuan Yew's government faced the challenge of supporting a population of two million residents in a poor country with no natural resources (K. Y. Lee, 2000). To address this challenge, the Singapore Government – most notably the Economic Development Board (EDB) – developed what Schein (1996) calls a culture of "strategic pragmatism" in its policymaking, leveraging the strategy of "instrumental rationality" (per Chua, 1995) to make policy decisions with the greatest likelihood to promote economic growth. Policymakers justified this approach as follows (per Chua, 2006, p. 107): "Because the island nation has no natural resources, material conditions can only be improved if wealth is created through economic development. From the beginning of its rule, the PAP recognized this; economic pragmatism has been its guiding principle. Every government policy is rationalized and justified by one single measure: whether it enhances the likelihood of economic growth." In turn, this economic growth would ensure continued stability of the nation, ensuring its survival against real and imagined internal and external threats (Chua, 1995).

For the first 30 years of Singapore's history, pragmatic policymaking – in both the EDB and the government more broadly – was considered to be a rousing success both within Singapore and to observers overseas. Given the country's lack of natural resources,

early policymakers in Singapore viewed the country's two million residents at the time of independence as the only resource to create growth; in the words of Lee Kuan Yew, "all of us in the cabinet knew that the only way to survive was to industrialize" (K. Y. Lee, 2000, p. 50). Thus, in the country's early days the EDB worked to attract foreign manufacturers to Singapore, employing the country's citizens in stable industries that at first required little educational attainment, but with opportunities for stable personal income and growth opportunities as productivity increased (P. Brown & Lauder, 2001; K. Y. Lee, 2000). In response to the successes of this approach, the PAP received overwhelming support from Singaporeans in each election, endorsing and encouraging the party's economically pragmatic policymaking (Chua, 1995).

After Singapore began to transition away from its focus on manufacturing and towards knowledge industries in the 1980's and 1990's, demands for higher skilled workers increased, particularly in the fields of banking, finance, chemical processing, and the life sciences[8] (Sidhu, Chong, & Yeoh, 2011). In light of the workforce demands of these emerging industries – as well as the impacts of the Asian Financial Crisis of the late 1990's – the EDB and the Ministry of Education (MOE) responded with the Singapore Government's characteristic pragmatism, modifying the country's education system in an attempt to produce graduates with relevant skills to promote economic growth in these areas (P. Brown & Lauder, 2001). In this period, higher education opportunities grew and diversified, policies were enacted to attract foreign talent, and the country's higher education institutions were imbued with principles of competition to promote excellence, leading to a competitive system of "centralized decentralization" designed to improve overall quality

[8] Fields prioritized as part of the "cluster-based approach" recommended by the Singapore Economic Review Committee in the 1990's (Sidhu et al., 2011).

through competition between institutions (M. H. Lee & Gopinathan, 2004; Mok, 2008). Thus, although the PAP's pragmatic approach is reflected in numerous social and economic policies, it is particularly relevant to the field of education, as described further below.

While the guiding principle of pragmatism originally grew from PAP social and economic policies after Singaporean independence, it has since grown out of the political realm and into the greater Singaporean ethos, becoming an implicit cultural value of Singaporean society more broadly (Chua, 1995). According to Singaporean sociologist Chua Beng-Huat (1995, p. 68):

> In the first two decades of the PAP regime, this pragmatism has been systematically elaborated and articulated to become a fleshed-out conceptual system that governs the regime's administrative policies and strategies. […] It has also penetrated the consciousness of the population and has come to serve as the conceptual boundaries within which Singaporeans think through significant portions of their daily life.

Given the importance of disciplined labor in Singapore's early industries, the incredible economic success of the new nation in the latter half of the nineteenth century was facilitated by the creation of "a new social order characterized by instrumental rationality and a population with strong achievement motivation" (Chua, 1995, p. 105), cultural traits that persisted even as the economy of the country has changed. Today, this culture of pragmatism imbued in Singapore's citizenry is reflected perhaps most of all in their approach towards education, as the educational achievement of a child is viewed not only as a reflection of the family, but as a necessity for the familial clan's – and the nation's – continued prosperity, as discussed below.

As an outsider arriving in Singapore, the Singaporean primary and secondary school system appears complicated, despite its obvious clarity to anyone educated within it[9]. Designed as a complex series of "pathways" corresponding to the potential needs, skill levels, and interests of a given Singaporean student, the system is segmented into three distinct stages – primary, secondary, and post-secondary – with benchmark examinations between each (see Figure 1 below) (Singapore Ministry of Education, 2016). Singaporean education is designed first and foremost to operate as a strict "meritocracy" at each stage, with the highest scoring students (as measured by the PSLE, O-level, and A-level examinations) receiving slots at the most prestigious institutions at the subsequent educational level (Chua, 2006), and the remaining students provided with technical or vocational options. In the words of Chua (1995, p. 62), "The system has by now been finely tuned to identify the different levels of 'abilities' of each cohort of students, and to stream them into different levels of basic and technical/vocational education, in line with estimated demands for the different levels of technical needs of an industrial economy." In other words, the system as a whole functions to develop productive human capital at levels proportional to the needs of the Singaporean economy, again reflecting the pragmatic, economically-oriented approach of the PAP government.

[9] As my student interviewees explained to me, patiently and repeatedly.

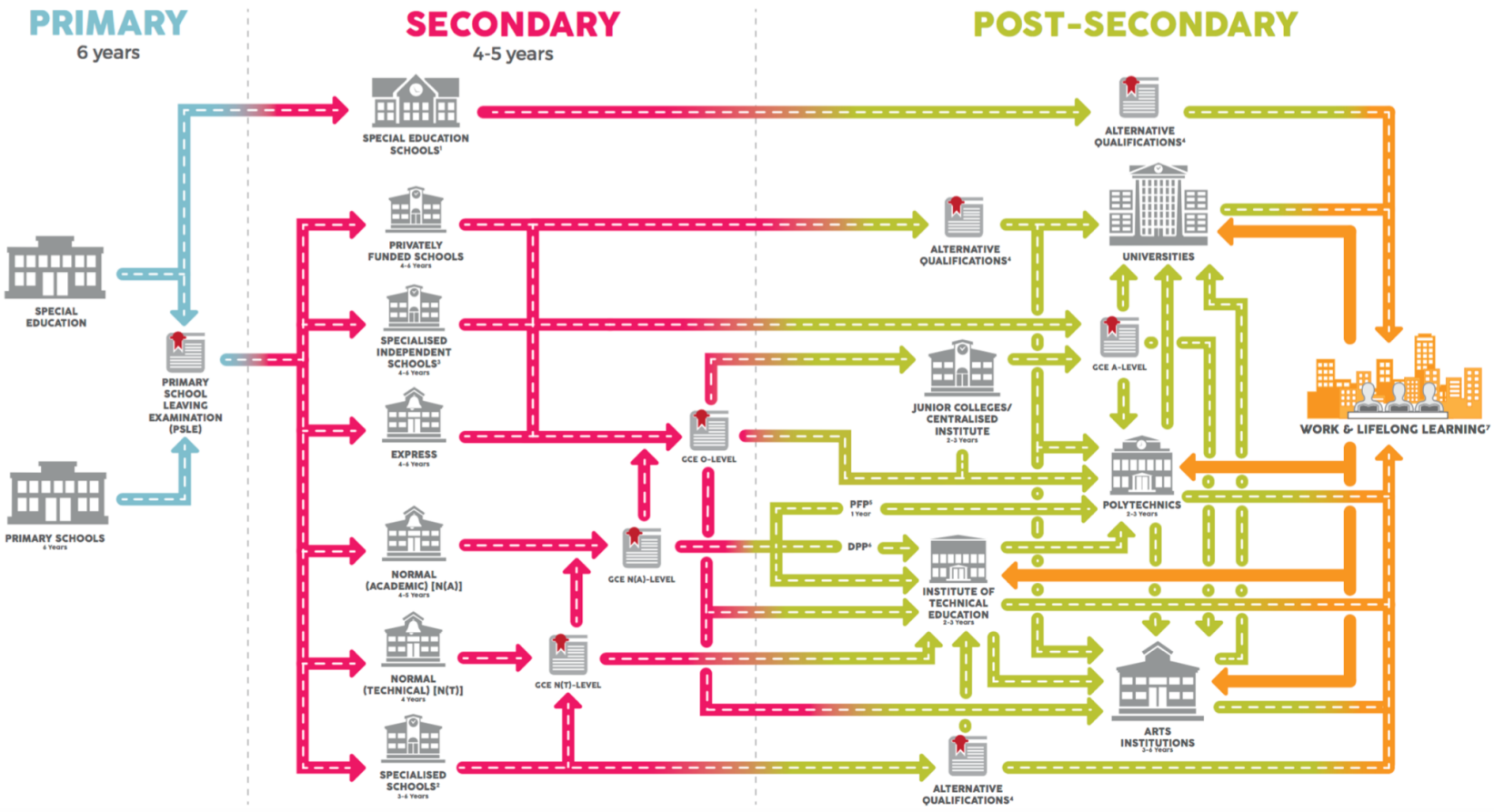

Figure 1. An overview of Singapore's many public education pathways, from primary to post-secondary education (from Singapore Ministry of Education, 2016, pp. 1–2). For the purposes of this narrative, it is not necessary to understand each pathway in depth; rather, the reader should simply understand that said pathways are numerous and complex, and that places at the nation's universities are generally reserved for students attending junior college or polytechnic institutions at the postsecondary level.

After making their way through primary and secondary school, most Singaporeans ultimately bound for university enroll in one of the country's twelve Junior Colleges (JCs) based on the results of their O-level examinations. In these schools – which can be roughly compared to high schools in the United States – they follow either the General Certificate of Education (GCE) A-level curriculum[10] or an International Baccalaureate (IB) program in preparation for their university entrance exams ("Post-Secondary Education," 2014). Although students are required to take modules across disciplines when enrolled in a GCE A-level program, most students who plan to pursue engineering or science courses[11] at university will primarily focus on math and science during their time in JC, generally only taking one humanities or social science "contrasting subject," as these topics are deemed "impractical" by many Singaporeans[12]. Upon completing the JC curriculum, students sit for A-level examinations, the results of which will determine which universities – and which courses within those universities – they are eligible to attend[13].

While JC graduates make up the majority of students at Singapore's universities, some Singaporean students also hail from the country's five polytechnic schools, or "polys" in the local vernacular. In contrast to the theoretically grounded A-level curriculum offered

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[10] Given Singapore's colonial history, the secondary system bears its primary influence from the British educational model, particularly in regards to system-wide examinations; however, American and European educational approaches have also had some influence on the educational system's structure, particularly at the post-secondary level (see Altbach, 1998).
[11] In Singapore, a "course" refers to a "course of study," referred to in the United States as a "major" or "concentration."
[12] From Chua (2006, p. 107): "Accordingly, education expenditure must emphasize a productive workforce, not 'intellectual' training, so science and technical education are emphasized over arts and humanities."
[13] Most Singaporean universities admit their students almost entirely based on A-level or polytechnic diploma results, eschewing the "holistic" admissions approach favored by top American universities. This reliance on examination results reflects the accepted Singaporean principle of "meritocracy" in the educational system through the use of data-driven comparisons of student quality.

at the Junior Colleges, polytechnic education is applied, with hands-on experiences in fields such as architecture, information technology, engineering or business meant to prepare students to enter the workforce directly upon graduation[14]. Unlike their peers from Junior Colleges, graduating polytechnic students do not sit for A-level examinations at the conclusion of their programs; rather, poly graduates who wish to attend university apply only with their polytechnic "diploma" and a cumulative grade point average.

In 2007, it was these polytechnic graduates presenting a perceived challenge to the functioning of the Singaporean tertiary education system. Although 15% of poly graduates in 2007 secured enrollment at Singapore's three autonomous universities[15] – the National University of Singapore (NUS), Nanyang Technological University (NTU), and Singapore Management University (SMU) – the public and policymakers believed that many interested in pursuing these opportunities were unable to secure entry, instead pursuing postsecondary education overseas (Peh, 2007). Said one August 2007 article in *The Straits Times*, Singapore's daily newspaper (Peh, 2007):

> The current situation has led to some unhappiness. Even though the universities increased the number of places, there was some fretting over admissions earlier this

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[14] Although it may seem like a useful comparison, polytechnics are not entirely analogous to community or technical colleges in the United States, as Singapore also has three "Institutes of Technical Education" (ITEs) offering programs in fields such as culinary arts, nursing, marine engineering (to service the domestic oil and gas industry), and the like. As per the education pathways illustrated in Figure 1, students may enroll in an ITE either as a step between primary school and a polytechnic or as a final educational experience before entering the workforce.

[15] In Singapore, the term "autonomous" is used in lieu of "public" in official communications to denote universities supported by the Ministry of Education. Although subject to oversight, these institutions are meant to be "autonomous" in their ability to design and deliver their educational programs, allowing them "to better compete in the global environment, and become world-class institutions" (Ministry of Education, 2008, p. 1). Reframing NUS and NTU as "autonomous" institutions was part of a larger series of Singaporean higher education reforms in the late 1990's, which were meant to promote innovation in the sector by adjusting the university management structures to be more "business-like" (Ng & Tan, 2010).

> year because there were more applicants as well. Mr Lee [Hsien Loong] recounted what MacPherson MP [Member of Parliament] Matthias Yao had told him about two constituents, a couple whose two children did well in polytechnic and went to Australia for their degrees and remained there. 'So two old folks alone at home[16], feeling bereft, empty nest,' said Mr. Lee.

In response to this oversaturation of the tertiary education market, at his National Day Rally speech in August 2007, PM Lee announced that the government would commit to increasing the national university cohort participation rate, perhaps through the creation of a fourth publicly funded university, an idea that had been discussed within the Ministry of Education and its affiliated committees as early as 2001 (M. H. Lee & Gopinathan, 2004). This measure was justified as a means to provide opportunities for these deserving students interested in pursuing higher education – and eventual employment – domestically, but who were currently excluded from NUS, NTU, and SMU. In his words (H. L. Lee, 2007):

> We aim to raise this [enrollment rate] now to 30 percent of the cohort in publicly-funded universities by 2015. We set a new target—from now to 2015, we have eight years, we will push it up from the current 23 per cent to 30 per cent and this means that we will have 2,400 more university places every year for our students. This also means that we should build a fourth publicly-funded university. […] I think it is the right thing to do because the existing universities are already rather large. We shouldn't expand them further. We need to develop a fourth institution with its own character, unique strengths, different from NUS or NTU or SMU; just as when SMU came along, it was not just NUS or NTU, but something different now, it has got its own character and its own pulling power. We may not limit ourselves to just one new institution. We could open more than one route. […] With these changes in our schools and higher education, Singaporeans can look forward to more opportunities to receiving a first-class education—more pathways to success.

Never a government to rush to policymaking without evidence and expert guidance, PM Lee's 2007 proclamation was concurrently released with the commissioning of a

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[16] Singapore's aging population has made the well-being of the country's elderly a particular focus of government policies and awareness campaigns; in addition, collectivism and orientation towards the familial clan are also strong Singaporean values, reflecting the Confucian influence on the cultural system. Given these factors, this image of lonely empty nesters would particularly pull at the heartstrings of the average Singaporean newspaper reader.

committee – called the Committee on the Expansion of the University Sector (CEUS) – to develop specific recommendations to reach PM Lee's enrollment goal. Composed of leaders of industry, Singapore's existing higher education institutions, and government ministries[17], this committee released its recommendations in late July 2008, just before the government formally authorized creation of the fourth autonomous university (Ministry of Education, 2008). While the CEUS report did make some recommendations pertaining to Singapore's existing universities[18], the focus of this report was the recommendation to establish a fourth public university, as per PM Lee's initial statements at the National Day Rally a year earlier (Ministry of Education, 2008). Based on data collection from both Singaporean stakeholders and high achieving university systems around the world, the CEUS recommended that the Ministry of Education seek to open a mid-sized university of 2,000-2,500 students per undergraduate cohort, which would offer programs in Design and Architecture, Engineering and Applied Sciences, and Business and Information Technology (Ministry of Education, 2008). In the Committee's words (2008, p. 22): "The Committee envisages that the new university could develop flagship programmes within each disciplinary area that would support the key growth areas for Singapore's economy." As with so much policymaking in Singapore, this report showed that this new institution would be explicitly designed to create graduates to fill the needs Singapore's current and future industries, demonstrating yet again the Government's commitment to developing an education system with economically pragmatic outcomes in mind.

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[17] Perhaps most revealingly, this group included the Managing Director of the Economic Development Board (the government body responsible for ensuring investment and economic growth in Singapore), as well as representatives from both the Ministry of Manpower and the Ministry of Trade & Industry.

[18] Notably, to explore creation of a Liberal Arts College as part of NUS, an endeavor that would ultimately result in the launching of Yale-NUS Liberal Arts College in 2011.

In addition to its recommendations regarding course offerings of the fourth university, the CEUS provided specific recommendations for pedagogical and content streams at the new institution, yet again based on feedback with Singaporean industrial partners. First, CEUS recommended that the new university's academic programs be interdisciplinary, as "jobs in the future will not only require a deep knowledge of a particular specialisation [sic], but also the ability to integrate knowledge across disciplinary lines" (Ministry of Education, 2008, p. 19). Citing the comparative ease with which a new institution may develop interdisciplinary programs when compared to an existing university, the Committee recommended that the fourth university's interdisciplinary efforts stretch across the academic programs, including in interdisciplinary course work, interdisciplinary project teams (included a suggested interdisciplinary capstone project), and interdisciplinary centers to consolidate research and academic efforts (Ministry of Education, 2008). Furthermore, the CEUS suggested that the fourth university's undergraduate academic programs include some collaboration with industry partners in the realms of both education and research, in an effort to ensure that the new institution "produces graduates who are more work-ready upon graduation" (Ministry of Education, 2008, p. 21). Finally, the CEUS recommended that entrepreneurship be included as a component of the university's core curriculum to "equip students with the skills and mindset to discern and seize opportunities, and to turn ideas into new value propositions," going so far as to recommend that the campus include incubator space for potential faculty and student start-ups (Ministry of Education, 2008, p. 21).

This particular drive towards entrepreneurship as an educational outcome perhaps explains the Ministry's choice to develop a new institution, rather than expanding the existing offerings at NUS, NTU, and SMU. While each of these institutions had experienced

remarkable successes in their own rights[19], some Singaporean stakeholders viewed their graduates as technically sound but not producing the entrepreneurial and innovative offshoots required to expand the economy[20], according to individuals familiar with the decisionmaking process. Thus, the CEUS recommended that that the expansion to the university sector should provide "diverse pathways" for students not well served by NUS and NTU's traditional models of education (Ministry of Education, 2008, p. 10), a similar rationale to that which had been used to justify SMU's establishment eight years earlier[21] (Ng & Tan, 2010). In this case, the "pathway" created by the fourth institution would serve to provide an education that produces graduates inclined towards entrepreneurial endeavors in the information and technology sectors, contributing to those areas of the Singaporean economy identified as governmental priorities in the new century (Mok, 2008).

With the decision made to diversify the higher education sector with a new, groundbreaking institution unlike any other in the Singaporean system, MOE – and the fourth university's steering committee – then turned to its next challenge: how to go about creating it.

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[19] NTU, for example, was ranked 13th in QS's 2016 Global University Rankings, after jumping an astounding 26 places between 2014 and 2015 (Nanyang Technological University, 2017); the same year, NUS was ranked 12th (National University of Singapore, 2017).

[20] Even the Singapore-MIT Alliance of the early 2000's – another governmental initiative to produce innovation in the higher education sector – was perceived as failing to produce entrepreneurial graduates at the desired level (Sidhu et al., 2011).

[21] Furthermore, the approach of developing a new institution also would also align with the Government's strategy to create "internal competition" in the Singaporean higher education sector, an approach of the Ministry of Education since the early 2000's and an additional rationale for the creation of SMU (Mok, 2008).

Like in many aspects of Singaporean economic ecosystem, the country's higher education sector has been in some ways defined by its global partnerships; while EDB employees spent the country's first decades wooing global leaders in banking, finance, and chemical production to come to Singapore, representatives across the government also liaised with some of the world's best higher education institutions, hoping that these universities would similarly invest their expertise in the country (Sidhu et al., 2011). In 1997, when Singapore established SMU, the nation's third autonomous university, the MOE turned to the University of Pennsylvania's Wharton School as a collaborator to develop this institution[22], tapping Wharton Professor Janice Bellace as SMU's first president in 1999 (De Meyer & Kong, 2017; Singapore Management University, 2017). In the first decade of the 21st century, the MOE also worked to attract numerous transnational education providers to open their own campuses in Singapore, efforts that resulted in the establishment of cross-border campuses of INSEAD (l'Institut Européen d'Administration des Affaires), the University of Chicago Booth School of Business, and New York University's (NYU's) Tisch School of the Arts – among others – in the city-state (Ng & Tan, 2010). Following in the steps of SMU, NUS established a collaborative medical school with Duke University in 2005, a graduate institution established to support the Singapore Government's efforts in the biomedical sciences (Duke-NUS, 2017). Outside the realm of education, Singaporean government entities – particularly the National Research Foundation (NRF) – also established numerous research partnerships with various overseas universities. Notably, NRF's Research, Innovation, and Enterprise Council established the Campus for Research Excellence and Technological Enterprise (CREATE) in 2006, a complex of partnerships

[22] Later, SMU would also partner with Carnegie Mellon University to design the curriculum of their School of Information Systems (De Meyer & Kong, 2017).

including research centers of the Massachusetts Institute of Technology, ETH-Zurich, Shanghai Jiao Tong University, and Technische Universität München (TU-Munich), among others (National Research Foundation, 2014). Through all of these efforts, the Singapore Government sought to create a so-called "Global Schoolhouse" in the higher education sector to attract foreign talent, develop local capacity, and – most importantly – spur economic growth (Ng & Tan, 2010; Sidhu et al., 2011).

While the majority of Singapore's Global Schoolhouse projects have been perceived by local stakeholders as successful, not every cross-border higher education initiative has achieved its desired outcomes. In November 2012, school leaders announced that NYU's Tisch School of the Arts Asia would close upon graduation of all of its current students (Schlanger, 2013); in 2013, the University of Nevada Las Vegas similarly announced that it would end its partnership with the Singapore Institute of Technology (SIT)[23], the country's fifth autonomous university, over budgetary and curricular concerns (Redden, 2013). Even in cases in which these institutions have remained open as planned, some of Singapore's cross-border higher education partnerships have been mired in controversy—Yale University's decision to collaborate with NUS to develop a new liberal arts college, for example, "touched off one of the strongest controversies in the 20-year presidency of Richard C. Levin" (Sleeper, 2013) when Yale faculty objected to the project over freedom of speech-related concerns.

Perhaps the most notable setback of the Global Schoolhouse project was the abrupt decision of the University of New South Wales (UNSW) to close its Singapore branch

[23] UNLV originally came to Singapore as a stand-alone branch campus in 2006; it chose to partner with SIT to stabilize and maintain enrollments, an effort that was ultimately unsuccessful (Redden, 2013).

campus in 2007, only two months after classes began (Davie, 2007). Originally begun in 2004 as a partnership between UNSW and the EDB, UNSW-Asia was meant to enroll 15,000 students by 2020, primarily from overseas (Burton, 2007). In its debut semester, however, UNSW Asia was only able to enroll 148 students, and given that the $32.3 million Singapore dollars (SGD) in funding from the EDB was considered "recallable" per the UNSW agreement – and that UNSW itself had already poured $17.5 million Australian dollars (AUD) into the project – leaders of the university ultimately deemed the branch campus endeavor too risky for the university to pursue (Ng & Tan, 2010). Understandably, this UNSW episode likely impacted both the Singapore government's approach to cross-border higher education and the approach of its potential collaborators; in the words of Ng and Tan (2010, p. 185):

> The government wants the targets and outcomes of private universities to coincide with its strategic plans and timeframe. It is prepared to invest funds, but it also expects universities to bear the responsibility of achieving long-term business sustainability and to deliver their part of the bargain. This poses a challenge for both parties. The government must now do more to attract top foreign universities to come to Singapore. These universities are likely to proceed with much more caution [after the closure of UNSW].

It was within this policy context – and fresh off of the failure of UNSW – that MOE and its freshly established New University Steering Committee (NUCom) sought collaborators for the fourth autonomous university, which would ultimately reside on the land in eastern Singapore that had been allocated for UNSW Asia. In the wake of the UNSW debacle, the government would again turn to the tried-and-true model of SMU and Duke-NUS Medical School, wherein international institutions would serve as the collaborators – not the sole founders – of a homegrown, autonomous higher education institution. Specifically, NUCom sought an American partner to diversify the existing higher education landscape—as a former member of the NUCom committee described:

> So, there were already two universities that were offering education in engineering and technology. One is Nanyang Technological University and the other's NUS. They were far ahead. But they were very much British track. So they [the Ministry] thought, "okay"…we all thought also and we agreed with the Ministry that it will be good to have a different approach and that we could do it ourselves, but if we had a partner, it would make sense [to choose an American partner] especially given the success. And I think it has also got to do with the timing. There was an endeavor in medicine with the Duke University, and that was a very, very well-received and actually quite well-claimed, and people in Singapore could see that even though it was early days, it was a successful partnership. […] So that's why the government felt inclined to want to have this partnership, riding on what was already a success with the Duke-NUS. And so, given that the other two universities were offering engineering education and technology much on the British track, we looked to America.

In addition to this American academic partner, NUCom also sought a Chinese collaborator to act as the second partner institution for the fourth university, aiming to reflect within the institution the broader Singaporean narrative of intersecting between the East and West[24].

With this plan in mind – and an established vision and authorization complete for the fourth university – MOE's steering committee began to solicit proposals from four American universities, liaising with their administrators and even coordinating NUCom on-site visits to the campuses of the four finalist institutions. Although the various visits had gone well, by late 2008 one crucial question had yet to be answered at the Ministry: which of these four institutions NUCom select as the fourth university's foreign partner?

[24] In the words of one SUTD administrator, SUTD collaborates with "the West to be the best, and the East to last forever."

Chapter 2: Beyond "02139" – MIT and the World

"As chancellor, I was responsible for, among other things, MIT's international partnerships. During that period, it seemed that not a month would go by in which I was not approached by some head of state asking whether we would assist in replicating MIT in another part of the world. It seemed that everyone wanted their own version of MIT, recognizing that a world-class institution of science and technology could act as a powerful stimulus for economic growth."
- Lawrence Bacow (in Keyser, 2011, pp. ix–x)

Running into Tom Magnanti on the streets of Cambridge, Massachusetts in late 2008, you would never expect that you'd encountered one of the world's foremost experts in operations research, a former MIT Dean of Engineering, and a future university president. Friendly, thoughtful, and soft-spoken, Tom – as he insists on being called by his students – does not quite fit the nerdy, pop culture stereotype of an MIT professor; rather, Tom seems more like a thoughtful and well-read grandfather – or great uncle – upon first meeting. Often bespectacled and with a trim, white mustache, Tom has a particular knack for making undergraduate students feel comfortable upon first introduction, helping freshman to forget that they are in the midst of a world expert and one of the most senior members of the MIT faculty.

Fresh off an eight-year term as the Dean of the MIT School of Engineering, in late 2008 Tom was fully settled in to life as an Institute Professor, the most senior title that can be held by a member of the MIT faculty[25]. Like other Institute Professors, Tom had no formal teaching or departmental responsibilities at MIT, an organizational design meant to enable these individuals to pursue individual projects or political appointments "that would

[25] Designation as an Institute Professor is considered the highest institutional honor an MIT faculty member can receive: "Appointment as an Institute Professor is at once an acknowledgement of extraordinary leadership, accomplishment, and service and an invitation to follow intellectual pursuits without the hindrances of departmental responsibilities" (Vatz, 2005).

otherwise not be feasible" within the MIT institutional structure (Vatz, 2005). As an individual self-described as passionate about education and always eager to tackle a new project, Tom's interest arose as he began to hear word of a new higher education initiative developing in Singapore while on a visit to the city-state, as one SUTD administrator described. Although larger than any international collaboration undertaken by MIT in the 21st century, a project of the scale described by his contacts in Singapore could mightily expand MIT's efforts as it sought to renew its engagement around the world, a major initiative of the Institute for the previous two decades.

While many American institutions began to strengthen and broaden their international activities in the last decades of the 20th century, MIT pursued large-scale international engagements as early as the 1950's and 1960's, seeking to extend the Institute's educational influence far outside the borders of "02139[26]" (Leslie & Kargon, 2006). After the conclusion of World War II, MIT emerged as a leader in science, technology, and innovation, and as a result of this reputation was asked to begin "assisting in establishing new institutions of higher education around the world" (Leslie & Kargon, 2006, p. 110). The first such project, the India Institute of Technology at Kanpur, was established in 1960 (Leslie & Kargon, 2006), and after the success of this venture, MIT engaged in collaborations to build new institutions in Iran, Brazil, and a second institution in India, the Birla Institution of Technology and Science (Bagiati, Sakhrani, Sarma, & de Neufville, 2012; Fischer, 2012). After these early efforts in university development overseas, MIT re-aligned its international focus, and from the 1970's to almost the turn of the 21st century, the

[26] The zip code for the eastern and southern end of Cambridge, Massachusetts, the Institute's home since moving from its initial campus in Boston in 1916.

Institute's international efforts primarily consisted of small scale research collaborations (often initiated by individual faculty) rather than large international projects coordinated by faculty across the Institute (Bagiati, Sakhrani, et al., 2012).

Beginning in the late 1990's, Institute faculty and staff used lessons learned in these first collaborations – including insights regarding cross-cultural communication and local beliefs and norms regarding the purpose of education – to revitalize and renew MIT's commitment to major international education projects (Bagiati, Sakhrani, et al., 2012; Leslie & Kargon, 2006). In 1999, MIT began the first of its recent large-scale international engagements through a program called the Cambridge-MIT Institute (CMI), a research and education partnership between MIT and the University of Cambridge that concluded most of its activities – save for a student exchange program – in 2007 (Bagiati, Sakhrani, et al., 2012). Concurrently to CMI, MIT also aided in the creation of the Malaysia University of Science and Technology, a postgraduate institution that exists in Malaysia to this day, albeit without a longstanding partnership with the Institute (Bagiati, Sakhrani, et al., 2012).

After the perceived academic and research success of CMI, MIT began to engage in larger-scale cross-border higher education initiatives, seeking once again to establish longstanding institutional partnerships in key regions around the world. The first such partnership began in 2006, when the government of Portugal initiated several major collaborations with universities in the United States in an effort to promote economic growth; the largest of these collaborations was with the Massachusetts Institute of Technology to create the MIT-Portugal Program (MPP) (Pfotenhauer, Jacobs, Pertuze, Newman, & Roos, 2012). This collaborative consortium includes MIT, eight Portuguese higher education institutions, 20 Portuguese research centers, and over 50 industrial partners (Pfotenhauer et al., 2012). In its second phase at the time of this writing, this collaboration

offers doctoral, master's, and executive master's programs in four areas; in addition, MPP supports collaborative research among its member institutions and supports faculty and graduate students both at MIT and at Portuguese partner universities (Pfotenhauer et al., 2012).

The Masdar Institute of Science and Technology project was MIT's first 21st century collaboration established to develop a new brick-and-mortar university, thrusting MIT back into the "university-building business" (Fischer, 2012). Opened in 2009, the graduate-level Masdar Institute was conceived as the intellectual center of Masdar City, a large, clean-energy community in Abu Dhabi, United Arab Emirates (Mills, 2009). Since beginning its involvement in the Masdar Institute project, MIT faculty and staff have contributed to the new university through collaborative research, faculty and graduate student research initiatives, conference and workshop organization, and student exchange ("MIT and Masdar Institute cooperative program," n.d.). Like in the other large international collaborations that would follow, MIT also eventually supplied Masdar with its president; MIT Professor Fred Moavenzadeh served in this role from 2010 to 2015, guiding the institution through its early years of full operation while on a leave of absence from MIT (MIT News Office, 2015).

In each of its major international projects, MIT's faculty and administrators have eschewed the often-risky model of branch campus development, choosing instead to act as a partner aiding in creation of new academic programs and institutions rather than expanding MIT as an institution itself (Fischer, 2012). In my discussions and interviews with MIT faculty, I have heard numerous rationales for this approach: avoiding public embarrassments like those of NYU or UNSW upon the closure of their branch campuses; the limited capacity of the small, 1,000-member MIT faculty; and the institutional circumstances that

many believe make the MIT educational experience unable to be replicated, among others. In the words of one senior MIT administrator in late 2014:

> Some people believe this [MIT] model is unreplicable or irreplicable [sic] anywhere else, and that's why we don't create campuses abroad. Because whatever it is, it won't be MIT, or it would be an adulterated version of MIT. […] It will never be MIT the way it is MIT in Cambridge, 02139, but it will be a version of MIT. Not a, you know—I don't want to call it a dumbed-down version, but it will be a [different] version of MIT.

While many faculty expressed similar concerns regarding the replication of the Institute's academic experience (in some cases going so far as to say that the Institute would absolutely never open an academic branch), the same individuals often leapt at the opportunity to pursue MIT's other primary output – academic research – overseas[27]. In fact, it was opportunities for research that lead many of MIT's faculty to Singapore, a country eager to partner with what governmental leaders and advisors perceived to be the best and brightest academic minds of one of the world's great research institutions.

While MIT's international academic engagements blossomed in Europe and the Middle East in the 1990's and early 2000's, the Institute also developed and grew a suite of research programs in Singapore, a country whose ties to MIT actually date back to the late 1960's and 1970's. During the early days of Singapore's independence, MIT professor

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[27] When asked why they opted to participate in any of MIT's overseas collaborations, many faculty members cite research funding as the primary motivation. Similarly, in selecting partners at the institutional level, administrators also seek to ensure that the collaborations will benefit MIT's research enterprise. In the words of one administrator: "We're MIT and we don't and shouldn't have to pay for this if people want us to do collaborative work. So that's one set of, you know, things that interest us and that we really want to look at very closely. What we do has to be good for MIT. And if it's money, that's not sufficient. In fact, money cannot be the first order activity. It has to be intellectually interesting. Faculty have to want to do this. They have to see an opportunity that they have some chance of creating a new research area, maybe doing a kind of research that they're not able to fund here. That's where funding comes in."

Gordon Brown led faculty delegations on several visits to the country (see Figure 2 below), advising Prime Minister Lee Kuan Yew's government on various aspects of the country's development, including industrialization, housing, and engineering education (G. S. Brown, Hagen, Ippen, Keil, & Pye, 1969). Foreshadowing MIT's later involvement with the Singaporean higher education enterprise, Brown was particularly involved in advising leaders of Singapore University (the predecessor of modern-day NUS) and the country's polytechnics on strengthening technical and engineering training within the country's educational system, as illustrated by numerous memoranda and communications available in MIT's Institute Archives and Special Collections.

Figure 2. MIT faculty members visit Haw Par Villa (a well-known – and somewhat eerie – Singaporean sculpture park) during their official visit in March 1969 (Institute Archives and Special Collections, 1969).

In 1997, a 25-member team of MIT faculty began scoping the potential for a large research partnership in Singapore, assessing the strengths and weaknesses of the Singaporean universities with which they might engage through this partnership (Magnanti, 2006). In 1999, these efforts led to the founding of the Singapore-MIT Alliance (SMA), a collaborative educational and research program partnering MIT with NUS and NTU (Magnanti, 2018). The first phase of this program – referred to within MIT as "SMA-1" – funded collaborative research programs bringing together faculty from MIT, NUS, and NTU in five research thrusts: Advanced Materials for Micro- and Nano-Systems; High Performance Computation for Engineered Systems; Innovation in Manufacturing Systems and Technology; Molecular Engineering of Biological and Chemical Systems; and Computer Science[28] (Lerman, 2007). In 2003, the SMA program was renewed as "SMA-2," expanding SMA's research thrusts and providing opportunities for participating students to earn MIT master's degrees in addition to those masters or doctoral degrees they earned from NUS and NTU in Singapore, as long as the students were able to pass MIT's stringent admissions thresholds[29] (Lerman, 2007; Magnanti, 2006). Similarly to SMA-1, SMA-2's research thrusts again reflected Singapore's national research priorities, including in advanced materials, manufacturing, chemical and pharmaceutical engineering, and computational engineering (Lerman, 2007).

In 2005 and 2006, Singapore's National Research Foundation (NRF) began to plan for the development of the CREATE Tower, a multi-partner academic research center

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[28] Not coincidentally, each of these areas is or was of important value to Singapore's economy—for example, in the country's electronics and semiconductor production industries.

[29] A similar model would also be adopted when creating SUTD's dual master's program with MIT, which was offered from 2010 to 2017 (Singapore University of Technology and Design, 2016).

described in Chapter 1. Based on SMA's legacy, Singapore invited MIT to establish a research center within this complex, becoming the "anchor" university of what would eventually become CREATE (Magnanti, 2018). This MIT initiative eventually became the Singapore-MIT Alliance for Research and Technology (SMART), which was founded in 2007. Unlike SMA, the SMART partnership has no academic component; rather, it is a large-scale research center focusing on specific research thrusts of interest to both MIT and Singapore, and is to date MIT's first and only research center located outside of the United States. In 2017, SMART and NRF announced that continuation of the five original SMART research programs would be reviewed; however, the same year SMART announced new and expanded efforts in the realm of innovation and entrepreneurship, expanding its purview to further align with governmental initiatives in these areas[30].

Of all of MIT's large-scale international engagements over the last 20 years, these Singaporean initiatives – especially SMART – are considered within the Institute to be some of the more successful and worthwhile international partnerships MIT has undertaken, according to several MIT faculty members involved in the SUTD project. Thus, over time the Institute's leaders began to think more and more highly of Singapore as a partner, per one senior MIT faculty member: "Through these prior interactions and collaborations, MIT and Singapore had, over the years, developed a strong relationship, with great mutual respect. MIT admired and was greatly attracted by Singapore's governmental leadership and its deep commitment to education and research. And, being English-speaking, ultra-safe, and extremely well-functioning, Singapore provided an attractive environment for MIT

[30] For example, in late 2016 SMART launched its very own SMART@SGInnovate office, formalizing its presence within the government-sponsored SGInnovate entrepreneurship initiative (MIT News Office, 2017).

faculty, staff, and students" (Magnanti, 2018). Furthermore, Singapore's priorities in these projects – specifically in terms of the specific research thrusts of interest – were well aligned with those of the MIT faculty; between 1997 and 2006 alone, 65 faculty from all of MIT's schools had participated in an SMA project, and the perceived success of these efforts by both MIT and Singaporean stakeholders contributed to the development of future collaborations between these two entities (Magnanti, 2006). As would be the case with the MIT-SUTD Collaboration, the perceived successes of SMA and SMART proved that MIT's research and academic priorities – as well as its engineering-informed, pragmatic approach to partnership – were well aligned with the Singapore Government's, paving the way for subsequent partnerships of ever increasing scope and scale. And involved in the success of each of MIT's Singapore projects – often in a spearheading role on the Institute's assessment or steering committees – was Tom Magnanti, one of the city-state's consistent champions within the MIT faculty and administration.

When discussing the early days of the MIT-SUTD Collaboration with those faculty that were involved at the beginning of the project, there is some disagreement as to how exactly how the Ministry of Education (MOE) reached out to MIT about the possibility of a collaboration—some claim that Tom Magnanti and other leaders of SMART heard word of the initiative from various contacts in the Singaporean government[31], others claim that influential Singaporean MIT alumni were tasked with sending a message through personal

[31] From Magnanti (2018): "At about the same time (August 2008), Dr. Tony Tan [Singapore's former President and then-chairman of the International Academic Advisory Panel] informs MIT that the Singapore government is seeking, through a competitive process, a U.S. partner university to help develop and establish the new university, with the partner university providing, on leave, the founding president."

backchannels. Given the deep and multifaceted relationship between Singapore and MIT, I would venture a guess that it was a combination of these communication avenues—in any case, it became clear to Tom and other influential MIT faculty that Singapore was looking for an academic partner to create the fourth university, and that MIT was high on MOE's list of potential collaborators (per several MIT faculty interviewees). At the same time, it was clear to MIT's leadership that SMA – MIT's first project in Singapore – was no longer going to be a priority of the Singapore Government moving forward, and that if MIT wanted to continue its educational engagement in the country, "we might want to think about this new university," in the words of one MIT affiliate familiar with the discussions.

Intrigued by the prospect of developing a new academic institution – as well as with the possibilities that Singapore provided – Tom and other faculty relayed this message to MIT's administrative leadership, expecting very little enthusiasm – and perhaps an outright rejection – in response. Said one individual familiar with this communication in an interview in October 2016:

> [We had] the expectation that MIT would not be interested, because MIT had been asked back in the 1990s to actually establish a campus in Singapore. And we decided not to do that; we said, 'we don't do campuses abroad.' But MIT had some interest; […] the interest I think was in some ways related to the content of this, and maybe in talking about the educational experiment, et cetera, et cetera, and doing something interesting. And MIT to that point had [a] very good relationship with Singapore, felt very comfortable with Singapore, knew the government, [and] felt comfortable with the government.

Given the Institute's renewed inclination towards large-scale international engagements, its comfort with Singapore, and the educational, research and, notably, financial[32] possibilities afforded by this type of engagement, MIT's leadership eventually

[32] Although the exact amount paid to MIT for its participation in the SUTD project is a closely held figure, most individuals familiar with the collaboration agreement discussed the

decided to support submission of a collaboration proposal to MOE, despite some disagreement over this effort from various corners of the faculty and administration[33]. Said MIT President (then Provost) L. Rafael Reif of this period years later (Reif, 2013):

> Late 2008, we started thinking about creating a university together with Singapore. By that time, there was no need to send a delegation—we knew each other very, very well. When the opportunity came, we said, 'This is a very good idea, let's just do it.' And that's the importance of having a relationship of mutual trust and respect for all these years.

While the process of developing and submitting a proposal was certainly not as simple as these statements imply, it was decided fairly quickly within the MIT administration – at least in university governance terms – that the Institute should submit a collaboration proposal to MOE, which would then be evaluated in Singapore through a competitive proposal process, as several MIT faculty familiar with this decisionmaking described. Given his history and familiarity with Singapore, MIT's leadership asked Tom Magnanti to convene a committee to develop this proposal, and he agreed to participate in the endeavor under one condition: that should the university proposal be accepted, he was unwilling to serve as the new institution's president given his familial responsibilities that prevented him from moving full-time to Singapore, despite MOE's interest in having this leader come from the collaborating institution (Magnanti, 2018). With this request agreed upon, Tom forged ahead, leveraging his knowledge of MIT's faculty to recruit a team that would hopefully develop a plan for a brand-new university.

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total cost of the project as being in the hundreds of millions USD (including both the operating budget of the collaboration and any potential payment collected by MIT).

[33] Said one MIT faculty member involved with the MOE negotiations: "You have different parties at MIT with different agendas. You have different groups within MIT that are either very pro international engagement or very against international engagement."

With a green light to explore options for the new university project, Tom first convened a group of faculty to discuss the possibilities for an MIT proposal in the latter half of 2008. Said one faculty member in November 2016 of the first of many meetings held to craft this proposal:

> My recollection was that I saw an email from Tom Magnanti, and he said, 'There's something interesting happening in Singapore, maybe a new university, and why don't you come and we'll talk about it.' And that's when I showed up in some room, maybe it was Building 10, and maybe a dozen people showed up. And we talked about the possibility and what might happen, and what Singapore hoped to gain, and what we might offer.

In any type of organization, the viewpoints, beliefs, culture, and knowledge of founders plays a hugely important role in setting the organization's cultural and operational path; in the words of Schein (2010, p. 81): "The particular beliefs and talents of the founders and leaders of the group determine which functions become dominant as the group evolves." In the case of these first meetings regarding a potential collaboration between MIT and Singapore, the group recruited by Tom Magnanti set the framing for the Singaporean collaboration in three important and consequential ways, as described in the following paragraphs. Although the members of this group would – of course – eventually make their marks on SUTD in myriad ways, these three aspects of this group ultimately would set the framing for the entire institution, as well as for the structural approach of the collaboration as a whole.

First, several members of the group convened by Tom Magnanti had common research interests in the field of design and design research. In the words of a faculty member involved in these first discussions (from November 2016):

> [Tom] had, earlier in his career, started a program at MIT called 'System Design and Management.' So the word 'design,' had certainly been part of his intellectual footprint. […] And then he invited me to come to these things, and I think he must have wanted design in there, if I was part of the group [given my research interest in design]. It did tend to evolve in that direction. Once he had decided who to ask to the table, that began to drive our particular proposal to Singapore in one direction.

Given this orientation of the initial proposal group, design quickly emerged as a unifying intellectual theme for the new university, as well as a potential motivating factor for MIT's participation in the endeavor as a whole, according to a faculty member in attendance[35]. While design had been mentioned in passing in the original CEUS report recommending creation of a fourth university[36], it was by no means a central theme; thus, it was these early intellectual leaders who would be ultimately responsible for the new university's reliance on design as a central academic and research tenet. This focus on design was conveniently aligned with a new interest in design in pockets of the Singapore Government, a trend most clearly exemplified by the government's interests in pursuing "design thinking" in government projects such as the Ministry of Manpower's pass issuance systems[37].

Second, many of the early faculty involved in the framing of the MIT-Singapore Collaboration – although not necessarily those in the very first meetings – had also been involved in earlier MIT education reform efforts, most notably the 2006 *Report of the Task Force on the Undergraduate Educational Commons* (Silbey et al., 2006). Since the late 1990's,

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[35] Said one senior faculty member: "MIT had pockets of design, some in mechanical engineering, some in architecture, MediaLab, other places on campus; but it wasn't very coherent at MIT. So MIT saw this as an opportunity to perhaps do something across the university in design."

[36] Design and Architecture was one of three initial disciplines CUES suggested should be offered at the fourth university, along with Engineering and Applied Sciences and Business and Information Technology (as described in Chapter 1).

[37] In the words of one SUTD affiliate: "We started our design council in the early 2000s—we have Design Council of Singapore and now it's called Design Singapore or something. […] It's a government thing. So they started the design council about 10 years ago, I think. And then in 2003/2004 we started seeing them push for design conferences and workshops, right? […] There was going interest, right, for sure. And I think four or five years ago – or even before that – the government set up a design thinking or design arm as well. This is open beyond the Design Council, which works with industry. So I think there's been growing interest. And the key case study they use as the main success story is how they redesigned the work pass process in the Ministry of Manpower. So if you check Ministry of Manpower work pass redesign, IDEO, it was quite a case study."

MIT's administration has routinely convened groups to examine and evaluate the Institute's undergraduate education, and in the words of one MIT faculty member who was involved in both these efforts and the SUTD project:

> I had been part of a task force that was looking at revamping the MIT curriculum. And so we had gone through all this thinking about what do you do the first two years or first year and a half [of the MIT undergraduate curriculum]. And so there was this…a lot of this discussion that already have happened at MIT that was just sort of, like, moved. I personally think sort of, you know, that thinking which just kind of moved over and said, okay we could apply it here [in the plan for Singapore] because we haven't been able to get it on here [at MIT].

Given this background, the faculty members sitting around the table at the initial meetings about the Singapore project were not only thinking deeply about issues of undergraduate education, but they were also faculty who had watched as carefully considered recommendations from this and other committees had not been implemented at MIT[38], largely due to the institutional difficulties in changing longstanding educational programs (per the faculty member quoted above). For many of these faculty, creating a new university afforded them the opportunity to design an educational program entirely free of institutional constraints, enabling them to both develop entirely new and innovative structures and to implement their initiatives that had never taken hold at MIT.

Finally, it is also notable that the majority of faculty invited to the table at these first meetings regarding the Singapore proposal also hailed from MIT's engineering departments, rather than the School of Architecture, the School of Science, the Sloan School of Business[39], or the School of Humanities, Arts, and Social Science. Although network theory may provide one explanation for this arrangement – as a former dean of the School of

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[38] For example, the recommendation to include more project-based experiences in the MIT first-year curriculum (Silbey et al., 2006, p. 45).

[39] Although several of the faculty involved in these discussions are dual appointments to both Sloan and engineering, including Tom Magnanti.

Engineering, Tom was most likely to be familiar and friendly with that school's faculty – some from MIT attribute this phenomenon to other forces at play. In the words of one senior MIT faculty member who hails from the School of Science (from April 2016):

> I mean maybe one of the themes in this story is, it has to do with kind of the facets of MIT that get involved in these engagements. And as with many other things – and this is certainly true of SMART and it's true of SUTD – which is that the engineers engage much more readily than the scientists. […] But I think…so there are sort of two underlying reasons for this. One is that in general – and this is a very broad brushstrokes – but in general, engineers view themselves as being problem solvers. We will solve your problem if you have, you know, essentially money to invest in funding them to do so. So […] the average engineer sort of has a toolkit, and if that toolkit can be deployed to solve an interesting problem of yours that you have funding for, then they're on board immediately. So they're essentially, you know, looking for - they're very - they're pretty agnostic about what kinds of problems they work on, right? Whereas scientists, […] you have to sort of aim for this very narrow kind of sweet spot. And that's very hard to find. And the thing is that, sort of what everybody in science expects is that it just requires an incredible focus and kind of incredible, kind of long term commitment to working on a problem. I mean, that's sort of the general, the general approach that I would say, you know, most of the people let's say in this building took in order to get where they are. And so, people don't – if you come along and say well, here's this other opportunity to work on something that's related to what you're doing, but it's essentially fundamentally a different project and you can hire these post docs in Singapore and so forth, the response of the average scientist is, 'Eh, who needs it? Why would I want to do that, because it's just going to dilute my effort and attention?'

Over and over in MIT's international partnerships, the same cast of characters emerges—a group of fewer than 100 faculty engaged in the vast majority of the large-scale international projects, mostly hailing from the Institute's engineering departments (Fisher, 2015). In interviews with these individuals, again and again they describe themselves as problem solvers, eager to find pragmatic solutions when presented with any given challenge[40]. In this way, the values that MIT faculty brought to the Singapore endeavor were

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[40] Relatedly, faculty at MIT also connect the pragmatic instincts of engineers as an explanation for the lack of negative, public pushback within the faculty to MIT's overseas engagements (a response common to more liberal arts-oriented institutions that have engaged in overseas projects, such as Yale and NYU). Said one senior MIT administrator:

understood to be inherently aligned with the pragmatic values system of Singapore's policymakers, who view education as a practical means to promote economic growth, particularly in science, technology, engineering and mathematics (STEM) fields (see Chapter 1 for more on this mentality). In the words of MIT President Reif during an address in Singapore (2013):

> I think there are several principles that both entities – the city-state of Singapore, the nation of Singapore and MIT – held in very high esteem. We both believe in excellence – if we do something, let's do it well – we believe in education; we believe in the importance of science, technology, engineering, and math; and we believe in the importance of a knowledge-based economy, an economy based on innovation. Those principles we have in common, and I think [this] has served as a foundation for all the things we have done together.

Given this alignment between the values and approaches of MIT and Singapore's government, in many ways collaboration between these two entities was a natural cultural fit. Without such an alignment, I would venture that the establishment of such a partnership might not have taken place; alternatively, had such an agreement been reached, communication and goal setting between the partners may have proven to be extremely difficult. Of course, without a counterfactual no conclusions can be reached on this subject—thus, let us return to late 2008, and to Tom's ad hoc committee of design- and education-minded engineers.

Despite all the competing voices at MIT regarding the potential merits of a collaboration with MOE (per interviews with faculty involved in the project at this early stage), a group of 22 MIT faculty – with Tom Magnanti at the helm – was eventually able to

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"You know, MIT is the greatest problem-solving institution in the world—university. And so what looks like a—an area for criticism in some universities, here it looks like: these are interesting problems, let's just go roll up our sleeves and go tackle them, okay? So we have that kind of attitude among many people."

deliver two "pre-proposals" for collaboration to MOE in December 2008, with follow up proposals (as requested by MOE) in April 2009 (Magnanti, 2018). While members of the initial planning committee had discussed some aspects of the educational approach of the new university at this stage, the initial educational proposals to MOE – the first of which was titled *MIT as a Partner in Establishing [a] New University in Singapore* – can been described largely as plans for the structure of a collaboration itself (setting the "KPIs[41]," as they are wont to say in Singapore), with some overarching discussion of the educational structure and approach for the new university, including rough guidelines for the various academic programs. In the words of an MIT faculty member familiar with the documents (from November 2016):

> We were chosen based on [an] initial proposal, but I think it's the case that even that initial proposal wasn't clear enough on some of those points about what the content of the curriculum would really be. I think that that initial proposal had...it was more focused on how much money are we talking about, how many faculty. That proposal was a proposal for collaboration. It laid out how much money MIT needed to spend to do this. How many MIT faculty would be involved in the collaboration, things of that nature. Not [the details of] what the curriculum would look like because that was what was going to be collaborated on.

In these documents, MIT outlined a labor- and time-intensive model of collaboration, in which MIT faculty members would design courses and curricula for the new institution and participate in numerous teaching and research residencies in Singapore. This document made clear that if the leaders of MOE were to choose MIT as its collaborator, the Institute's faculty would be deeply involved in all stages of the new university's academic development.

It is worthwhile to note that the academic proposals from MIT also differed from the guidelines set forth by the Ministry in important ways, most notably in the number of students that the fourth university would be designed to serve. In its final report in 2008,

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[41] "Key performance indicators," but only ever referred to by the acronym.

CEUS suggested that "at steady state, the new university could cater to an annual intake of about 2,000-2,500 students," for a full undergraduate population of approximately 8,000-10,000 students (corresponding to the places required to increase Singapore's overall university enrollment to 30%, the stated goal of creating the fourth university) (Ministry of Education, 2008, p. 19). However, even in its earliest proposals, MIT suggested a much smaller university of approximately 1,000 students per intake, the same size as MIT's undergraduate population. As *The Straits Times* reported after the MIT-MOE agreement was formally announced (A. Tan, 2009):

> [Education Minister] Dr Ng [Eng Hen] said cohort size will be kept small, with an undergraduate population of about 4,000 students. That would mean a yearly enrolment of about 1,000. Asked about the smaller enrolment size, he said: 'In our discussions with our partners it was clear that there would have to be some trade-off between quality and quantity. You can't realistically take students of varying calibre [sic] and some of them will struggle in the courses.' He does not preclude a larger intake in the future. 'The issue is really on quality that is consistent with our choice of partners and the way we position this university.'

Given this difference in enrollment, MOE would ultimately be required to create a fifth autonomous institution (eventually called in the Singapore Institute of Technology) in addition to SUTD and develop numerous partnerships with overseas institutions to increase cohort participation rates to the desired level set forth by the Prime Minister in 2007 (Almenoar, 2009).

In addition to the academic proposal, in December 2008 MIT also submitted a second document not originally solicited by the Ministry: a proposal for a joint research center between MIT and the new institution. Given MIT's status as a research-intensive university (as numerous MIT and SUTD faculty members described)[42], the faculty members

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[42] The importance of research is so pervasive within the culture of MIT that freshman students have told me that they feel "behind" their peers if they do not have a "UROP" (an undergraduate research position) with a faculty member during their first year. Within the

on the first proposal committee – especially Tom – felt that a strong research agenda was a necessity if the new university was to become a top-tier higher education institution. Said one MIT faculty member familiar with the discussions of this period:

> I think in the discussions with [then International Academic Advisory Panel and NRF chairman] Tony Tan [we] basically said, […] 'There has to be research component, as well [as an] education component.' Otherwise you won't be able to do [it], you know. Just having a straight undergraduate program without or straight teaching program was not going to get you where you wanted to be.

After two rounds of proposal submissions for both the academic collaboration and the research center – as well as months of informal communication between Singaporean and MIT stakeholders – MOE's steering committee ultimately decided to select MIT as a collaborator, including both of the proposed partnerships as components of the agreement. When asked about MOE and NUCom's rationale for selecting MIT as the collaborating partner, a former steering committee member said of the process in June 2017:

> So we felt that the faculty members that were involved, they were very enthusiastic and they seem really keen to get this going. And the curriculum that they proposed, the first cut, the base curriculum, seem[ed] very much in line with what we wanted. Later on, they want[ed] to flesh it out and actually work on each of the courses, but what they were proposing seemed exciting. And of course, Tom Magnanti was a very important part of it as well. And the fact that an Institute Professor was very involved gave a...put quite a bit of shine on MIT's proposal. So, [the proposed] fees, the eagerness to want to do this as well as the names that were involved, I guess, were really the main factors that we looked at to assess that MIT's proposal was indeed the best. And also the familiarity with MIT. The other universities[43], there was some...maybe there was some relationship with [them] in various things, but at a lower level. Whereas with MIT, there was already a quite a high-level relationship and a very long-standing relationship and with CREATE, and with things that MIT has been doing in Singapore. So the familiarity [was a factor]. And a person that was then very important to the whole process who we sought his advice was...he wasn't president yet of Singapore, but there's Dr. Tony Tan, and he had retired from government and he was then Chairman of Singapore Press Holdings, […] he is very

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faculty and graduate communities, the importance of research is – understandably – held even higher.

[43] Although many faculty at SUTD and MIT have heard rumors of the identities of the other universities who submitted proposals for this project, the names of the other institutions have not been publicly disclosed and thus are not included in this account.

> familiar with MIT because he got his doctorate from MIT. So, yeah, the stars seemed to align.

On May 19, 2009, the Ministry of Education announced that MIT would be the fourth university's founding American academic partner[44] (A. Tan, 2009); three days later, Tony Tan announced that a joint international research center would also be developed as part of the partnership, with hopes that it would open well before the university enrolled its first students in 2011. As was reported by *The Straits Times* (Gunasingham, 2009):

> 'Traditionally in Singapore, we have established universities that start off with undergraduate studies, before moving on to postgraduate studies and then research,' Dr. Tan explained. 'Under the proposed model, we will establish a research centre with a sound research base first before taking in graduate students and undergraduate students.' Research universities around the world were no longer just education institutions, but were making their mark as key driving forces of economic growth, he added. 'They are places where new knowledge is created by faculty members and students, which facilitates the transformation of this knowledge into new industries and commercially viable enterprises.'

As is clear from these statements – as well as those concurrently released by then-MIT President Susan Hockfield – MOE and MIT had publicly established what they each hoped would be a strong partnership, and appeared aligned both in terms of the educational and research components of this endeavor. Despite these public pronouncements affirming the agreement, however, one significant hurdle still threatened its success: MIT and MOE had yet to sign a formal contract outlining the terms and scope of their partnership. And as all participating stakeholders were about to discover, external agreement may well have been the easier – and lower stakes – negotiating hurdle to leap.

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[44] At this point, MOE was still in talks as they sought a second academic partner from China; in November 2009, MOE announced Zhejiang University (ZJU) in Hangzhou as this second collaborator, fulfilling the vision of the fourth university partnering in both the East and West.

Chapter 3: To a Conceptual Design

"MIT faculty will be involved at every stage – from developing new curricula, to helping with early deployment, to assisting with mentoring and career development for SUTD faculty, to conducting major joint research projects. We also look forward to numerous opportunities for student exchanges and collaborations."
– MIT President Susan Hockfield (in U. Lee, 2010)

With a partner selected and a plan for the fourth university rapidly taking shape, MOE's New University Steering Committee dissolved in July 2009, having carried out its charges to structure and select a foreign partner for the fourth university. At the same time, the fourth university was officially and legally incorporated, with many – but not all – of the NUCom members transitioning to its newly founded Board of Trustees, with Singaporean real estate developer – and MIT alumnus – Philip Ng at the helm. With a blank slate and no staff to speak of, the Board's first task was clear—recruit the new university's administrative leadership – and especially a founding president – as soon as possible.

Although MOE and NUCom had been clear from the outset that the fourth university's president should come from its collaborative partner (as had been the case for SMU when it was initially founded by Wharton), Tom Magnanti had made clear from the start that he was unable to serve in the role, despite his willingness to champion MIT's efforts in developing and securing the collaboration. Given Tom's important role in developing the vision for SUTD, however, the Board believed that Tom was the right person for the role of SUTD founding president. As one board member said of that time in an August 2017 interview:

> It's a different model—no one had done it before, having a university based on systems as opposed [to] based on disciplines. So when you look [at] all universities, you've got academic disciplines, they're vertical. The professors are rewarded by the depth of research and therefore that drives the behavior of the universities. But when [you] go into the real world, we don't go by disciplines, we go by systems. But universities do not teach systems that way because of the structure of the universities. So when Tom came up with this idea, no one had done it—are we

willing to do it? And we thought, 'I think this is important.' And since he originated the idea, we thought that he would be the best person to make it happen.

After a period of discussion among Tom, MIT, and the Board, a compromise plan was eventually reached among the various stakeholders, in which Tom would serve as the new university's president for an initial three-year term while on leave from MIT; during this period, the university would support him as he returned home to Cambridge on a monthly basis, providing the opportunity to maintain a life in the United States while still serving in a leading role in Singapore (per interviews with SUTD administrators and trustees). With the details worked out and a plan in place, Tom was officially named as president of the new university on October 29, 2009. On the same day, the Board of Trustees also announced the name of the new university: the Singapore University of Technology and Design, referred to at the time as "SU" for short[45].

As it became clear to MIT's leadership that Tom would eventually be tapped as SUTD's founding president, a new challenge emerged for the Institute's administrators. As was described in the preceding chapter, at the time the collaboration was announced, the formal details of the partnership still had not been set, and it was clear to both parties that extensive negotiation would be required to reach a formal agreement. However, with Tom

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[45] Although the fourth university's acronym was originally "SU," it was later transitioned to "SUTD" after alumni of the now-nonexistent Singapore University (which was incorporated into NUS as part of Lee Kuan Yew's English-Malay educational reforms) and governmental officials raised objections (according to two SUTD administrators familiar with this period). For their part, MIT faculty – especially Tom – wanted the new institution to be named the Singapore Institute of Technology as homage to its MIT roots; however, they were told that the term "institute" has a particular meaning in the Singapore educational system, specifically with regards to the Institutes of Technical Education (ITE's). Imagine their surprise when Singapore's fifth autonomous university – the institution established to bolster enrollment after NUCom agreed to SUTD's smaller-than-anticipated enrollment – was incongruously and conspicuously christened "SIT," particularly after originally receiving the designation of "Singapore Institute of Applied Technology," or "SIAT."

serving in a boundary straddling role – on-leave MIT professor on one hand, incoming SUTD president on the other – it was quickly decided that he was no longer the individual to negotiate an agreement between the two parties (per two MIT faculty members familiar with this period). Thus, MIT's administration needed to find another faculty member to negotiate on behalf of the Institute as quickly as possible, especially if the MIT team was to have a hope of completing preparations before 2011, MOE's target date for the first SUTD students to enroll (A. Tan, 2009).

Upon first meeting, MIT mechanical engineering professor Robert O'Malley does not seem like he would be the loudest voice in a room—with a salt and pepper beard and professorial glasses, Robert speaks in an even and thoughtful fashion, responding to viewpoints he doesn't share with calm and dignified clarification. In mid-2009, it was Robert that the MIT administration recruited to coordinate MIT's efforts in developing a final plan for SUTD, and was selected for this role based upon both his relationship and familiarity with Tom Magnanti, as well as his previous experience in Singapore, having served as a former director of SMA. In this role, Robert was tasked with two distinct goals: to develop a conceptual design for the fourth university with Tom Magnanti and the other faculty interested in the project, and to negotiate the actual agreement between MOE and MIT for the structure and operations of a collaboration. In order for the latter milestone to be reached, Robert and the MIT team first had to tackle the former: developing an educational plan that would satisfy both MIT and MOE stakeholders, within the framework of the initial vision set forth by Tom Magnanti.

As Robert and his team approached the task of fleshing out the original MIT proposal, the group did have some initial framing for the educational and research

endeavors, as much of the overarching educational plan was set in the original MIT proposals to MOE. In the words of one member of this committee in a December 2016 interview:

> I think by the time that a conceptual design committee was launched, it [the SUTD vision] was already well established in terms of key areas (like architecture) that did reflect Singapore considerations, the overall structure in terms of pillars, the kind of interdisciplinary nature, the emphasis on design. I think all of that had been established. But there were issues related to, you know, what actually would be covered within the pillars, what kind of breadth the students would get in terms of sort of non-major courses and exposure. So I think it was primarily those aspects and also issues related not so much to pedagogy – which also Tom had spent a great deal of time on – but related to resources and all those required to actually deliver the course and what kind of people were required.

While the conceptual design committee grappled with specific academic issues – curriculum, program offerings, and the like – over the months-long period of negotiations, they would at times return to the overarching vision of the university, discussing over and over again what the fundamental goals of the university would be, and what role MIT could and should play in helping an institution reach those objectives[46], according to one faculty member present in these meetings. During these far-reaching discussions, MIT faculty operated under an ever-increasing time pressure—if the new university was actually to enroll its first students in 2011 (as MOE had stated publicly when announcing MIT as its foreign partner), these discussions and negotiations were taking place just two years before a brand-new university was set to open its doors. Given this pressure – and the nature of faculty negotiations of this sort – at times MIT stakeholders felt like they had reached impasses, and that the differences in vision among the stakeholders just couldn't be reconciled, calling the entirety of the partnership into question (according to many faculty present at the time). In

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[46] For example, several faculty described discussing over and over again what was meant by the term "design," arguing that MIT would not be an appropriate partner for the institution if it was to include a program in fashion design, for example.

the words of one faculty member present at many of the discussions in a November 2016 interview:

> There were times when I thought it was not going to happen. I felt that we got very close to a point where it's too bad, but it's not going to happen. But I remember a time when it was coming up for a committee vote, and I really believed the writing was on the wall. I think Robert O'Malley in particular was ready to pull the plug on that. Just saying, 'You know what? We just don't have enough common ground on this university. In fact, I don't even really know what they want to create there.' […] [A few of us] mulled it over and the way I remember it, we said, 'If they gave us a little more time, if we agree to defer for another six months, we could write a concept design or a blueprint. And if we had a blueprint that we agreed on, then we could sign.' That is a very important event in my recollection of the birth of SUTD. We're about to come to a decision and say, 'No, we can't do it,' and then we said, 'If we had six more months, we could put together committees at SUTD and MIT, agree on a blueprint, and just...whatever we're worried about, couldn't we hash it out if we had just a little more time?' And that is, I believe, what happened. […] It seemed like we really did need to stop and just hash out what we meant by 'design' and then in that blueprint, it makes it more clear—really we're talking about [is] technologically intensive design. And as long as we could agree on that, I felt it could calm us and understand that actually, we were on the same page.

With this extra time, Robert and his team did eventually develop a conceptual design for the institution, addressing both the overarching vision of the institution – and its alignment with both MIT and Singaporean principles and priorities – as well as finer grained details of the undergraduate curriculum and pedagogy, the composition of the faculty, and potential graduate-level programs the institution could offer. Although a high-level overview of the curriculum and academic structure of the new university, this conceptual design bears an incredible likeness to what would ultimately implemented at SUTD, demonstrating the influence that the discussions leading to the conceptual design would eventually have on SUTD as an institution.

The final SUTD conceptual design – completed November 2009 (Magnanti, 2018) and eventually included as a piece of the broader collaboration agreement – builds off of the previous MIT proposals, setting a vision for a multidisciplinary university with a near-single

minded focus on application, both of technology and fundamental science and mathematics. Setting the stage for what would eventually be called "Big D" Design at SUTD[47], the vision laid forth in this design is that of a university where all programs and stakeholders (particularly students and faculty) are oriented towards solving industrial and societal problems using the methods of design implemented across the value chain. As was discussed in the previous chapter, the MIT faculty involved in this effort overwhelming hailed from the Institute's engineering departments, making this application-based orientation of the SUTD proposal fairly unsurprising. At the same time, the Singapore Government's pragmatic orientation towards economic development also lends its educational institutions towards such an approach; thus, the new institution's application-oriented "outside-in" approach to education[48] (as Tom Magnanti would later call it), was inherently aligned to both Singaporean and MIT values and approaches, a fact that I argue fundamentally facilitated the establishment of the collaboration as a whole.

Similar to the original academic vision set forth in MIT's initial proposals, the final SUTD conceptual design organized the university into four "pillars[49]" corresponding to products, systems, and services, plus architecture—i.e. the "fundamental needs" of the world (in the view of the senior MIT faculty members designing this proposal). Even in this early

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[47] From Wood et. al. (2012): "Big D includes architectural design, product design, software design, systems design and basically all technically grounded design. It is design through conception, development, prototyping, manufacturing, operation, and maintenance – the full value chain. It includes an understanding of the liberal arts, humanities, and social sciences. In short, Big D encompasses the art and science of design."

[48] "Outside-in" refers to an academic approach that incorporates the needs of industry into the academic curriculum—i.e. bringing priorities from *outside* world *in*to the academic programs.

[49] The term "pillar" was chosen to denote these entities in lieu of traditional terms like "major" or "department" to emphasize and facilitate the multidisciplinary nature of SUTD's academic endeavors. As many SUTD faculty told me over the course of my data collection, however, these are "pretty much just departments."

version of the SUTD academic plan, these four pillars were designated as Architecture and Sustainable Design (ASD), Engineering Product Development (EPD), Engineering Systems and Design (ESD), and Information Systems Technology and Design (ISTD), names that would persist at SUTD through its steady state. To complete their "pillar years" of their courses of study, students would be required to take core subjects; subjects in a particular topic "stream" such as energy, telecommunications, or transportation; and a multidisciplinary capstone design project, which might straddle several of the pillars.

In addition to the pillar structure, the final conceptual design also discussed at length the introductory three-semester sequence of core courses required of each undergraduate student, a structure originally introduced in the earlier April proposal[50]. Designed using MIT's undergraduate General Institute Requirements (GIRs) and Restricted Electives in Science and Technology as a starting point, these courses were intended to provide students with the required fundamentals in science and mathematics (as the MIT GIRs provide) and technology and design (as the MIT GIRs do not). While the courses in the first two terms would largely mirror those of MIT's undergraduate core requirements – with the addition of a design course and a Great Books-like Humanities, Arts, and Social Science (HASS) sequence – the sophomore cluster developed by the conceptual design committee was a new invention unique to SUTD. In the courses delivered in this third term, students would develop the technological literacy required of careers in architecture and engineering through modules exploring the fundamentals of these careers: the digital world, the physical world, and the systems world. Furthermore, these classes would serve as introductions to the four

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[50] Divided into two freshman terms and a "sophomore cluster," which would ultimately be rebranded as the "freshmore year" by MIT-SUTD Collaboration Director Arjun Bhat, ever with an eye for snappy branding.

pillars, allowing students to make informed decisions when selecting their pillar of study at the beginning of their sophomore years[51]. Like at MIT, the conceptual design also included extensive humanities and social science requirements past the first year, requiring students to complete seven[52] HASS courses to qualify for graduation (including the two core Great Books courses in the first year).

The curricular structure presented in the final conceptual design – in particular, the design of the interdisciplinary freshman-sophomore course sequence – is perhaps the clearest example of how the involved faculty members' previous participation on MIT curricular reform efforts influenced the development of the SUTD curriculum. As described in Chapter 2, several faculty involved in the early stages of the SUTD project had also been involved in the 2006 MIT Task Force on the Educational Commons, which in its final report recommended several structural changes to the MIT curriculum, including to the HASS requirements as well as to the science and engineering core curriculum (Silbey et al., 2006). In the words of one faculty member involved in both groups in a March 2016 interview:

> And I think a lot of the energy of the people in the room, and the shape of the what became a priority in designing...in having a willingness to be involved in the Singapore experiment, was that those people, in science – [and] especially [in] engineering – wanted to see more design work in the early curriculum, and had failed to see it endorsed [after the Task Force report].

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[51] This common sequence of classes leading to selection of a course of study is particularly unique in the Singaporean context, where undergraduate students at the other public universities enter having already chosen a particular major (or "course," in the local vernacular). It is unclear if the MIT founders were all aware of this difference when designing the curricular plan; however, this approach would certainly have consequences once SUTD began to recruit and enroll its first students.

[52] At MIT, students are actually required to take eight humanities or social science courses to graduate (corresponding to one per term); at SUTD this number was reduced to seven to make room for the required freshman design class in the crowded curriculum.

This desire to broaden the science and technology core courses at MIT is directly reflected in the plan for SUTD's interdisciplinary freshman-sophomore course sequence, which was designed to include foundational math and science, interdisciplinary coursework in technology and systems, and – perhaps most importantly – experiential design projects. With SUTD, these faculty were given the opportunity to develop this curriculum without the administrative roadblocks to implementation they faced at MIT, illustrating how the opportunity to design an educational experience without institutional constraints drew them to – and affected their participation in – the SUTD endeavor.

While the curricular structure set forth in the final conceptual design is fairly similar to what would ultimately be offered at SUTD, the conceptual design's imagining of SUTD's pedagogical approach ultimately would not be exactly realized, although reflections of the original framers' intents remain. Originally, SUTD's pedagogical approach was conceived as a mélange of different pedagogical approaches, combining lectures, recitations, laboratories, studios, and discussions in different combinations depending on an individual student's course of study (although always with an emphasis on hands-on learning, reflecting the MIT motto of *Mens et Manus*, or "mind and hand"). In this original vision, MIT framers ultimately left the door open for the establishment of student learning communities that would travel through the curriculum as a group, an idea that ultimately would result in the development of SUTD's cohort-based combined freshman-sophomore year (see Chapters 4 and 7 for more on this model).

In addition to their conception of SUTD's academic curriculum and pedagogical approach, SUTD's framing faculty at MIT also included grand dreams for student life at SUTD within their initial frameworks, imagining a vibrant and engaged population of students building, creating, and serving their community, similar to the student body at

MIT[53]. Thus, in the final SUTD conceptual design faculty explicitly stated that SUTD's students should be limited to four classes per term, to provide students opportunities to participate in "opportunity programs" in research, teaching, industry, or other areas that would emerge over time (modeling after MIT's popular UROP and UPOP programs, which operate without restrictions on the number of classes in which students can enroll). Said an MIT faculty member involved in these discussions in December 2016:

> I can give you an example of a case where we tried to make sure that SUTD did not commit the same errors that MIT has over time and that had been very difficult to repeal or reverse. The MIT curriculum is very congestive. There are many required subjects. There are many restrictive electives. Students tend to be overburdened. They tend not to have always sufficient time to either enjoy, appreciate, or internalize efficiently what they're learning in any given course. And so one of the recommendations was – or rather let's do it here [in Singapore] – was a rather strict limit on four subjects per semester, which is not a restriction at MIT. And the purpose was also to give students time to do extracurricular activities. MIT students do many extracurricular activities despite the fact that they're taking five or six subjects, many of them were extremely active in either—well, in the clubs, but that's a rather loose word. But for example, solar vehicles and electric vehicles and hyperloop—all these activities that go on in addition to course work and UROP [research] projects. And the idea was that in order to somehow reduce the stress it would be better to – from the beginning – try to define a curriculum which left adequate room for those kinds of activities.

In addition to the core design class included as a component of the freshman-sophomore sequence, this structural limitation within the curriculum is one of the clearest examples of how MIT faculty used the SUTD opportunity to design an idealized institution without the institutional constraints of an established university like MIT.

Finally, in addition to the curricular and co-curricular structures of the new university, Tom, Robert, and the other members of the conceptual design group also set the

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[53] In 2012, MIT's Association of Student activities registered 436 student clubs at MIT, a campus with approximately 10,000 students (4,000 undergraduate and 6,000 graduate) (Fisher, Bagiati, & Sarma, 2017)—given this proportion, students at MIT are often cringingly over-extended with their extracurriculars (in the views of several faculty interviewed for this study).

structure by which the proposed collaboration would operate—i.e. the exact mechanisms that would be established to "transfuse the MIT DNA" from Cambridge to Singapore (as many participating MIT faculty were wont to say during this period, per my own experiences with the collaboration at this time). Although the collaboration itself would ultimately be far more wide reaching than the specific programs set forth in this plan, some key mechanisms outlined in the collaboration outline included (Bagiati, Sakhrani, et al., 2012):

1. Provisions outlining the process by which MIT faculty would "deliver" courses to SUTD, by supplying syllabi and other course materials for approximately 100 courses in the undergraduate curriculum;
2. Support for short- and long-term MIT faculty "residencies" in Singapore, during which they would do research or provide academic support (either as visiting instructors or in consulting roles) for SUTD courses;
3. Development of a faculty development program to expose SUTD's early hires to the MIT faculty culture, as well as to provide them with teaching and research support;
4. Creation of a joint postdoc program to supply SUTD with "surrogate" graduate teaching assistants for the undergraduate programs as SUTD worked to recruit its own graduate students;
5. Establishment of undergraduate exchange programs between MIT and SUTD (with particular emphasis on opportunities for Singaporean students to study in the United States, per the interests of the Singaporeans); and
6. Creation of an SUTD-MIT Education Committee (EC) to provide oversight on the academic collaboration as a whole.

In addition to these educational mechanisms, MIT founders also believed that joint research projects supported by the IDC would also help to communicate the MIT DNA to Singapore

(per discussions with two faculty involved in these deliberations), particularly given the Institute's focus on interdisciplinary, boundary-breaking research. With proposals for these collaborative structures – and consensus around an academic and research plan for SUTD – it was time for MIT-MOE negotiations to begin in earnest.

With a satisfactory conceptual design and a proposal for a formal collaboration in hand, in the last months of 2009 MIT's leadership was ready to pursue final negotiations for the SUTD project under these guiding frameworks, an endeavor that would ultimately require a formal contract of satisfaction to both MIT and MOE stakeholders. At the same time, the Institute's calendar also showed that then-MIT president Susan Hockfield was scheduled to be in Singapore in late January 2010, providing the perfect opportunity to sign a formal collaboration with the pomp and circumstance appropriate to such an endeavor. With this visit rapidly approaching on the calendar, the MIT and MOE teams had a deadline—finish negotiations for a final collaboration contract by mid-January, or miss an opportunity to unveil the SUTD agreement in a way befitting the circumstances of the occasion[54].

Under this intense time pressure, MOE sent a team to Cambridge to negotiate the agreement, which would outline the specific deliverables for both MIT and MOE within the seven-year period of the academic agreement (and the corresponding ten-year agreement for

[54] In Singapore, formal occasions – especially those including representatives of the government – generally have a great deal of pomp and circumstance, including (but not limited to): an official opening or closing by a senior leader in attendance, singing of the national anthem, or giving of certificates or awards. Even student events at SUTD are generally formally "opened" by a senior member of the academic leadership, often accompanied by a bang from the official campus confetti cannons.

the International Design Centre[55]). With the MOE's legal team and its Director of Higher Education on one side of the table and Robert and the MIT lawyers on the other, the group worked day and night to hammer out the details of the massive agreement. In the words of an individual familiar with this period: "They worked essentially around the clock. This is true—essentially around the clock. I was getting emails at 3:00 in the morning from the Singapore side saying, 'Here's what happened today. Any comments, any suggestions?' Those types of things."

At the end of this period of frenzied negotiation, the teams from MOE and MIT ultimately emerged with a collaboration agreement, totaling several hundred pages. With the behind the scenes work complete, President Hockfield was able to participate in a formal signing ceremony for the collaboration agreement on her Singaporean visit, at which Singapore PM Lee Hsien Loong provided his first extensive comment on the agreement, via a video message (U. Lee, 2010):

> 'We wanted to add something new and valuable to our university scene which the existing universities did not provide, and we eventually came up with a solution which is the SUTD,' PM Lee said, adding that the 'very high-quality education' will teach students 'how to think and apply what they have learned' when they enter the workforce. '(They should do this) not just in the technology and design areas, but also be creative in bringing it out of the academic environment into the real world, into the business arena, into the real economy and make a difference to the world.'

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[55] Originally, the IDC was conceived as another one of Singapore's Research Centres of Excellence, which are university centers jointly funded by the universities and NRF; however, ultimately this center did not align with NRF's priorities and they declined to fund the proposal, and MOE agreed to support the first ten years of the research agreement – in addition to the academic collaboration – instead. Said one MIT faculty member with experience with the IDC: "I think it also was not a research priority for them [NRF]. I don't think they were ever particularly persuaded that design was a good topic for research. I don't think they ever really believed that. And I was never able to convince them of that." Other MIT and SUTD faculty acknowledged that there were also most likely political factors within or between the various governmental agencies that lead to this outcome—regardless of these factors, however, MOE footed the bill for the IDC, since a commitment regarding this entity had already been made to MIT before NRF came to its final funding decision.

With the negotiation process complete and announced publicly and with much fanfare, the MIT team was then faced with the task they had been working towards for over a year: creating a university in just 22 months, in preparation for the first class of SUTD students to enroll in November 2011[56].

Given his experiences with both SMART and the SUTD negotiation, Robert O'Malley seemed the logical choice to head the collaboration effort; however, after the fervor of the negotiation period, Robert ultimately decided to step down, turning down the position of MIT-SUTD Collaboration Director in hopes that someone with relevant research and administrative interests would take up the role. Faced with the prospect of a full-blown university startup project on ambitious timeline, what faculty member would be a better fit for this role than a self-proclaimed "start-up guy" and – fittingly enough – a graduate of one of MIT's first overseas university partnerships, to boot?

To fulfill the role of MIT-SUTD Collaboration Director, MIT's senior leaders turned to Arjun Bhat, an energetic and entrepreneurial faculty member in the school's department of mechanical engineering. Although a native of India – and a graduate of IIT-Kanpur, one of MIT's first large overseas initiatives – Arjun has spent almost 30 years in the United States, making a name for himself as both a scholar and entrepreneur in radio-frequency identification technology (RFID). Self-described as always eager for a new project or a new challenge – and with a penchant for internationally oriented work – Arjun seemed an ideal choice to lead the new MIT-SUTD Collaboration Office after the signing of the

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[56] Ultimately, the start date of the first batch of SUTD students was pushed back to April 2012 to facilitate unified entry of male enrollees as they completed their state-required National Service (Leow, 2010). Perhaps to the relief of the stakeholders involved, this shift also gave planners at both MIT and SUTD a bit more time to plan for the students' arrival.

collaboration agreement in early 2010. Intrigued by the challenge and opportunity of building a new university from scratch, Arjun agreed to take on the MIT-SUTD Collaboration Director role after being asked to serve by MIT's senior leadership.

One of the MIT-SUTD Collaboration team's first challenges in making the SUTD conceptual design a reality was to recruit MIT faculty as the leads for various components of the endeavor: "cluster" leads to facilitate development of various areas of the curriculum, an MIT-based director of the IDC, a facilitator for the SUTD faculty development program, and so on. While many of these coordinators transitioned into their roles after serving on the initial planning committees, some required active recruitment by Tom Magnanti, Arjun Bhat, or members of the MIT administration (as several of the cluster leads later described). By late 2010, twelve MIT faculty members were serving in cluster lead or co-cluster lead roles, with Arjun and his small staff coordinating the efforts of these faculty as they worked to flush out the curricular specifics of their pillars. After transitioning out of his role as the leader of the MIT team, Robert O'Malley agreed to serve as the coordinator of the sophomore cluster, recruiting fellow Mechanical Engineering professor Arthur Foster – the future successor to Arjun Bhat in the Collaboration Director role – to lead development of the two freshman terms.

As a first step, each cluster lead gathered a team of faculty to "scope" out their pillar curriculum, defining the educational objectives for the academic programs before deciding what particular courses would achieve those desired outcomes. In the pragmatic fashion characteristic of engineers – as well as the Singapore Government, fittingly – several of the cluster leads approached curriculum design by first reflecting upon the needs of relevant industrial organizations in their fields, allowing the curriculum itself to follow based on these desired outcomes. In the words of one of the cluster leads: "I think [it was] like a design

exercise. So [we] began with: what was it we were trying to deliver, in terms of student graduates, for what types of jobs, what type of industries, so forth? Then based on that, okay, then what should the undergraduate curriculum do?" Notably, given the lack of faculty or academic administrators in Singapore during this period, MIT faculty designed the structure of the SUTD curriculum largely independently, with Tom acting as one of the only voices formally representing SUTD (as described in the next chapter).

In addition to their responsibilities to first organize the overall curriculum for their pillar, the cluster heads were then responsible for recruiting other MIT faculty members to develop specific plans for the individual courses that would populate the pillar curriculum once it was introduced at SUTD. As one former cluster lead described this process in a November 2014 interview:

> The way I presented it to each of these people [from whom I solicited classes] is, 'Look, this is an opportunity for you to work on your class you can make your class better. I am talking about pay…being able to pay for you to work a summer month on your class and you have to develop…you know, work this through and to be able to say, 'How could I make my class better?' And so you can teach that [revised version] here in MIT. The only catch is you have to give me all your materials, tests, you know, notes, all those things and give them all to me so I can submit it to SUTD.' That's the only pitch but it's essentially…and this is really what was pitched to the entire faculty, you know, in terms of this is a huge amount of work and the question was, you know, 'Well, are you just taking faculty away from teaching people here?' And the argument was no, what's happening is we're paying people to make their courses better here and then we're bringing that to SUTD as part of their curriculum, so will kill two birds with one stone. And that flew with the administration and flew with most of the faculty around here and, you know, with no risk forced.

With Arjun, Robert, Arthur, and the other cluster heads circling MIT to recruit faculty to participate in this effort, they gradually compiled a database of course proposals from faculty all across the Institute, complete with course descriptions, learning objectives (LO's), and measurable outcomes (MO's), as was specified in the collaboration agreement. As had been the case in developing both the initial proposal and the final conceptual design, the initial

MIT faculty serving in these roles consistently faced a challenge common to academia—reconciling many competing viewpoints of faculty from within and across disciplinary boundaries, particularly when developing common core curricula for disciplines as different as architecture and engineering[58]. Despite these differences, through hours and hours of discussion and debate the plan described in the proceeding pages was flushed out to a workable level, based upon the participating faculty's views on education, their experiences at MIT, and the framing set forth by the Ministry of Education. As the specifics of the curricular plan began to solidify, however, a new group of voices was brought into the mix—the academic and administrative leadership of SUTD, who would enter SUTD with their own visions of what a new Singaporean university could – and should – look like.

[58] Said one MIT engineering faculty member of his understanding of the architecture discipline, for example: "Well, I didn't think it would be that different, just naively say, 'I know architecture is the design and engineering of buildings, so I guess it won't be that different.' But I feel in fact it is professionally and culturally different. And now I understand that better."

Part II: Founding

Chapter 4: The SUTD Pioneers

'It gets very difficult to unravel a culture that has been ingrained in an old institution. [...] There are always set ways of doing things. […] Here, you know, you have the opportunity to set up something new. If you set your parameters to how your company needs to be driven, and what kind of culture will drive its mission, it's now. Do it right now. You might be able to get it right 80% of the time, and then you scale and sustain it for the rest of your livelihood. […] Now the danger of having to assemble people from different walks of life – particularly those that come from other universities – [is that they] will have other, older fashions of doing things." – Early SUTD Affiliate

In 2017 – 5 years after SUTD opened its doors to students and 7 years after the signing of the MIT collaboration agreement – early SUTD staff members still have the habit of working their employee number into casual conversations when out and about around campus, quickly establishing to those new to the institution that they were employee 6, 12, or 32. A not-so-subtle demonstration of status, it appears to be particularly desirable to have an employee number lower than 7, the designation Tom Magnanti received upon being formally hired by SUTD in October 2009. Given that SUTD had no staff and no facilities when it was first incorporated, however, how and by whom were these early staff members actually hired, if there wasn't even a staff to dole out the employee numbers?

The answer, of course, lies with MOE and the then-newly formed SUTD Board of Trustees, whose first job was to select the staff members that would found SUTD as it created itself as a fully operational university from the ideas set forth by the framers at MIT. Thinking operationally, MOE first turned to find the heads of what it viewed as the necessary departments to the functioning of an organization – finance, facilities, and human resources – before quickly expanding to include marketing and communications, as well as deputies and staff support for each of these departments. Given that the first hires of the university were made before SUTD was even incorporated, the first few members of the organization – notably, the head of human resources and the head of facilities – were

officially hired by and housed at the National University of Singapore before their official employee affiliation with SUTD could be processed. Thus, it was in an NUS conference room that Tom Magnanti received his first view of the team that would help him realize the dream of SUTD, via a videoconference beamed between Singapore and Cambridge. It was at this meeting that Tom first insisted that his staff call him "Tom" rather than "President" or "Professor," making the first of his many intentional attempts to have SUTD buck the Singaporean trend towards strict hierarchy and reverence to those in positions of authority[59].

While some of these early administrative staff members did come from Singapore's other universities or the higher education sector more broadly, many of SUTD's early senior leaders came from Singapore's private sector, including the Directors for Human Resources and Marketing and Communications, as well as the campus librarian. When discussing the approach to staffing the university, one member of the original Board of Trustees said of this process in June 2017:

> So, we felt that we wanted a university that would be also quite efficient, and that we did not have to duplicate too many functions and that if possible, if there were things that we could do with other universities, we should be open to it rather than have our own individual...well, many, many organizations like to replicate everything. They want to have this function, that function, and so on. So they end up very heavily laden with too much human resources. But we felt that with SUTD, there were things that perhaps we could do differently. We could perhaps…like our investment

[59] Said Tom years later in an interview with *Multiverse*, the SUTD student literary magazine (Larasati, Mak, & Sim, 2016, pp. 15–16): "Why I like you all to call me Tom—this is done quite on purpose. The first meeting that I've ever had with the staff here, […] the first meeting we had was via the internet over video conference. The first thing I said was 'from this moment on, I'm to be referred to as Tom, not President Magnanti', because that's the culture that I wanted. That's the kind of culture that we want to have with the university, where we felt this lack of hierarchy in some ways would make us feel the sense of community, the sense of—we can get a little corny and say a sense of family, however you want to think about it. Now that's not to say we don't have rules and regulations and that there isn't an hierarchy [sic] because someone has to define what the curriculum is, someone has to make decisions about certain things, and the faculty and administrators have to do that. I think they've got some responsibilities to fulfill but we want a culture that is open, we want a culture in which you feel you have the freedom—almost an obligation to speak."

> office, it would be good if we could come together with SMU or other universities and work on that end, so have a more compact unit and share resources. And some of the things that other universities were doing, if we felt that we could partner with them, it would be better suited. We reduced the administrative head count. So that was one of the things that we wanted to do. And so we had to bring in administrators and the people that actually work on finance, on the operations, on the marketing, et cetera.

Clearly, narrative surrounding the staffing decisions made on the operational side of SUTD was at least in part one of efficiency, wherein staff members claimed to organize the new institution to run like a business, rather than prioritizing more traditional models of higher education operations, which are not known for their leanness or efficiency (as anyone who has worked at a university can probably attest). Today, it is clear that that this narrative has at least partially taken hold, as manifested by the language used by many employees to describe the work done at SUTD—in some administrative departments, the approach is so business minded that individuals refer to students as "clients," education as a "product," and SUTD itself as a "company" rather than a university. I would argue that this is due – at least in part – to the autonomy that these early administrators were given in staffing and running their departments given the sheer volume of work to be done in SUTD's early days; in the words of one individual familiar with this period from February 2017:

> Each of the [unit] heads had the aspiration of how they wanted to run their department and how they wanted to run that department in sync with the university mission—in sync with what the university was going to represent in terms of pedagogy, in terms of research, in terms of administrative functions. So that was quite…that was very well coordinated, there was a lot of coherence in that. Helped that it was a small group, but helped even more that many of them were [industry] heavyweights who knew what they—who have done maybe something quite similar, or who at least had led teams in their previous jobs.

Framing SUTD as a business endeavor certainly aligns with the Singaporean view of the social sector emulating the private sector—for example, representatives of the EDB have been known to categorize the country as both "Singapore, Inc." and "Singapore Unlimited" (Schein, 1996).

While many of the high-level administrators hailed from the Singaporean private sector (and ran their departments based on these previous experiences), a few – notably Ang Chok Tong, the Senior Director of Campus Development – came from Singapore's existing autonomous universities, NUS, NTU, and SMU. Furthermore, as these early departments expanded to fill lower-level administrative roles, they more and more looked to the other universities to hire administrative staff, as most professionals with higher education experience in Singapore would hail from one of these three institutions. Said one early SUTD affiliate of this phenomenon in February 2017:

> Especially when new people come in, they come in with their own mindset and their past institutional experience. They might or might not embrace the new – the SUTD culture or practice it so much, yeah. […] Especially if they have worked in the other institution for like many, many years. Then they might just think, you know, one university is the same as another university and just carry on, you know.

Thus, over time there emerged two distinct perspectives among SUTD's administrators, in which some departments strived to run SUTD like a high-functioning, efficiency- and profit-oriented Singaporean business, with others operationally functioning very similarly to their counterparts at NUS, NTU, or SMU. And – as will be seen in Chapter 9 – the differing approaches of these Singaporean administrators would have a lasting impact on how SUTD would operate as an organization in the long term.

With early administrators on board and the operational practices of the university beginning to take shape, the Board's next task was to hire the remaining academic administrators, to provide support and perspective for Tom and the MIT team as the academic plan for SUTD took shape. Like with the early senior administrative staff, the decision regarding where to look for these individuals – inside or outside of Singapore, and at what types of institutions – would also have lasting impacts on SUTD as an organization,

and its composition and balance of traditionally Singaporean versus non-Singaporean "cultural DNA."

Although Singapore is a multinational, multicultural, and open city, after time in Singapore one learns that there is still a "Singaporean way of doing things" based on structure, meritocracy, and pragmatic rationales for decisionmaking. Although evident in many fields, the Singaporean approach is particularly evident in education, due in large part to the role education played in developing Singapore's workforce, the island nation's sole "natural" resource (see Chapter 1 for more on this perspective). Thus, although Tom Magnanti had years of experience in Singapore at the time of his hiring as the inaugural SUTD president, it was important to MOE stakeholders that the Singaporean perspective also be included in SUTD's upper-level academic management—after all, the MIT-MOE agreement was meant first and foremost to be a collaboration, in marked contrast previous failed higher education enterprises like UNSW-Asia or NYU's Tisch-Asia. As one board member described in August 2017: "Our thought was very clear. You have a president from MIT, surely you want someone [else] to understand what is going on in Singapore. Otherwise the SUTD can be anywhere else in the world. So I thought...it's not explicit, but implicit. Isn't it obvious?" With this perspective in mind, in 2009 MOE and the Board of Trustees[60] began a search for two important individuals to complete SUTD's initial academic

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[60] Notably, while Tom Magnanti did have some role in interviewing candidates for these positions, the final selection of these individuals was that of MOE—said one MIT faculty member with knowledge of the period: "I think that there were definitely efforts to try keep it in balance. I think that it was actually a little bit painful that Tom didn't really get to choose his own provost. […] I don't think it was up to him; I'm pretty sure it came from the Ministry. And this must've come as a shock, because I'd think the president of MIT would have [had] a lot more input [on hiring]. And this is maybe the baseline expectation you

management team: a Provost to serve directly below Tom Magnanti and an Associate Provost for Education to aid in the development of SUTD's academic approach and structure. Given Tom's plan to return to the United States on a monthly basis during his term as President, the provost would serve a particularly important role, acting as the campus' leader during Tom's frequent absences from Singapore.

The first of these academic leaders would come to SUTD from NTU, geographically about as far as one can get from SUTD's planned home on Singapore's eastern tip without accidentally venturing into Malaysia. At the time of SUTD's incorporation, Dr. Lee Yam Keng – or "Prof Lee" as he would later be known to SUTD's students, per the Singaporean vernacular – was a "rising star" at NTU (in the words of a fellow SUTD administrator), serving as the Head of the Microlectronics Division, Director of the Microelectronic Centre, and Director of the Nanyang Nano Fabrication Center, in addition to his role as a Professor in the NTU School of Electrical and Electronics Engineering. With a clear energy and passion for education – as well as his Singaporean education credentials, which include both undergraduate and doctoral study at NUS, as well as his work at NTU – Dr. Lee was considered to be the perfect fit for the Associate Provost for Education role, and joined SUTD in January 2010, just as the MIT agreement was officially inked.

Given the importance and visibility of the SUTD Provost role, it was perhaps even more important for the individual selected for this position be of the Singaporean establishment, and well aligned with the interests and perspective of MOE. After a search across the island, MOE and the Board eventually settled on Dr. Guo Wei Xun, who in 2010

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could've had. But it is [a] Singapore university, and they really felt they needed to balance that out, someone who knew the landscape there."

was serving as a head of two divisions at Singapore's influential Agency for Science, Technology, and Research (A*STAR), while also maintaining a faculty appointment in Electrical and Computer Engineering at NUS. Prof Guo is – as many stakeholders around SUTD described him to me – a "true blue Singaporean." Coming off as friendly and soft-spoken – although with disciplined body language reminiscent of his days in National Service – Prof Guo is a President's Scholar, having received the most prestigious undergraduate scholarship offered by the Singapore Government's Public Service Commission[62]. From his resume both before and during his time at A*STAR, it is clear why MOE and the SUTD Board thought Prof Guo would be an ideal fit for the SUTD position, as he brought to the role both academic and non-academic leadership experience (from his administrative roles at NUS and A*STAR) and experience overseas (having completed his undergraduate training at the Tokyo Institute of Technology and his doctoral work at – fittingly – the Massachusetts Institute of Technology) (Ministry of Education, 2010). In early 2010, however, there was one significant challenge in bringing Prof Guo to SUTD—he was unable to leave A*STAR until May 31, thereby potentially missing five crucial early months of SUTD's development as he waited to complete his current appointment. With the decision made that Prof Guo was the right man for the job, however, Tom and the fledgling SUTD team would just have to deal with this delay, bringing in the future provost for discussions part time and relying on Prof Lee for the day-to-day work of realizing the new university.

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[62] Past President's Scholars have become politicians, Cabinet ministers, Supreme Court Justices, and even Prime Minister, in the case of Lee Hsien Loong (O. P. Lee, 2012; W. L. Lee, 2015).

Although both Prof Lee and Prof Guo hailed from traditional, established Singaporean educational and research organizations, it became clear over the months and years after their arrivals at SUTD that both "drank the Kool Aid" (as one MIT faculty member later described to me) of SUTD's curricular and pedagogical approach, despite the stark differences between this model and those of their previous institutions. As SUTD worked to recruit its first students and faculty, these individuals became some of the staunchest proponents of the SUTD academic approach, and in 2017 still serve as effective ambassadors for SUTD, particularly when convincing nervous parents to allow their children to enroll, as they can communicate a shared Singaporean perspective in a way that SUTD's foreign faculty and administrators cannot. And – as will be seen later in this chapter – these individuals also played important roles in realizing SUTD's curriculum and academic structure, imbuing a Singaporean perspective into the MIT framers' original plan for the institution.

With SUTD officially incorporated – and the early leadership team beginning to take shape – the fourth university was quickly assigned a new home by MOE: a small group of offices on the top floor of a facility at 287 Ghim Moh Road, a short drive north from the National University of Singapore. SUTD's home for approximately two years, the Ghim Moh offices were on the top floor of an old elementary school[63] and housed at the beginning just a few offices, including the offices of the President and Provost, the Office of Education, the Office of Human Resources (HR), and the Office of Finance. In general,

[63] Since repurposed as the Singapore Centre for Chinese Language, in case you're ever looking for it.

those present during these early days recall Ghim Moh with a kind of fond nostalgia; said an individual familiar with this period in February 2017:

> I liked the old place. […] It's so quaint and cozy. If you're a Singaporean you would have grown up in one of those – if you're a 40 (or over) year old Singaporean – you would have grown up in an environment where schools were like schools; chalk and duster and blackboard type schools [like that one]. And we only occupied the highest level at that school – that makeshift school – and it was only just basically HR and finance and the provost's office and education office.

Given the size of the staff during this period (described to me as no more than a few dozen people) and the temporary, ad hoc environment in which they found themselves, SUTD in its early days essentially functioned as a startup with an espoused "all-hands-on-deck" mentality. In this time, people from across departments would intermingle and help one another with ideas or projects as necessary, creating a close-knit community within the small team. Perhaps viewing this environment in contrast to the large business organizations from which many of the early staff members came, these individuals began to recognize and cultivate a culture of family within this space. Said one individual familiar with this period: "We were tiny, and we were all friends. We were, at that point in time, really just an extended family." Although this narrative of the "SUTD Family" has persisted to the current day – in large part to the efforts of SUTD's first students, as described in Chapter 6 – it does often contrast with the approach taken in SUTD's operational practices, as described in Chapter 9.

Figure 3. SUTD's first official home, at 287 Ghim Moh Road (July 2017).

While the new SUTD team finally had an official home, the university was – in large part – still just an idea, albeit with a clear vision set forth by Tom and the team at MIT. Given the seriousness with which Singaporean parents approach the education of their children, early administrators viewed it as imperative to create a strong identity for the institution to use in marketing and promoting the idea of the new university to its first prospective students. This task fell to Sylvia Low, SUTD's new Director for Marketing and Communications, who joined SUTD in 2009. With professionalism and confidence reminiscent of her years in Singapore's private sector, Sylvia quickly joined with the Board of Directors to develop a "brand identity" (as it is referred to in her office) for SUTD in preparation for the first marketing campaigns to target new students.

What emerged from this brand development process was an identity for the institution that was fundamentally oriented towards application and problem solving, best captured by the university's new tagline: "A better world by design." Sylvia and the Board of Directors – the majority of whom are Singaporean – ultimately settled on the brand positioning theme of "innovation" in hopes of developing a university that would "serve as a

catalyst and an innovator for the [Singaporean] higher education scene," as a Marketing and Communications staff member explained at a new employee orientation event in December 2016. This institutional framing – which would ultimately be a key factor for recruiting students to the university – clearly aligns with the Singaporean values of education as a practical pathway towards production and growth, and the influence of this messaging on the perspectives of SUTD's future students would have clear and present impacts, particularly in the projects and initiatives they choose to pursue during their undergraduate years.

In addition, Sylvia also completed this process of brand positioning armed with a new logo for SUTD, which was meant to invoke the SUTD (and Singaporean) mentality of the marriage of East and West, combining the feel of western text (as in MIT's block letter logo) with the square shape of Chinese characters[64]. And across the bottom of this logo in large, maroon letters were five words that Sylvia and her team believed would be key in attracting students and their parents to come to SUTD: "Established in collaboration with MIT."

[64] I've been told that the shape of the letters is also meant to invoke a chope (a traditional seal used to stamp official documents in East Asia), a maze, and/or a computer chip.

Figure 4. SUTD's official logo, 2010-2017.

In the latter half of 2010, as SUTD's leadership team settled in to their new home in Ghim Moh and began the task of branding and promoting SUTD across Singapore, Arjun and the cluster heads worked furiously in Cambridge, attempting to compile a complete, flushed-out plan for the SUTD curriculum, along with high-level course overviews including course summaries, learning objectives (LO's), and measurable outcomes (MO's). By December 2010, the small staff of the MIT-SUTD Collaboration office – along with each of the cluster heads for the various aspects of SUTD's curriculum – had compiled a massive slide deck outlining 105 courses proposed by MIT faculty to fill the curricular plan. With this compilation process complete, Tom, Prof Guo, and Prof Lee traveled to Cambridge to provide feedback on this plan in a marathon meeting with Arjun and the cluster heads. In the words of one of the MIT faculty members present at this event (interview April 2016):

> Lee and Guo were here and then we literally went through the entire program and, you know, each class had a write up with LO's, MO's, and a paragraph on the back to each one. […] You know, we identified that this class could be a good class to have, and a lot of these things it goes through. So we went through this whole thing with Lee and Guo and Magnanti. And, you know, talking about it, yes, this is good

> idea, you know, and so forth and so on. It was two days of meeting; something like that.

Although these Singaporean stakeholders had been involved in the course and curriculum drafting process throughout, this meeting was the first formal opportunity for the MIT and SUTD stakeholders to discuss the curricular plan as a whole. With Prof Lee, Prof Guo, and Tom Magnanti happy with the output of the session, Arjun and the cluster heads were given the green light to proceed with the development of classes, and each went back to the MIT faculty to finalize the individuals who would develop the courses, many of whom would later expand their involvement to include significant time at SUTD's campus in Singapore. For instance, it was during this period that Arthur Foster first recruited Joyce Williams to lead development of the chemistry curriculum, setting the stage for her long-term support of and interaction with SUTD's chemistry and biology instructors.

With the first academic leaders of SUTD selected and a final plan for the curriculum rapidly taking shape, the SUTD Human Resources department turned to their next challenge: identifying and recruiting the four "pillar heads" to lead the four academic units of SUTD[65]. In contrast to the process to hire faculty and lecturers (as described in Chapter 5),

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[65] Notably, neither the Math and Science nor Humanities, Arts, and Social Science (HASS) divisions were assigned a departmental head in SUTD's early design, illustrating the extent to which framers and founders of the institution – both at MIT and SUTD – implicitly viewed these divisions as lower priorities than the pillars. Only after years of lobbying from HASS faculty and their allies at MIT was the HASS department – since renamed a "cluster" to differentiate it from the pillars – able to secure a head; as of July 2017, the Math and Science cluster did not have anyone in a leadership position. In the words of one MIT faculty member familiar with the HASS process (from a March 2016 interview): "There were a couple of years of, 'What are we gonna do about this [HASS situation]?' Which also involves saying, 'Well, okay, you still have your four pillars. No, we're not [advocating for] humanities majors. We're not asking for that. We're just saying you have to have qualified people who can teach, in a way that makes sense, within what you've constructed.' So the bringing in of a HASS person, [the goal] was to bring in someone who could hire some actual faculty lines,

the pillar heads and associate provosts were actively recruited using a professional search firm. Although this firm managed the day-to-day of recruiting these individuals, MIT faculty members played a key role in identifying leading scholars who might be appropriate to lead the various pillars, and in liaising with these potential hires as they considered whether or not to join SUTD. In the words of one former MIT cluster lead, his role in the pillar head recruitment process was "both identifying them, as well as getting them there [to Singapore]." In addition, the founding SUTD Board of Directors also played a role in this process, representing the Singaporean perspective in the decisionmaking process. As one SUTD affiliate described in July 2017:

> [Prospective pillar heads] were evaluated by them [Tom and Prof Lee], they were evaluated by MIT, they were also evaluated, [for] lack of a better word, by the Board as well as the Ministry of Education. I mean, it's to be expected because we had...I mean, it was the first batch of people that we assemble[d], we had to make sure that they all were in sync with the mission of the university. The board was very clear [that] the first level…the first generation of board members that we've had were very clear with what Singapore had to do with the SUTD. The Ministry of Education didn't play a very big part in it; they didn't breathe down our necks and say that you are to find such and such a person. If anything it was more of a sanity check. With all due respect to how things are typically done in Singapore – even with military authorities [in] Singapore, for example – we are adventurous but we make sure there are checks and balances to ensure that the process wouldn't go awry with radicalism and such. These are just some other things that we think about along those lines, but it's more a track; then they needed to validate everything.

The leaders of both MIT and SUTD sought top scholars to fill these vacant positions, believing strongly that the success of the university would ride on the quality of its faculty, particularly those faculty that would serve in SUTD's leadership positions (as several MIT faculty and SUTD administrators described). In seeking this caliber of faculty, however, those recruiting for these positions faced an immense challenge, as few high-

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that would attract people who'll want to come [and] who are of the caliber that you would expect if you're going to put MIT's brand near it. And that took a couple of years then – after they even decided that […] – to get someone who was willing, and fit those criteria. That's why it took a long time."

profile scholars at top engineering and design institutions – most of which are located in Europe or the United States – were interested in uprooting their personal and professional lives to move to Singapore full-time to work at a university with no faculty, students, or research enterprise to speak of. To make the prospect of these types of appointments more attractive, a compromise solution was offered: founding pillar heads could negotiate limited appointments of three to five years at SUTD while on leave from their home institutions, leaving SUTD after the founding work was largely complete[66]. In the end, three of the four founding pillar heads would take this arrangement, with only Andrew Meyer – the founding Head of EPD as well as the founding director of the SUTD branch of the IDC – planning to stay at SUTD in a long-term capacity.

Of those that eventually agreed to take on positions as pioneer pillar heads, the two interviewed for this study described the opportunity to create a new university from scratch – particularly within the context of a collaboration with MIT – as the biggest draw to join SUTD. Said one of the pioneer pillar heads of why he chose to leave his previous faculty position to join SUTD:

> So, I never thought I would get attracted away [from my previous institution], but there are very few times in our lives that unconditionally you get to start something that has great potential. Like [in] a collaboration between, you know, the 4th GDP in the world country with MIT. […] Likewise, being able to reinvent education or in terms of organization, pedagogy. [Being able to reinvent] all the structures and things in the multidisciplinary aspects, et cetera, that are virtually impossible to do in establish[ed] universities no matter who they are. It is a once in a lifetime type of opportunity.

[66] Tom Magnanti negotiated a similar arrangement, originally planning to return to the United States in 2015 or 2016, but eventually extending his term to eight years.

Tom Magnanti also played a key role in recruiting these academics to SUTD, particularly in their late stages of decisionmaking. Said one of the original pillar heads of the process of choosing to come to SUTD:

> Before I finally decided to come here there were several meetings with quite a few people here, but the meeting with Tom was the most effective in [leading] me and my wife to make the decision. […] SUTD was really, really nice in making – doing everything for us and for her so that we have no sort of questions remaining of how Singapore will be et cetera, et cetera. And Tom, of course, he's a fantastic person, anyway. He was fantastic. He is the one who convinced me that this would be a good place.

Of particular importance in these recruitment efforts was the vision Tom set forth for the university, as a unique institution that could serve as a test bed for research and educational innovation. As this pillar head continued:

> The vision that was sold was it is a new and different kind of university. And I understood the different kind because I know the universities in Asia, how they function, they are very hierarchical. They do not provide the kind of flexibility and opportunity that are available to a U.S....in the U.S. university. So I could immediately get that. And then the fact that it could be a different university not just in that sense but in also the sense that the design and curriculum, the pedagogy, et cetera, is going to be quite different.

As the founding pillar heads arrived at SUTD between 2011 and 2013, each began to make their marks on their respective pillars' academic programs, taking the original plans set forth by MIT and liaising with the assigned cluster leads to modify them based on their own professional experiences and perspectives, as described in Chapter 7. Notably, none of these founding pillar heads were Singaporean or Singapore-educated, and brought with them decidedly Western views of education upon their arrivals in Singapore. In addition, of all the talk of transferring the "MIT DNA" to Singapore, it is also notable that none of the founding pillar heads came to SUTD from MIT—three came from engineering departments at well-known American public universities (the University of Texas, the University of

Minnesota, and Purdue University), with the fourth from the École Polytechnique Fédérale de Lausanne in Switzerland.

During this period – as the curriculum and pedagogical plans were taking shape, but before many SUTD faculty were hired to work on the specifics of their courses – several major developments took place to adapt and expand on the overarching SUTD curricular plan, motivated by stakeholders at both SUTD and MIT, to varying degrees. While some of these developments had roots in the original MIT conceptual design, others emerged in their entirety from the early founders at SUTD, illustrating means by which local actors – albeit local actors of the international variety – shifted the SUTD academic approach to reflect their own educational philosophies.

In the final MIT conceptual design for SUTD's undergraduate education, the MIT framers suggested that active learning techniques – like those used in the MIT physics TEAL classrooms – could be a key component of SUTD's undergraduate education. In addition, this original plan suggested that SUTD should consider the possibility of incorporating fixed learning communities into the academic structure, in which students would travel as a group throughout the common classes of the first three terms. As they joined SUTD, the academic leadership and pillar heads talked at length about how these ideas should be incorporated into the SUTD model, with Andrew Meyer serving as one of the strongest advocates for introducing an entirely cohort-based, active learning model in the first three semesters. Ultimately, it was this approach that would eventually be selected—each year, the entering class of students would be broken into "cohorts" of approximately 50 students, and each group would be assigned an active learning classroom, in which faculty would take

turns teaching throughout the school week (see Chapter 7 for more on the consequences of this model). As one senior SUTD administrator described of this decisionmaking process:

> MIT has these TEAL classroom[s]. So, when we first visited MIT, there were…we were shown the TEAL classroom[s]. So [our model] is similar to that kind of concept but we do it, actually slightly different[ly] from a TEAL classroom—[the] TEAL classroom is quite good, but at MIT the TEAL classroom, the size [is] very big. In fact, when we visit[ed] it was a physics course [with] I think at least 100 student[s], yeah, in the TEAL classroom, right? But that's fine, that's how they do it. I think, I don't know, maybe it's Tom [that] recommended us to go to visit Olin. Olin is another college right? You know, in Massachusetts. So, we went there. And Olin is also very problem-based learning [environment]. And we visit[ed] the classroom and it is actually also [a] cohort classroom, right. And I think the size is smaller. And we can see [that] they have the fabrication facility, just next to the classroom. And so, so, when we learned about all [these] thing[s] we come back [and] so we said, 'Okay, how are we going to implement this pedagogy', right?
>
> The pedagogy, we believe it…we do not want to…we want [a] similar [thing], we want active and interactive learning. So, it cannot be a big class. So therefore, it had to be a smaller class. So, [the] cohort classroom concept [was] already, I think, almost like the solution that we need[ed], right? But we define[d] so how big is the class [size]. So look[ing] at MIT, we think [it] is too big. Look[ing] at Olin, maybe it's [the] correct size. Maybe, and so we, we just sa[id], 'so [it should] be 50.' So next, how [did] we end up [at] 50? And 50 is good because when we plan this university, right, if we have 1000 student come in, I need 20 classrooms. Each one [is] 50, right? If I have a bit smaller, I need 30 classroom[s]. I think we don't have that kind of space, right? […] So, I think, that's why we sa[id] why don't we just do 50 and each, each cohort we have at least two to three instructors, right, do that. And, and we learned, we also learned along the way, lah. It's not that from day one we know how to do it.

As this administrator described, the decision to implement the cohort learning model was both pedagogical and pragmatic, illustrating how SUTD's leaders took inspiration from MIT (and in this case, from Olin as well) and adapted it to fit the organizational – and in this case, logistical – needs of the new institution.

Another key adaptation to the MIT plan proposed by the SUTD leadership was to restructure the school's academic calendar. At the initiative of Associate Provost Lee after an initial suggestion by an MIT faculty member, the undergraduate academic structure was redesigned from the traditional agrarian calendar (wherein students take classes for eight

semesters over four years, with summers in between), to a system in which students would take the three common semesters sequentially in one year – subsequently renamed the "freshmore" year[67] – then two sequences of two semesters and three semesters, respectively, with summers in between (see Figure 5 below for a visual representation of this schedule). Although this redesign was nominally in part to ensure that SUTD's calendar would align with MIT's in order to better facilitate exchange programs over summer and the January Inter Activities Period (IAP), there was also another, extremely efficiency-minded motivation. In the words of one SUTD administrator:

> Then the other reason is that we wanted to maximize the use of the campus more. So, in most agrarian universities, you have the summer, everybody disappear[s] for [the] summer. The university, yes, the university is empty. It's like a ghost town, whereas, first of all there's no farming in Singapore or anywhere, yeah, or not even in MIT. And so the summer months are kind of wasted. So, with the May design, you have the first year [students] and the graduating class in school in summer. So, you use the campus facilities a lot more in a more balanced way. That is the reason.

This efficiency and optimization-based approach to education is clearly reflective of the business mentality of both SUTD's administrators and Singapore as a whole—by reworking the curriculum to get students through SUTD's programs in just three and a half years, the university could develop smaller facilities to serve the same number of students. While this goal has certainly been achieved, the uniqueness of the curriculum schedule – as well as its misalignment with other academic institutions – has certainly caused some headaches in the years since this decision was made—one notable example is that some first-year students would enroll in SUTD's first term to "try out" the new institution, then ultimately transfer to

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[67] Although the freshmore year is well understood, this unique schedule leads to some confusion as to when a student is officially a sophomore, junior, or senior. I actually interviewed several students who weren't sure of their class year at the time of interview, a phenomenon I would venture is unique to SUTD.

NUS or NTU at the start of the fall term with no penalty or time lost (except for a term's worth of tuition fees, of course)[68].

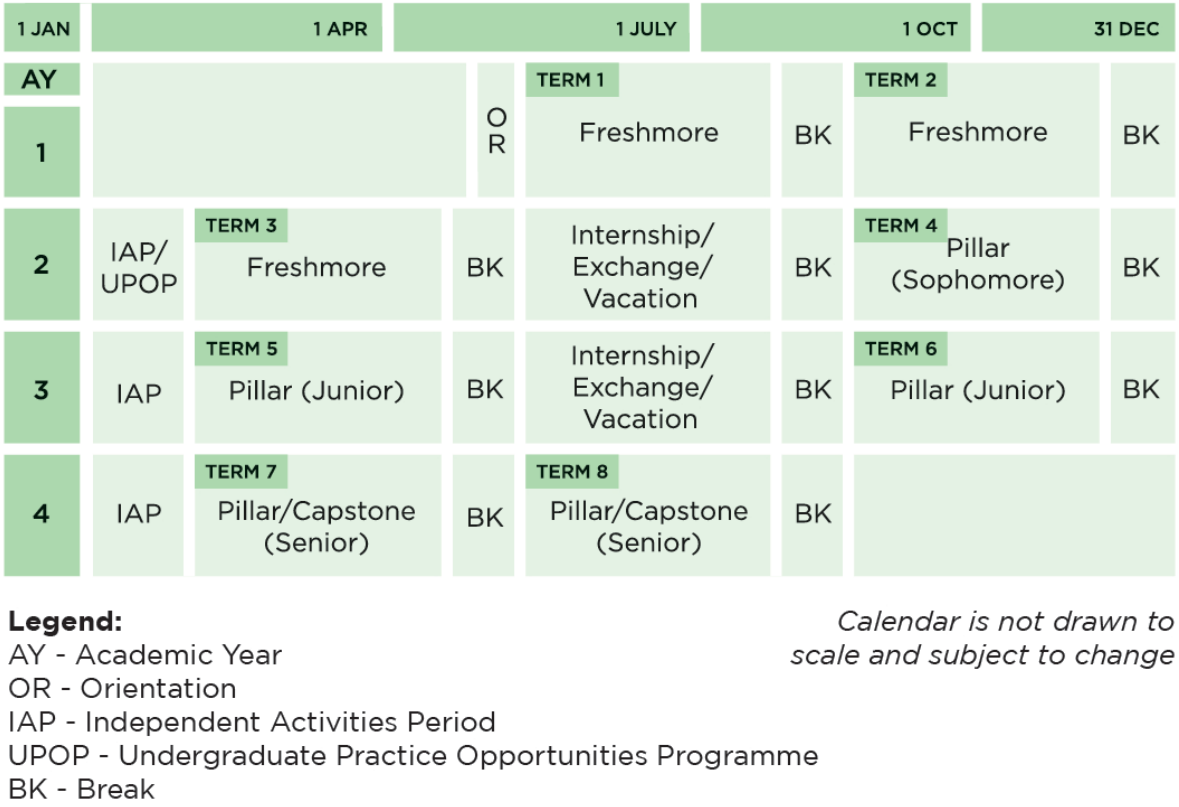

Figure 5. SUTD's cohort academic calendar (from Singapore University of Technology and Design, 2017a).

Another major pedagogical innovation of this period was the concept of "4D Design," which emerged after MIT and SUTD faculty collaborated to prepare small design activities for the first of SUTD's open houses to recruit prospective students. In the words

[68] In addition – and perhaps more concerning – students in the first and final years of the SUTD describe being exhausted and burnt out at the end of these term sequences, as in each of these phases students study for three sequential semesters, with only short breaks to relax or process in between academic terms. For students in ASD – the vast majority of whom pursue an MArch immediately following their undergraduate degree, as a component of architecture licensing – this academic marathon is even more intense.

of an SUTD faculty member involved in these planning discussions (from an October 2016 interview):

> But the question [that] came up in those conversations [before the open house] is: we're 'D' and there is nothing 'D' in this open house. There is no design. All the students are going to go, 'This is like any other open house.' So, we postulated and then we coined the idea of what's called a 'designette.' A designette is a short design experience that can cover any one…can cover part of or all of the design process, [and] it can be physical or non-physical. But it has a design. It's completely design-focused. And so we coined that term, threw it up on the wall, it just did not exist beforehand. And we ran our first, I was going to say two, I don't really remember – no, there was at least three – three designettes at the very first open house.

Armed with the idea of the "designette" – as well as the perceived success of these activities at the first open house – "then as we talked as a group, we got the idea that, hey, why…wouldn't it be great to have design in every course?", as one faculty member said. Eventually, this idea developed into a new plan in which design would be integrated at four "levels" of an SUTD undergraduate education: 1D (required designettes within each individual course), 2D (designettes that integrate across all courses, particularly in the freshmore year), 3D (designettes that integrate across time, connecting material from sequential courses), and 4D (integrating design into students' co-curricular endeavors) (Wood et al., 2012). Of particular logistical challenge would be the 2D projects—Prof Lee and EPD Pillar Head Andrew Meyer originally planned that these projects would occur at SUTD twice per term, during which formal classes would be cancelled for the week so that students could focus on their cross-class projects. At the urging of the MIT faculty, however, the 2D projects were eventually reduced to one per term; in the words of an MIT faculty member (from a November 2016 interview):

> There are concepts—you know, the 2D experiences, trying to…you know, you shut down the university – or shut down the freshman program – and then you have something that cross-cuts across all the subjects in the first, second, and third term. Originally they were talking about doing that twice per term, and I walked in the freshman year and was like, 'You can't do this. They don't know enough.' They were talking about week three and week ten. […] You haven't had any time, you

> know, what are you doing? And in fact the problem is you're taking time away from the actual learning process, although you could argue that they learn from that experience, and yes they do. But on the other hand I think you've got to lay down some information that they can draw upon. And it's actually a very difficult process to be able to come up with something [that integrates across subjects] that isn't contrived.

Clearly, not every MIT faculty member was enamored of the idea of 2D; however, as the academic leadership team took shape at SUTD, faculty from MIT began to defer to them more and more in the planning for the university, as will be seen in later chapters. The emergence of 2D as a visible, highly touted SUTD program is but one example of this localization process, along with the academic schedule and implementation of cohort-based learning in the freshmore year.

As the vision, curricular structure, and course content of SUTD rapidly solidified on both sides of the Pacific, there was still one notable group of stakeholders missing from the discussions—SUTD faculty members who would ultimately be delivering the MIT-developed content to Singaporean students. In its original design, MIT anticipated that SUTD would have 400-500 full time faculty teaching its steady-state population of 4,000 undergraduate students, and during its early planning stages at Ghim Moh, there were only three senior faculty to assess candidates SUTD recruited to fill these positions, creating a monumental task for SUTD's early academic leaders. In addition to the challenges of realizing this hiring goal in the long-term, however, was a more pressing concern: who could be hired and ready to teach classes for the first undergraduate students, then planned to enroll in April 2012?

Chapter 5: Getting to "11:1" – Building a Faculty and Research Agenda

"The idea [for SUTD] was, if we can get students that we feel are similar to MIT level students, and faculty that are similar to MIT level faculty, it will all grow from that. That quality begets quality, begets quality. Students come because they think the research faculty are quality, and then faculty come because the students are quality, and it just builds [from there]." – MIT Faculty Member

As the early leaders of SUTD quickly discovered, there are two competing forces at play when attempting to staff the faculty of a university completely from scratch: first, the desire to make hires as quickly as possible to ensure that the university's academic components can function properly, and second, the desire to maintain quality and research rigor[69]. As one administrator described this process as it occurred at SUTD (in February 2017):

> Here, we needed everybody. At the beginning, if you think about it…so I would say the hiring was largely done around delivering the educational offerings, delivering the course[s]. To begin with, it was 'You've got to hire people to teach freshmore year.' Then it was quickly…okay, now we start having the pillar years. So it was very much in my view a 'just in time' thing. But aside from selecting areas – and realizing we needed a lot of areas – it was largely, I would say, [a goal to] find the best applicant. And so the criteria, though, you know, [were] excellence in the research programs, the potential…and actually, more, the potential—some demonstration of the potential to be excellent in teaching, the potential to develop a top-notch, international scholarly reputation. I would say that's very much like in [top U.S. universities].

Although early administrators at SUTD expressed feeling this pressure to fill SUTD's faculty ranks with top-quality candidates as soon as possible, they also faced similar challenges as when performing searches for senior administrators such as the associate provosts and pillar heads, as described in Chapter 4. First, although Tom and the MIT faculty wanted top candidates to fill their faculty positions, most strong engineering,

[69] The same challenges also apply to recruiting students to attend a new institution, as described in the following chapter.

architecture, and design programs are located in the United States and Europe, and many graduates of these institutions are less interested in positions in Southeast Asia than they would be in Europe or the U.S. Said one MIT faculty member involved in evaluating early SUTD faculty candidates in November 2016:

> So when you put out an ad from MIT, you just can't believe how lucky you are. And Singapore was more challenging. You would get excellent people, no doubt, but far fewer people who had been trained [at top programs] in the U.S. and Europe envisioned their life in Asia. The ad would come out, and this would be not everyone's choice, so that shrinks the pool quite a lot.

In addition to this constraint, in 2011 and 2012 SUTD had absolutely no brand recognition—relatively few graduating PhDs at MIT even knew of the new university's existence, never mind other graduates of top programs at other universities. Thus, SUTD staff promoted opportunities at the university in any forum they could, using MIT faculty suggestions as to the programs from which potential hires would be graduating. Said one SUTD affiliate of this process in a July 2017 interview:

> A lot of them in MIT would come back and tell us, 'Okay, for this particular category of somebody who's in architecture, okay, these are where they would be reading the journals, these are the publications that they would be publishing themselves in, so this is where you should be making your presence at least known.' So, we were advertising in periodicals, on the online versions of it, we were doing road shows, we were going over to the MITs and Harvards, to Stanfords, to the Imperials, to the Melbourne Uni[versitie]s, to tell them that this is new university: this is the education pedagogy, this is the research pedagogy. […] A lot of them were very taken into it. It's a radical change from a conventional way of doing things in most traditional universities. […] And of course, Singapore as [a] brand helped a lot.

Finally, once candidates were identified and submitted applications for the faculty positions, yet another personnel problem emerged—as was the case with the early SUTD staff and administrators, no SUTD faculty existed to evaluate or vet the potential hires. Similar to the administrative hiring processes, MIT faculty stepped in as surrogate evaluators in this process, providing feedback on potential candidates during and after their "job talks" at SUTD's offices in Ghim Moh. As an SUTD affiliate described this process in July 2017:

> [An MIT faculty member] suggested that, you know, because you have no faculty here, to hire, do hiring, maybe you should do hiring in groups of people. You bring them together in groups. They get to see each other, so they get to see who might be a colleague because other than that there's no colleagues for them to have. And so we adopted that, and we started bringing in people—we'd have sort of a day where we bring in maybe half a dozen people. We would interview them all, but since we didn't have the expertise, we would seek the expertise of domain experts from MIT. So we'd video conference[70] and we'd ask the people to make ten-minute presentations. We have about 30 minutes of conversation with them. And we would videotape that. We might provide some of our own assessment of the fact—if we didn't think they were suitable, we wouldn't send anything to MIT. If we thought they were suitable or were questionable in some ways, then we'd send them to MIT and then [the coordinating faculty member] would direct them to an MIT domain expert in that particular area and then they'd provide us some feedback in terms of whether these people were suitable or not.

In addition to these virtual reviews, in the early days MIT faculty were often present to review and question potential SUTD faculty in person as well—said one MIT faculty member of this process in November 2016:

> The whole leadership team participated in the process of hiring new faculty, and I think that's one of the places where your value system in this regard is made operational. That was one thing. I was in most of the meetings where we ever interviewed the first 50 or so faculty. And we always spent a lot of time evaluating their research capabilities and their track record so far, and understanding how they were going to be successful within that context.

In all types of organizations, members – and early founders in particular – tend to choose new members of the organization who reflect their own values and beliefs. In the

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[70] Although MIT faculty no longer evaluate SUTD new faculty hires (and therefore recordings of job talks serve no discernable purpose), interviews are all still video recorded, illustrating the strength by which processes become institutionalized – and therefore unchangeable – in Singapore. Said one SUTD administrator who sat on the final new hire evaluation committee: "This is one thing I would say is interesting about Singapore is that once things get started, it's very difficult to change things. […] And so at the beginning, when a candidate would come here, they'd meet, say, Tom and Wei Xun and Yam Keng, and they would videotape them and send the videotapes to this group at MIT. And so then it was done this way—this is not done any more. To this day, [however], the same videotaping is still occurring—god knows where those videotapes go. I don't think anyone has ever looked at one since I've been here, you know, but it's very clear process [that has not been changed]."

words of Schein (2010, p. 249): "Founders and leaders [of organizations] tend to find attractive those candidates who resemble present members in style, assumptions, values, and beliefs." In turn, these individuals play a role in embedding the culture of the organization, through their responses to and interactions with the organization's leaders (Schein, 2010). In using MIT faculty (as well as Tom, with his years of MIT experience) as the primary evaluators of the first batch of SUTD faculty hires, it is likely that they were attracted to candidates reflecting their own academic culture and research approach. Thus, under the right leadership environment, one can assume that these individuals might be predisposed to an "MIT-like" academic and research culture; however, as described in Chapter 4, much of SUTD's administrative culture was set as distinctly different than that of MIT, a fact that would pose significant challenges for the faculty as they settled into life at SUTD (as described in Chapter 9).

Of the first faculty members hired by SUTD, many discuss the interview and assessment process as a fairly strange method of hiring—unlike at other universities (where faculty would deliver job talks to the members of a particular department), faculty instead were asked to give short, attention-grabbing talks about their research and teaching approaches to a group of individuals with little-to-no expertise in their field. In addition, these faculty were also evaluated in diverse groups in which no one had similar research expertise—sociologists spoke of interviews with physicists, engineers spoke of interviews with chemists, and the like. While this interview environment certainly served to promote the idea that SUTD would be an interdisciplinary institution, the structure of this early interview scheme appeared to give nearly all the power to evaluate the quality of prospective SUTD faculty members' research to MIT faculty, demonstrating how SUTD's early legitimacy largely relied on its collaborators at MIT.

Perhaps in no department did the breakneck pace and broad scope of faculty hiring have greater implications than in SUTD's Humanities and Social Science cluster. As was described in Chapters 3 and 4, the MIT designers of the SUTD undergraduate curriculum planned for HASS courses to account for almost 22% of undergraduate students' academic load (seven of 32 total courses); however, these initial planners did not opt to create a position for the head of SUTD's HASS cluster, as this division was not to receive the official designation of "pillar" reserved for the degree-granting departments. In the words of one MIT faculty member familiar with the SUTD HASS department (in a March 2016 interview):

> There were four pillars. They had senior people, where they thought it out, to head the pillars, these four pillars. That clearly was done through international searches with some care. And they are not faculty from MIT, they were people who were willing to go there and be pillar heads. But there was a lot of input from MIT's faculty, along with other appropriate figures. None of this was comparable [to what happened in HASS].

As will be seen in later chapters, planning for HASS – particularly in terms of its departmental leadership and its curriculum – was in no way a high priority area for SUTD's planners at MIT, but was approached with a moderate level of consideration—these individuals viewed HASS as a necessary component of undergraduate education, but clearly did not put the care into planning for HASS that was exercised for the engineering and architecture pillars. This lack of high prioritization would eventually have huge implications for HASS as a department, particularly on the work of young faculty members hired in the cluster.

One such faculty member is Elena Lipohar, who joined SUTD as one of the first HASS faculty members in early 2012. A native of Croatia but educated in the United States, Elena is a scholar of science, technology, and society, examining in her work social conceptions of science and medicine in East Asia. Warm and soft-spoken but with a cutting

wit, Elena's distinctly European air seems at first an odd fit for casual Singapore; however, after years in the city-state, she has become beloved by her students for her straightforward – and sometimes shockingly non-conformist – teaching style[71]. Given her personal love for literature and the arts, Elena is also generally the faculty member artistically-inclined students approach to support their endeavors, and has served as a (somewhat) reluctant advisor for the school literary magazine and the theater and dance troupes (preferring to focus most of her energy on her teaching and research pursuits).

Like other early faculty members at SUTD, Elena's on-campus interview was performed in a group setting in front of a panel including Tom Magnanti, Guo Wei Xun, Lee Yam Keng, and several faculty from MIT. Given that none of these individuals have any experience in her field of research, however, the final review of Elena's application was done by a faculty member in MIT's Science, Technology, and Society department. Inspired by the excitement of her fellow interviewees, Elena eventually opted to accept an assistant professor position at SUTD, enthused about the prospect of a multidisciplinary, startup university. As the HASS faculty began to come together, however, structural issues began to emerge in the department, particularly with regards to the lack of a cluster head. As Elena said later of the HASS hiring process:

> I realized after a short time that there was no vision. There's no plan. There's no framework. There's no structure. There's no clue what Humanities, Arts, and Social Science should be at this university or could be or how it ought to operate. I think there was this idea that […] it [HASS] would run itself. It would just hire people and it would run itself. There was no intention of ever having a [cluster] head or that…there was no understanding or conception of what we did. And even to this day, I think there is some basically misunderstandings of how we operate and what we do. It's a thinking that we are fungible. That I can teach literature or that sociologists can teach literature. Literature people can teach economics.

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[71] Elena has been known to casually use profanity in her course lectures, which elicits gasps or surprised giggles from her traditionally-minded Singaporean students.

Without leadership in HASS, Elena watched as her peers – other assistant professors, straight out of graduate school – were asked to take the lead in developing and executing a curriculum, as well as organizing a nascent academic department (with all of the strong personalities therein). As will be seen in Chapter 7, the lack of consideration put into HASS by both the early MIT and SUTD founders would have real consequences for the department, providing Elena and her peers with significant challenges in the years to come.

With the first few faculty hired but no campus, students, or a completed curriculum to speak of, MIT began to implement another key aspect of the collaboration plan to "transfuse" or "transplant" the MIT DNA to SUTD in Singapore: a training and exposure program for newly hired SUTD faculty on MIT's campus in Cambridge (Bagiati, Sakhrani, et al., 2012). Originally called "Teach the Teachers" (TTT) and since rebranded as the "immersive faculty development program[72]", this experience at MIT – which lasted for between six and twelve months, depending on the faculty member – was meant to expose SUTD faculty to the culture of MIT, as well as to provide them with opportunities to improve their teaching practice and to potentially form research collaborations with MIT faculty and researchers. Said one of the original planners of the TTT program in February 2017:

> So I thought that it should be—that the activity should be something that would engage them in aspects of MIT that they would not see by doing their research work, reading the papers, and being in the lab. So it ranged for different things, but it [was] meant for them to get engaged with and have discussions with people who ran MIT; say, in terms of issues of how do you discipline students […] or how do you admit

[72] There were understandable concerns that the name "Teach the Teachers" may read as a bit condescending; in the words of one SUTD faculty member, "Yeah, to 'Teach the Teacher' was kind of derogatory." However, as with many of the cleverly and catchily named aspects of SUTD, the name "TTT" has stuck on campus, despite the best efforts of some senior leaders (particularly at MIT) to change it.

> students, what's the basis of advising students. Having them go and attend doctoral defenses, which are very different, and so forth. Having them go and make things in the hobby shop[73] to get an experience – you know, *mens et manus*, well, get your *manus* – a lot of these people hadn't done anything like that before. […] It also involved some sessions with [the Teaching and] Learning Lab, in terms of what do we think about how do you present education, which is different than 'I talk, you listen, and that's the end of it.' Whatever, so there's a whole range of things built to raise your thinking about how we do things very differently, and it's not something you see in publication records or the quality of the lab work or whatever you wish to say; it's just that we have a very different ethos about it [education and university life].

As SUTD faculty participants describe it, the cornerstone of the TTT program is the teaching development program run through MIT's Teaching and Learning Laboratory (TLL). Originally run as workshops designed exclusively for SUTD faculty – and later incorporated into the Kaufman Teaching Certificate Program – the activities with TLL were meant to help SUTD faculty both improve their own teaching practice and develop specific courses that they would eventually teach at SUTD[74], per reflections of several former participants in the program. While the TLL activities served as the programmatic core of TTT, faculty were also encouraged to organize monthly workshops with individuals or offices of interest around MIT, such as the writing center, industry collaboration office, or office of admissions. Outside of those formal activities, faculty were largely left to organize their time on their own (with guidance from an MIT professor or department serving as their host), and most would take the remaining time as an opportunity to further their own work by attending seminars or seeking out research collaborators around MIT.

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[73] Exposure to the MIT Hobby Shop was a much-touted element of the early iterations of TTT; as the MIT News reported in November 2011 (Holden, 2011): "Seven SUTD instructors from various departments recently commanded laser cutters, water jets and other advanced wood- and metalworking equipment in the MIT Hobby Shop to develop building skills, teamwork and an appreciation for a cornerstone of MIT culture."

[74] In the early iterations of TTT, faculty would sometimes serve as collaborators as MIT faculty worked to develop the initial plans for SUTD's courses; in later years, faculty would either bring an existing course to improve upon or an idea for a new course proposal.

Of the SUTD faculty I interviewed who had participated in TTT, none actually went to MIT to "absorb the MIT DNA," per se; rather, most decided to participate in the MIT program to either get a break from the SUTD campus[75] or to take time to focus on their own research, particularly as they approached their tenure and contract reviews. While these individuals' motivations for participating in the program varied, their assessments of the value of the TLL workshops was nearly unanimously positive—most found them very helpful to improve their teaching, often to their own surprise. Said one TLL participant during his time participating in the program:

> Teaching-wise I got loads out of it—that is actually the surprising thing about it, because I didn't expect much on that level. I was more expecting something in research, but in teaching I got loads out of it. So I just learned different techniques that I would want to incorporate, and then of course I also learned a little bit about the scientific side of teaching. So I would just want to incorporate a few things. There are certain things that you intuitively learn[ed]…so I have a pretty long experience in teaching, I've almost taught 15 years before coming here. But then, as I said, a few things you learn intuitively but there are things you cannot learn [just by practice].

Despite this and other positive reviews of the teaching instruction component of TTT, most faculty participants in this program seem to view their time in Cambridge as a pleasant respite from SUTD's campus rather than as a life-changing opportunity to "absorb" or experience MIT's institutional culture. Said one SUTD faculty member of the program:

> We are a very diverse faculty, we're coming from all over the place. And that's why also I find it a bit annoying if there's an expectation into the faculty that is already diverse to get—to learn about diversity at MIT. I think it's…as I said, it's a super generous program, it's fantastic, I would do it any time again, I would recommend it

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[75] With SUTD's year-round academic schedule – in addition to the energy-intensive pedagogy used in many of SUTD's classes – many lecturers and pre-tenure SUTD faculty demonstrate signs of burnout, particularly because university policy states that faculty are not granted sabbaticals before they are granted tenure. Based on my own experience, Singapore's unchanging seasons may also play a role in heightening this phenomenon—with month after month of unchanging heat and humidity – with a year-round academic schedule, to boot – it is hard not to feel like time morphs into an unending slog of sorts.

> to anyone—it's the best thing you can do. But the administrators' expectations are just a little bit different.

While faculty members may not directly attribute TTT with providing revolutionary insights on the MIT culture[76], it is clear that faculty did get to experience MIT culture in smaller, perhaps less obvious ways—when discussing their stays in Cambridge, SUTD faculty told stories of feeling supported in their research by their MIT faculty hosts, attending interesting departmental seminars, and of receiving valuable feedback on the plans for their courses. While most recalled these stories with much fondness, often these memories had been reframed not as immersive cultural experiences, but to stand in contrast with the operational practices of SUTD, with faculty wistfully recounting the freedom and intellectual community of MIT, and hoping that SUTD could someday reach a similar standard (see Chapter 9 for more on these issues). Given this dynamic, in retrospect it is possible that TTT was developed for the wrong SUTD stakeholder group—while SUTD faculty were generally familiar with the type of academic culture present at MIT, SUTD's staff members were not, exaggerating perceptions of contrast between the operational policies of the two institutions rather than creating some type of "cultural transfusion" channel between them (Bagiati, Sakhrani, et al., 2012).

Given the MIT framers' vision of SUTD as a research-driven university, one would posit that a large part of the university's early faculty hiring and development efforts would be related to the research enterprise of the new institution. In the early days, however, the

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[76] This is understandablegiven that as of January 2018, 88% of tenure-line SUTD faculty have some experience as students, post-docs, or faculty at educational institutions in Australia, Europe, or North America, most at prestigious universities of a comparable caliber to MIT (Cornell, Oxford, Michigan, and the like).

primary[77] organizational vehicle to execute the SUTD research strategy was the International Design Centre, the dual-site research center set to have locations at both SUTD and MIT. Said one SUTD administrator of this process in a February 2017 interview:

> To be honest, I would say research was a bit of…I would say research was an afterthought. […] It's interesting, I think. I think the argument was made that we had to do research, it had to be research intensive. I mean, if you go through the history of the university the original plan was not to have research. […] That was their [MOE's] view of what was of value—what they wanted. They wanted sort of—I don't think they would use the term an 'elite' technical education, [but] they wanted something like that. The intent was not to be research active. And then they started socializing, you know, and invited a few universities to give proposals. […] They ended up selecting MIT. And MIT basically, I think generally, their business is [to be] a research-intensive university, they said we have to have a research-intensive university. And I think that was a bit of a—that was a pretty big disruption in the whole building of the place, because I think there were probably quite a few people who didn't think that we needed more research. […] But that's fait accompli when MIT was signed up, right? So I think quickly what they did is then they put a few things in place to build research, but there was not a lot thought [about] anything…there was just too many things to think about. So there wasn't a lot of thought about what should our research—how should we do research, what areas should we do, and stuff. In some ways I think the idea was if we do it, there's got to be a scholarly effort around design, we want to be this hub around design research, [and so] a group of faculty at MIT wrote this proposal for the IDC.

When the idea for the IDC was originally conceived at MIT, faculty framers developed five "Design Research Thrusts" for the new research center (Experimental Design, Design Computation, Visualization and Prototyping, Fostering Creativity, Decision Making, and Global Collaboration), which would be organized across three of the world's "Grand Challenges" (Sustainable Built Environment, Design with the Developing World, and ICT-enabled Devices for Better Living), forming a "matrix" that would guide the new center's research (Wood, Fernandez, Magee, & Otto, n.d.). When developing this framing

[77] In addition to the funding opportunities available through the IDC, faculty research at SUTD was also funded through small faculty start-up grants available to all new hires. Faculty used these grants to pursue their own individual research interests, which were theoretically aligned with the SUTD "research vision" given that they had been hired at SUTD based on their existing and planned research portfolios.

for the IDC's research, MIT professors conceptualized these categories as "a marketing device" to make the research "relevant to here [in Singapore]" (in the words of one faculty member involved in drafting the proposal), seeking to identify areas that would be a priority for potential funders at NRF and MOE. Thus, in some ways the IDC was developed to incorporate Singaporean priorities in a similar fashion to other components of the SUTD plan (as in Chapter 3), albeit through the lens of what MIT faculty thought would be attractive to these Singaporean stakeholders.

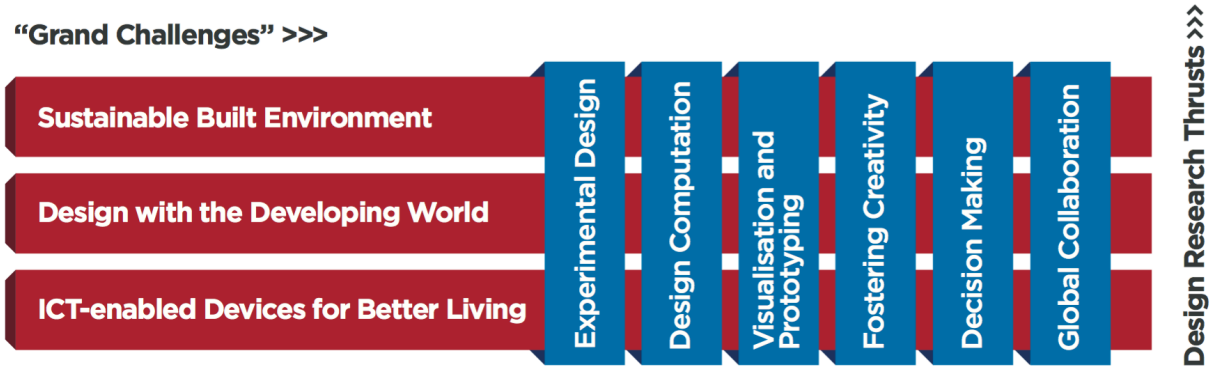

Figure 6. Visual representation of the original IDC "Design Research Thrusts" and "Grand Challenges" (from Wood et al., n.d., p. 2).

Another key aspect of the design of the IDC was an attempt to promote flexible, interdisciplinary research in a way that is counter to the perception of how research is traditionally performed in Singapore. Said one MIT affiliate of his view of Singaporean research: "In this context here [in Singapore], it's all about KPIs [Key Performance Indicators]—it's not about having impact. […] It's solitary work, it's traditional work—you [just] want to publish in the established journals." In contrast, the IDC matrix – and the research center as a whole – was meant to promote interdisciplinary research, mirroring the interdisciplinary structure of the academic pillars and seeking to emulate what the MIT framers viewed as the MIT "way" of doing research. As this MIT affiliate continued:

> The research at MIT is much more aggressive, it's much more collaborative. People seek each other out—it's not stove piped, it is very different. And the way we work

> with students…in Singapore, the tendency is you do what you're told and you tell people what to do. It's not you handle yourself. MIT is bottoms-up; they expect junior faculty to come up with good ideas, not to do what they've been told. It is self-organizing.

As described in Chapter 9, the attempts of IDC and SUTD leadership to promote this type of interdisciplinary, bottom-up research through the center have generally been viewed as successful, and the IDC is considered the primary driver of the early years of SUTD research. Said one SUTD administrator of the IDC:

> [The IDC] kind of served as this real backbone of support for the university['s research efforts], and it's also served as the backbone for space for the university. So about half of the – now maybe it's 40% – of the research space of the university now is in the IDC. Which is a challenge for us, I think, because it's probably sized about right for the research it does, but…when it was started, the IDC was essentially 100% of the research of the university; you know, now it's maybe 15%. But yeah…it's sort of our signature group activity.

Furthermore, the IDC would, in time, serve as a vehicle by which SUTD can liaise with leaders of Singapore government and industry, aiding the university's efforts to build external legitimacy across the city-state.

While faculty hiring and development of SUTD's research infrastructure took place at a breakneck speed in 2010, 2011 and early 2012, it was abundantly clear that SUTD would not be able to fill its instructional needs with tenure track faculty alone, as the original pedagogical plan called for three instructors per 50-student cohort classroom for each of the freshmore year courses (then set to begin in April 2012, with a target enrollment of 500 students in the "first batch"). Thus, while much of the focus of the time was on hiring tenure-track assistant professors, SUTD HR also solicited applications for lecturer positions, particularly to teach within the freshmore course sequence.

Given that early plans created by MIT faculty for SUTD specifically stated that even introductory subjects – like freshman chemistry and biology – should be taught by an

"expert" with PhD-level training[78] in the relevant field, lecturers at SUTD are required to have essentially the same credentials as tenure-track faculty, including an existing portfolio of peer-reviewed research. Thus, while some of those hired as lecturers in the early days of SUTD did originally apply for these positions, others originally applied for tenure-track faculty roles before being selected for open lecturer positions instead[79]. Said one individual with knowledge of this process in July 2017:

> [The lecturer hiring process was] pretty much the same [as with the tenure-track faculty]. Now what happened was in the earlier days we were very conscious of one thing. We, no doubt, we – as a good university and any good university – have to focus a lot on research. But because we are a university and we need to teach our students, we need to…[for] the whole education bit, we need strong lecturers and strong teaching faculty. We were then, because of the luxury of having a lot of candidates at that point[80], we were then able to look at candidate…remember this teaching statement and the research statement that came along with the application? We were then able to look at a candidate and see if these candidates were strong in teaching, maybe stronger in teaching than research. Okay? But still, they were able to embrace this whole multidisciplinary design approach. Now, we want those teachers and the teaching faculty to inculcate this kind of design philosophy, multi-disciplinary philosophy to the students. So, they were never, well for lack of a better word, they were never a second tier. They were, if anything…the search committee reacted to them on equal standing as the assistant professors because they were as equally important as the researchers, the research-based faculty members. Just that, by virtue of the application, sometimes teaching just kind of plays up a little bit more and some people just don't really want to do research outright anyway.

Notably, unlike the tenure track faculty hired at SUTD, the lecturer positions were more likely to be filled by individuals with pre-existing ties to Singapore—either by Singaporean citizens looking to find a position at home, or by foreigners (or Permanent

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[78] Given the differences in architecture from those disciplines in the other pillars, it was specified that ASD faculty may hold an MArch – or significant practitioner experience – rather than a PhD and still be considered "experts."

[79] Sometimes with no additional review of their teaching skills before being hired for these teaching-heavy positions, per several lecturers interviewed for this study.

[80] As would be the case with admitting students, this professed volume of candidates did not necessarily lead to fast hiring, as SUTD administrators and MIT faculty sought to be discerning in the caliber of faculty actually hired to join the new institution (as described by several individuals familiar with the process).

Residents, referred to in Singapore as "PRs") searching for posts after completing education – or a different work contract – at another Singaporean institution. Although not all lecturers can be classified as such, the proportion of those with these existing Singaporean ties is certainly greater than within the population of tenure-track assistant and associate professors. This is perhaps understandable simply due to the nature of the lecturer roles (which might be less attractive as motivation for foreign academics to uproot their lives to move to Singapore); however, this dynamic is noteworthy in the fact that it presents yet another distinction between the communities of faculty and lecturers.

It is also worthwhile to note that – particularly in the early years – SUTD disproportionately relied on lecturers to fill many roles in the freshmore course sequence (particularly in chemistry and biology), as well as in HASS. As one MIT humanities faculty member described of the situation in HASS in an interview in March 2016:

> They had hired, as I say, [pre]dominantly lecturers, who happened to be or were willing to be in that geographical zone and it had been done. And again, others probably could be more useful on the specifics of the hiring process, but it certainly was not done in any way that resembles a U.S. academic hire. It was done, primarily, I believe, through HR, Human Resources, the way you hire for staff here, not for academics.

Given the pace at which SUTD had to hire to fill the teaching slots required to instruct the first batch, this haste in filling teaching positions was certainly understandable; however, the lack of a long-term strategy to train and assess these hires certainly resonated in the first few years of SUTD's full operation, as both faculty and lecturers worked to execute an innovative and demanding educational model, as described in Chapter 7.

As should be clear by the descriptions in this and the preceding chapter, a distinct pattern began to emerge as SUTD began to fill its research faculty positions: while senior professors were selected to fill key leadership roles at the new institution, the remainder of

the faculty were new, entry-level hires designated as lecturers or tenure-track assistant professors. While over time SUTD has hired several more experienced faculty at the associate professor level, as of late 2017, the vast majority of faculty members are still assistant professors (see Table 2 below).

Table 2

SUTD Faculty and Teaching Staff Distribution by Pillar/Cluster (as of August 1, 2017)

Pillar/Cluster	Professors	Associate Professors	Assistant Professors	Senior Lecturers	Lecturers	Adjuncts*
ASD	2	1	15	0	0	1
EPD	7	5	26	6	11	3
ESD	3	1	15	1	4	3
ISTD	3	2	11	3	1	1
HASS	1	1	13	5	3	0
SCI/MATH	0	1	4	3	6	3
Total (N = 165)	16**	11	84	18	25	11

Note. In each of the pillars (ASD, EPD, ESD, and ISTD), all but one of the full professors also hold positions as administrators (Provost, Associate Provost, Pillar Head, etc.) or as directors of SUTD research centers (IDC, iTrust, etc.); thus, there were only four full professors without such positions at the university as of August 2017.

*The three individuals listed as SCI/MATH adjuncts are so-called "Faculty Fellows."
**Of the 16 professors with tenure, four were promoted from SUTD assistant professor positions after a tenure review.

This lopsided ratio of junior-to-senior faculty had profound impacts for both the full professors tasked with setting up the university and the early career assistant professors tasked with executing the academic and research vision. For those in senior leadership positions, faculty described being occupied with the required tasks of setting up a new university, leaving little time or organizational bandwidth to mentor junior faculty or attempt to set organizational culture within the various departments. Within the junior faculty, the assistant professors – most of whom arrived at SUTD directly out of their doctoral programs – were asked to deliver courses and develop a research portfolio virtually from scratch, often in an entirely new cultural and academic environment than the one in which they had received their training. In total, this dynamic did little to foster cohesion within the

faculty as a whole, and to this day, junior faculty still describe themselves as disconnected from SUTD's "senior management." Further contributing to this sentiment is the fact that in the early days of SUTD, little-to-no organizational resources – or organizational thought, for that matter – were devoted to organizing faculty governance mechanisms for SUTD, as none of the MIT nor SUTD founders thought of these mechanisms as a particularly high priority in developing a new university[81]. In time, this has made it difficult for junior members of the faculty to advocate for their interests—even in full faculty meetings as late as 2017, many SUTD faculty members feel as if members of the school's senior management simply provide them with administrative directives, rather than asking them for their input on new initiatives[82].

In addition to the proportion of junior to senior faculty and the communication channels between these groups, the cultural dynamic of SUTD's academic staff also is influenced by the complex relationship between the research faculty and the university's lecturers. Given that the prestige, pay, and job security of SUTD lecturers is perceived to be lower than that of assistant professors, it is understandable that the lecturer hiring system – wherein candidates deemed unfit for faculty positions are at times "shifted" to lecturer roles – had the potential of creating a dynamic of resentment and dissatisfaction within the community of SUTD lecturers. While many lecturers I spoke to on campus seem satisfied with their role on campus – albeit exhausted by their teaching load and SUTD's unrelenting

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[81] At MIT, in contrast, faculty are represented by an influential Faculty Chair and numerous faculty-led administrative committees (although many MIT faculty question the efficacy of these entities); in the words of former Associate Provost Samuel Keyser (2011, p. 51): "MIT has managed this tricky situation by blurring the line between administration and faculty as much as possible."

[82] Admittedly, this is likely a complaint of faculty at nearly every higher education institution, including MIT.

academic schedule – others described struggling with the perception of their secondary role on campus, even causing some to leave the SUTD community for opportunities elsewhere. This dynamic is exacerbated by the Singaporean inclination towards strict, well-defined organizational hierarchies, which have served to further alienate SUTD's teaching staff, as described in Chapter 9.

Finally, it is worthwhile to note that as with the faculty governance structure, the tenure process – by which assistant professors would be promoted to the title of full professor – was also ill defined when the first faculty members were hired to join SUTD. Like at other universities, early faculty were informed that they were hired on a "three plus four plus one" basis[83]; however, the exact process by which their tenure packages would be evaluated – as well as the individuals that would do the evaluating – was unclear to many of the early hires. In the years since, this process has become increasingly formalized; however, faculty members still face a great deal of uncertainty as they approach their tenure reviews, particularly those in non-engineering disciplines in which research contributions are traditionally evaluated by different metrics.

In 2010, 2011, and 2012, the hundreds of hours of work done by MIT faculty and SUTD administrators had achieved its desired outcome: by the time SUTD opened its doors to students in April 2012, the university would have enough teachers to cover instruction for the freshmore core subjects, supplemented by graduate teaching assistants supplied through a collaborative program with MIT. Of pressing concern, however, was SUTD's ability to

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[83] Under this scheme, faculty members undergo their first tenure review after three years, then their second review after a subsequent four years. If faculty are denied tenure at the second review, they are given a one-year additional contract to aid them in "transitioning" from SUTD to another academic institution.

recruit the students that these individuals would teach—how could SUTD's trustees and administrators convince students and parents in risk-averse Singapore to gamble their education on an unrealized vision of a new university, even one seemingly endorsed by a prestigious brand name like MIT?

Chapter 6: Finding the Risk Takers – Campus Building and the "Pioneer Batch"

"We have this idea that SUTD students are making, rather than just receiving. I think it could be from the beginning implanted [in them] or from the beginning we made it together. No matter what, I think we have this kind of spirit—[an] institutional spirit." – SUTD Assistant Professor

Just before Chinese New Year in February 2010, SUTD Associate Provost Lee Yam Keng received an unexpected call from the Singapore Ministry of Education. Although the first senior staff were just settling into SUTD – and Prof Lee himself was only a month into his role at the new university – representatives from the Ministry of Education called the new administrator to inform him of an alarming deadline: according to MOE, SUTD's first applicants had to apply and be reviewed by March 2010—just four weeks later and well over a year before the university was originally scheduled to open its doors to students. Said one SUTD staff member with knowledge of this period in April 2017:

> Before Chinese New Year they say 'You have to go for admission exercise.' So we thought it's joke, because the admission cycle typically start[s] in March—that was when the three international A-level […] results are released. So we said that, it must be like, you know, joking but they said no. The reason is very simple: because you have to actually recruit or admit students who are male right now, so that they [can] come in two year[s] later after serving their National Service in [the] army, air force or navy. So then we realized that we have to do something right now, before we lose the male student[s to other universities].

Under this time pressure, Tom Magnanti, Lee Yam Keng, Sylvia Low, and the team at MIT set to work on an incredible task: convincing parents and young students two years away from entering university that they should gamble on a brand-new institution with no courses, faculty, or even a physical campus to speak of. Given the risk averse nature of Singaporeans – particularly with regards to their children's education – this task would be difficult on its own; however, SUTD administrators also worked against larger, more structural issues as they attempted to recruit and enroll the university's "pioneer batch" of students.

First, while the Singapore Government nominally sought to expand the higher education sector to expand opportunities for polytechnic students (see Chapter 1), the overall population of university-bound students in the country was declining, in line with Singaporean population trends as a whole. As is shown in Figure 7, the number of annual live births in the country has steadily declined since the late 1980's, with the exceptions of small upticks in 1988, 2000, and 2012[84]. Given the Singapore Government's penchant for long-term planning, stakeholders at MOE surely foresaw this decline as plans for the fourth university took shape, and perhaps sought to increase quality in the higher education sector by promoting competition between the universities for an ever-decreasing number of top qualified students[85]. Regardless of the motivation, the reality as SUTD recruited its first students in 2010 and 2011 was that there were fewer Singaporean students than ever to fill the country's university places, and that the highest achieving students were also likely to be admitted to Singapore's other top institutions (or prestigious universities overseas), making recruiting "top" talents difficult for the new institution.

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[84] These years coincide with the Year of the Dragon on the Chinese Zodiac, a particularly fortuitous year to be born for those of Chinese heritage. As such, Singapore experiences an uptick in the birth rate in these years, as parents make concerted efforts to ensure that their children are lucky "Dragon Babies."

[85] This strategy would certainly align with previous governmental strategies to increase competition in the higher education sector, as described in Chapter 1 (see also M. H. Lee & Gopinathan, 2004).

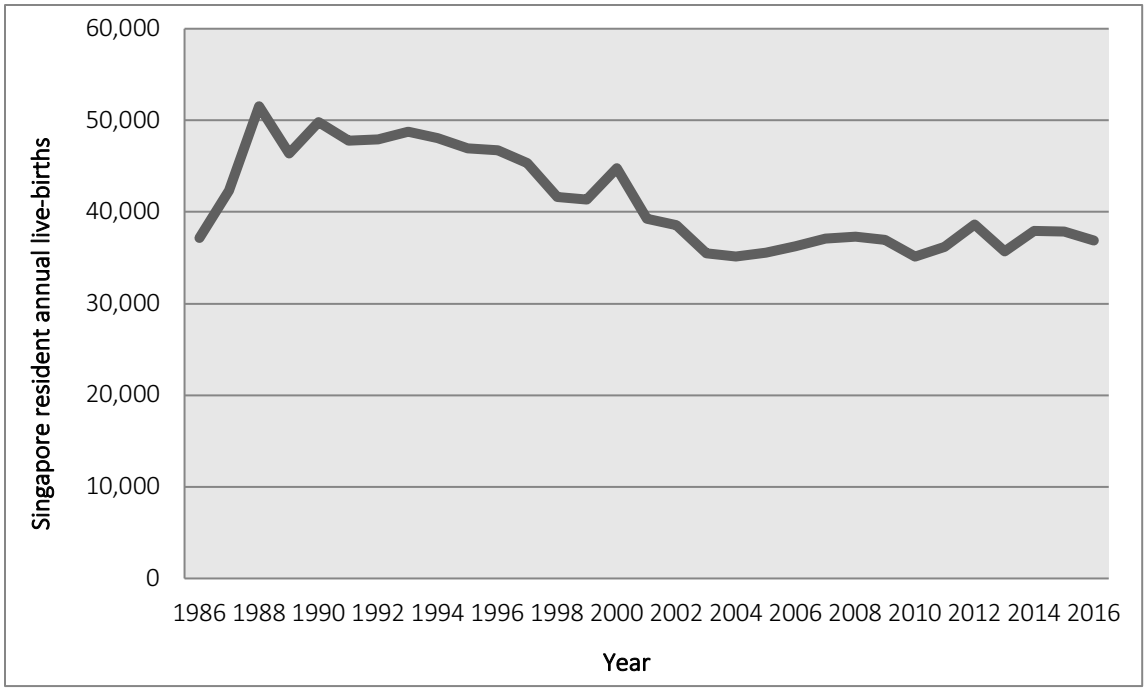

Figure 7. Singapore resident annual live-births, from 1986 to 2016 (Department of Statistics Singapore, 2017). The oldest students enrolled in the first batch at SUTD would likely be Singaporean males born in either 1989 or 1990, representing the group within the first batch that delayed entering university after hearing about SUTD during their time in National Service.

Within this context of a shrinking university-bound Singaporean population, SUTD also faced a struggle with regards to its academic offerings: in the period since the early 2000's, Singaporean students' interest in studying engineering has plummeted, just as the Government's interest in training Singaporeans in technical domains has risen[86]. With

[86] Several of my informants directly attributed the decline in interest to the government's efforts to promote engineering careers in the country. Essentially, these individuals argued that an unforeseen outcome of expanding the country's existing engineering programs in the early 2000's was a decline in quality of those programs' enrollees, which in turn led to a nationwide decline in the perception of engineering education overall. Said one SUTD administrator of this trend: "Engineering no longer takes in the top caliber students any more. And it's almost—quite sadly, there some engineering courses that are even considered as 'dumping grounds' for those who can't make it to other courses. So this is really quite a reversal from several years ago." Similarly, as *The Straits Times* reported (Chong, 2016): "The [engineer] shortage has prompted [the Prime Minister] Mr Lee to highlight, several times in the past year, the need to grow the pool of engineers and rethink the value of engineering."

increasing numbers of students and parents interested in better paying, more prestigious professions such as law, business, or medicine, recruiting top talent – or enough domestic students, full stop – has become a challenge for technical programs in Singapore in the last ten to fifteen years, as several SUTD administrators and trustees described to me. For example, said one MIT faculty member of this phenomenon in computer science in particular:

> I think that there is a view in Asia in general that computing is particularly, like, tedious or non-prestigious. […] So I think the perception there—I mean, this isn't SUTD's problem, this is Singapore's problem. Because my friends at NUS two years ago or three years ago they published…so because Singapore is so planned, the university doesn't get to decide who to admit exactly. The computer science department, let's say at NUS – […] NUS's computer science department gets told, 'produce 100 majors this year' by the central government, no matter how bad the applicant pool or how small the applicant pool is. So they have to go down the list until they get 100 students no matter who they are. So […] they publish for each department how low they have to go [to recruit enough students]. And two years ago computer science at NUS was only above …around plant science, or [something]. And I mean, it's just like two departments [from the bottom]—like it was at the bottom! I mean, in a way I was just like 'this is kind of unthinkably weird that it is just, like, not [a] prestigious thing.'

In addition to these structural challenges in the Singaporean educational system as a whole, early decisionmaking at SUTD created yet another hurdle in reaching the first batch enrollment targets: SUTD administrators had proudly – and publicly – declared that SUTD's student intakes would be at least 40% female, in marked contrast to the country's other university engineering programs. As *The Straits Times* reported in January 2011 (Durai, 2011):

> Slated to open in April next year, the country's fourth university hopes to have 40 per cent of its projected 500-strong student population made up of women. […] If SUTD attains its 40 per cent target, it will have double the percentage of women in most engineering-related courses in American and Singaporean universities, said its president, Professor Thomas Magnanti. 'For a school that's focused on engineering, that would be remarkable,' he added. The university is kicking off a drive to recruit women this year. 'So far, the admission exercises have been geared at the boys because they're the ones making a decision two years in advance,' said Prof Magnanti, referring to male junior college and polytechnic students having to serve two years of national service before going on to university. 'Girls who have finished

> JC or polytechnic may not want to wait two years to start university,' he noted of the 2012 starting semester for SUTD.

While this strong female enrollment would certainly serve as another cultural element of MIT reflected at SUTD[87], in setting this target SUTD administrators set yet another substantial challenge in recruiting a large pioneer batch of students for the university.

One final limitation early SUTD administrators faced in reaching their enrollment targets were MOE-mandated restrictions on the number of foreign students SUTD could accept to supplement its domestic intake. Given SUTD's substantial public funding, MOE policymakers expected that the university should primarily serve Singaporean students, capping the number of foreign students at 30% of the total intake, a similar proportion of international students to those at the other existing universities. Of this 30%, a substantial number would be captured by participants in the "SM2" program, a government-organized scholarship scheme to recruit talented students from China to study at Singaporean universities (Yang, 2016). While these SM2 students would potentially limit the number additional of foreign students SUTD may recruit, they would also provide a guaranteed number of students in each batch, potentially aiding in recruitment and retention figures[88].

With these various constraints on their ability to attract enough students to reach SUTD's initial enrollment target of 500 in the first batch, SUTD administrators began to

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[87] In the 2016-2017 academic year, 46% of MIT undergraduates were women (Massachusetts Institute of Technology, 2017), and for years the Institute has enrolled women undergraduates at near equal rates to men.

[88] Of particular note is that SM2 students are not given the opportunity to select the university they will enter once in Singapore—while they express interest in a field or major while applying to the program in China, their particular university is assigned upon their arrival in Singapore for the program. From Yang (2016, p. 57): "Although [SM2] scholars are asked to indicate their preferences prior to coming to Singapore, the Singaporean university to which they are assigned appears to be largely decided randomly by the MOE. Scholars are also asked to indicate which majors they wish to pursue, and admission decisions are made by the university schools or faculties that offer those majors."

develop strategies to both spread the word about SUTD and eventually convince students to enroll. Unlike in the United States, however, in Singapore the students are often not the ones making decisions about their education (as numerous Singaporeans described to me in both interviews and informal conversations)—rather, in many households the parents are those that hold the decisionmaking power. In the words of one SUTD administrator: "There are two kinds of kids, okay. One, the parents are the key decision makers. The other kind of kids is like, 'Oh, I decide already, then I go home and convince my parents' kind of thing." With this in mind, in 2010 SUTD's office of Marketing and Communications got to work in recruiting for the pioneer batch, developing a multifaceted approach to marketing in hopes of convincing both students and parents to consider the possibilities of SUTD.

Each year, on one day in late February or early March, every graduating Junior College student across Singapore receives his or her A-level results. The culmination of years of studying and preparation, the results of these examinations dictate to which universities – and which programs within those universities – graduating students can apply, as the vast majority of Singaporean universities admit solely based on these scores (see Chapter 1 for more on this system). Given the structure and uniformity of this system, in the first few months of the year all of Singapore's universities begin a mad scramble to compete for the top students, hosting events and open houses on their campuses, information sessions at local schools, and sponsoring all forms of advertising all across the island. During this period in early 2017, university advertisements plastered Singapore seemingly overnight; anywhere I went – on buses, trains, in shopping malls, or even on *The Straits Times* website – I suddenly saw advertisements for NUS global programs, NTU's open

house, or SMU's many student internship opportunities[89]. During my year in Singapore, SUTD's advertisement campaign was particularly eye-catching, featuring close-ups of faces gasping, apparently meant to evoke awe and inspiration for the power of design (see Figure 8 below).

[89] Perhaps most eerily, I even started to hear audio advertisements for SUTD's open house as I listened to Spotify at home after work.

Figure 8. Promotional advertisement for the SUTD 2017 Open House (from Singapore University of Technology and Design, 2017c).

In the earliest days of SUTD, Sylvia Low and the SUTD senior management faced a monumental task far larger than that of the team in 2017: getting the word out about SUTD as quickly and as broadly as possible (since only the most dedicated *Straits Times* reader was likely to have heard of the new university), while simultaneously convincing potential enrollees and their parents that SUTD was a legitimate higher education institution[90]. To address this challenge, Sylvia and her team turned to a creative solution to get the word out to prospective students during the A-level results season; in the words of one member of Sylvia's team (from December 2016):

> So, actually it was very interesting because of course we are a brand-new university. We really needed to get the word out, right? But the challenge was that, because of our small startup nature, we don't really have the deep pockets—we still don't have a deep pocket like the [NUS], NTU, SMU and so on. So, the question is how do you constantly remind the students that SUTD exists, you know? Yeah. So it was a very big challenge. And so, we looked around all the different media. And we arrived at bus[es], okay. So, yes, yeah. So, it was really the cheapest perennial…every day it's in your face, and every day it goes to the schools. So, we had to explain to the Chairman [of the Board of Trustees] why we were doing bus advertising because, you know, he had no clue. So we explain[ed], you know, students take public transport—they either take the bus or the train. Even if they take the train, they have to take the bus to go to the train, right? So, and imagine every single day [an] SUTD bus arrives and pick you up and go to wherever you want to go. So, we purposely chose buses that supply the routes of the schools. Yeah. So that's why, we were the first university ever to do bus advertising and now every university has followed.

With these buses serving routes filled with potential students, Sylvia and her team also took out a series of advertisements in Singapore's print media as well, citing as a rationale that

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[90] A member of Sylvia's team explained that many Singaporean parents were particularly wary of the possibility that SUTD was a private institution, as there had been several high-profile cases of private universities failing to deliver on their promises after setting up shop in the city-state (for example, the University of New South Wales which, although not private, was not supported through the Ministry of Education). In addition, many parents asked questions as to whether or not the degrees from SUTD would be accredited, illustrating the thoroughness with which Singaporean parents approach the education of their children.

many adults still read the country's newspapers either in hard copy or online each day, enabling print advertising in these forums to "drive the awareness of the adults" (in the words of an SUTD staff member).

In addition to the print and bus campaigns, SUTD also took its early recruitment efforts online, both to social media and to other online advertising venues. As the university had very few faculty or senior administrators when the first admissions exercise began, Arjun and the MIT cluster heads acted in their stead, shooting a series of videos in which they plugged SUTD's curriculum – and, perhaps even more importantly, the university's collaboration with MIT – that were put on SUTD's newly formed YouTube page. In addition to these testimonials, Sylvia Low was also able to shoot a promotional video with Singapore Prime Minister Lee Hsien Loong, in which he touted the possibilities of an SUTD education, saying (H. L. Lee, 2010):

> We wanted to add something new and valuable to our university scene, which the existing universities did not provide and eventually came up with a solution, which is the Singapore University of Technology and Design. We hope that it will provide something different from the existing institutions—a very high-quality education which will teach the students how to think, how to apply what they have learned, how to be creative not just in the technology and the design part, but also creative in bringing it out of the academic environment into the real world – into the business world – into the real economy and make a difference to the world. It is a university which is linked up with MIT and with Zhejiang University in China. These are very eminent institutions, and we think these linkages will provide the students [with] not only very high quality academic input, but also connections to two vibrant economies: the United States, with its entrepreneurial, dynamic economic culture, and China, a vibrant emerging economy. We hope that it will provide a different experience for the students; very high quality academic environment, but not just an academic environment—one that is going to be stimulating the students to go beyond the book knowledge, but to apply it to solving problems, apply it to using it in the real world, apply [it] to making a commercial success in the economy in business. You must be prepared to work very hard—that's the way to get the maximum out of a university experience like this. This is a place which will stimulate you, which will stretch you, which will take you in unexpected directions which you may not have thought of when first you contemplated going to university. And which will enable you to develop your potential and engage you in the world around, so that you come out not just an engineer or an architect or a software person, but

somebody with passion, with ability, and with dreams to go and do something which is going to change the world.

As is evidenced by these words from the Prime Minister, early efforts to recruit students to SUTD relied on two primary factors to establish legitimacy for the institution: first, the applicability of the education to the needs of the economy (perhaps best exemplified by the "better world by design" tagline discussed in Chapter 4 and incorporated into nearly all of the university's early advertising) and second, the new institution's relationship with its foreign partners, particularly MIT[91]. In leveraging these particular aspects of SUTD, local actors in the university's Marketing and Communication department localized the SUTD vision to fit the desires of students entering the Singaporean higher education ecosystem, framing the institution in a way that they thought would be attractive to local students. In turn, the students recruited to join the pioneer batch would arrive at SUTD with these framing mechanisms in mind, and would in turn develop a student culture built upon these ideas (see Chapter 8). In this way, seemingly small decisions from the Marketing and Communications team would have far-reaching impacts on SUTD's institutional identity, particularly within the community of pioneer students.

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[91] This technique was apparently an effective method in attracting students—said one SUTD staff member: "I think MIT was a key part of the reasons why many of them came to know of SUTD—because of the MIT brand name. And when we ask them 'Why did you apply to SUTD?,' a lot of them will conveniently say 'Oh, it's because of the MIT linkage.' So we kind of make up for the lack of ranking by the association with MIT. I think that helps really a lot, especially in the initial years. But I think moving forward, whether that will be as important, I'm not so sure. Definitely it was very important in the initial years. So even today, we still hear some of them say that they are applying to us because of the MIT collaboration. I think of course any of them were also hoping that as part of the collaboration they have the chance to go to MIT. Every true-blue engineer's dream [is] to have the chance to go to MIT – you're talking about the world's best engineering institution – so they will want to have the chance to go there."

Although these messages developed by the Marketing and Communications team served to spread the initial word about SUTD – and frame prospective students' views of the institution – few students or parents in Singapore could be convinced to risk enrollment at a brand-new university on slick and well-branded advertising alone. Thus, the SUTD team also began to coordinate a series of events to sell the new university's vision to prospective students and their parents, and it was at such an event that SUTD pioneer Yap Jun Kai would get his first real view of his future university.

Upon first meeting, Yap Jun Kai seems like a quintessential Singaporean teenager. With a small frame and large plastic-framed, trendy glasses, Jun Kai seems entirely of the mainstream Singaporean aesthetic (further exemplified by his daily uniform of shorts, t-shirt, and flip flops – or "slippers" in the local vernacular – the preferred style of most Singaporean men of university age). Embodying the design-oriented mentality of SUTD, whenever we would meet for an interview or a chat, Jun Kai would proudly show me a new project on which he was tinkering, ranging from a multi-dimensional, morphing sketching surface for young artists to experiment with three-dimensional space to a motion-activated carpet nightlight for small children to make their way out of bed in the dark.

It was this interest in creative pursuits that first attracted Jun Kai to SUTD. As Jun Kai described of his mindset when applying to university (from March 2016):

> For me, I like science [and] I like arts. I'm especially good at arts as a…sort of like a talent kind of thing. But I don't get to use that for, sort of, like, my education, because in the Singapore environment, I was taught to choose the safer route, which is like [the] science stream, which eventually leads to engineering. So when I was young I already do have this sort of path that I think is the safest and everyone who will go, and I will just go that path. So for me that's that. And along those years of education, I really think that I should do something related to the arts if I could, because this is what I think I will differentiate myself from other engineers. And then I sort of picked up design stuff just by reading books. But what happens is that my initial mindset was to apply to NUS and get a business and engineering [joint]

> degree, which is definitely still the safest, because if you can do something or you can innovate something, it's natural that if you can sell it, right? So that's the general concept. But in my heart I was really thinking that if I am able to blend the arts (something that I am good at) and engineering (something that I am being trained at), I could do something totally different.

In the midst of preparing a halfhearted application to NUS's joint engineering and business program, Jun Kai heard about SUTD through a promotional mailer delivered to his home. After going to the new university's website, Jun Kai was immediately drawn to the SUTD vision of "a better world by design." As he would describe later:

> So I went to take a look at the marketing. […] The first thing I saw is like 'Oh, design and engineering combined.' I was like, 'Whoah, this is something that I want to do.' Like, literally, I was literally…I checked in to that. So that was the moment where I realized that this is the school that I want to go to and there's no other school that I would want to apply for any more.

Although Jun Kai described himself as instantly sold on the SUTD vision, his parents remained concerned about his future job prospects as a graduate of an unproven, nonexistent university, and continued to push strongly for him to consider the joint engineering and business program at NUS instead of SUTD. Said Jun Kai: "I had to convince my parents, because I think…my dad particularly was always for me going for a safe course – a safe path – that would guarantee you a career or employment or something like that." This concern about employability reflects Singaporeans' broader vision about the purpose of education as contributing to an individual's future economic productivity (see Chapter 1), and Jun Kai's parents were by no means alone in their concerns about future SUTD graduates' job prospects post-graduation. In the words of one SUTD staff member:

> In the initial years it was even harder [to recruit] because we didn't have any graduates until two years ago. So it was really a leap a faith for any students who eventually join[ed] SUTD, not knowing whether…and we didn't have accreditation – in fact we've gotten only provisional so far – so there were some of these concerns about whether our degrees would be recognized. After all, we are in a very practical society, and especially where parents come in [and] are involved in the decisionmaking. Parents in particular are most concerned about the career prospects, and that's where we didn't have any track record yet to show.

Despite their skepticism, Jun Kai eventually convinced his parents to attend an SUTD recruitment "tea session" at a restaurant near the Ghim Moh office, one of many recruitment events coordinated by Sylvia Low's staff during this accelerated admissions exercise[92]. At this event, Tom Magnanti and members of the Board of Trustees pitched the SUTD vision to the small group in attendance, using just a few PowerPoint slides to outline the plan for what they hoped would become the most innovative technical university in Southeast Asia. At this particular event, there were also several MIT faculty members on hand to talk about the educational vision of SUTD; Arjun Bhat was described as particularly compelling as he discussed the numerous opportunities for SUTD students to participate in hands-on design projects, as well as a planned exchange program through which SUTD students could spend one of their summer[93] breaks at MIT. After the conclusion of the formal program, Jun Kai and his family spoke at length with the Chairman of the Board of Trustees (the campus representative assigned to do outreach at their table), listening as one of the most powerful and well-known men in Singapore attempted to sell Jun Kai's family on the prospect of an SUTD education.

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[92] Because SUTD's staff was still working out of the small Ghim Moh office during this period, admissions and recruitment events were held in public venues all across Singapore, including in schools, restaurants, and even large convention centers like Suntec City in Singapore's downtown. Because of SUTD's limited manpower, these events were "all hands on deck" affairs—even powerful and influential members of the Board of Trustees would attend to personally convince parents and their children to take a risk on SUTD (as Jun Kai's family was soon to discover). Said one SUTD administrator of these events: "[Board members] would literally come and host tables and talk to their parents and convince them and so on. So, it was very collegiate in that sense. It was very close knit. So, all of us were like, all hands on board, literally, because they were just so few of us."

[93] Since Singapore's climate is unchanging throughout the year, locals generally avoid seasonal terms; they are, however, used in this manuscript for simplicity's sake. For this dissertation's readers in the Southern Hemisphere, assume that these terms correspond to the seasons in Cambridge, not Canberra.

In the end, it was both this conversation and the strong, visual MIT presence at the tea session that ultimately persuaded Jun Kai's parents to allow him to apply to SUTD. With the blessing of his parents, Jun Kai gleefully began to prepare his SUTD application, which itself was foreign and unique to the Singaporean higher education context. From the very beginning, the early SUTD leadership decided (with considerable input from MIT stakeholders, no doubt) that students would be admitted to the university based on a holistic admissions process, taking into account both their academic scores and broader qualifications. Although a standard process at top universities in the United States, this approach was a radical departure from the traditional Singaporean system—in the words of one member of the SUTD admissions team: "[Our process] is a combination of both considering academic as well as other qualitative factors. Now, in Singapore there's [normally] a whole emphasis on aptitude-based admission [based on exam scores]." Although SUTD's initial review of candidates is based solely on grades (with students passing a certain cutoff "shortlisted" for admission), in an effort to make the process "holistic," admissions staff at SUTD also decided to include a required interview and essay[94] as a component of the application. Thus, not only was SUTD attempting to recruit students to a new, unproven university at a lighting fast pace, they were also asking that students – and parents – buy in to an unproven admissions process with additional, unfamiliar steps.

After two months of tea sessions, large events, online and print advertising campaigns, and aggressive social media blasts, SUTD's multifaceted and aggressive outreach

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[94] This essay has since been replaced with several short answer questions, as admissions staff found that many students would abandon their applications after reaching the essay page, presumably because they were too intimidated to attempt to write a full essay for admission. Perhaps relatedly, HASS faculty describe SUTD students' comfort and ability at writing as a consistent issue at the institution.

and admissions programs proved effective—in the first admissions exercise in early 2010, 674 students applied for admission at the new university, of which 120 were accepted, including an elated Jun Kai. For each of these accepted students, a senior manager was dispatched to their family's flat with their acceptance materials, in an effort to show the students – and importantly, their parents – that were they to attend SUTD, they would receive a so-called "personal touch." In the words of one of the administrators who made these home visits (from April 2017):

> You know what we did? We send offer letter personally to the house of the kids. We send it to the kid's house. We did it for the first few year[s]—maybe first three year[s], almost every weekend or at night. The reason is the following: we want[ed] to impress upon the parents and the kid, you know, about this new university because then we don't have a lot of faculty here. Then our curriculum is still under development. Then we don't have, you know, a nice campus. So we have to do a little bit of more personal, like, you know, salesman type, kind of, I would say, arrangement. […] And it's only certain level of staff that maybe…I can't remember, maybe manager and above are allowed to do that and faculty as well. And we did that for the first few batches. And sometime[s] I can tell you, I mean, everyone who [was] involve[d] in this, they can tell you and can say, you can go with empty stomach in the evening on Friday, and [though] they didn't know [you were coming], they actually sat down with you and talked to you for two, three hours. I still remember one student, you know, I went there about nine something, talked until midnight with [an] empty stomach. But I think there is a payoff, because later on we realized that the quality of first few batches was very good, was very good. But it [was] a bit [of a] hard sell.

After these personalized visits – as well as a series of teas for admitted students, at which they and their parents could again ask questions of trustees, SUTD administrators, and visiting MIT faculty such as Arjun Bhat – 80 of the 120 admitted students committed to SUTD at the conclusion of this first admissions exercise. Although still far from the stated admissions target of 500 students in the first batch, administrators could rest at least somewhat easy based on this result—clearly, some combination of the vision, the pedagogy, and the relationship to MIT was attractive enough to Singaporeans to allow them to gamble their education on the new institution.

While many of these individuals committed to join the first batch were men about to enter National Service (NS) (the original targets of the first admissions exercise), SUTD also admitted outside of this demographic group. The first 80 students admitted to SUTD included women, international students, and some Singaporean men who had already completed – or were soon to complete – their time in NS. Although these individuals could have begun studies at SMU, NTU, or NUS as soon as they completed Junior College (JC) or NS, these students opted to delay their university enrollment to "wait" for SUTD to open (as administrators at the university describe today). Despite these students' obvious excitement to join SUTD, there was some concern among the new institution's administrators that some student attrition may occur in the interim before classes were set to begin in May 2012. Thus, with the admissions exercises finished the leaders of SUTD faced yet another challenge: keeping these future students and their parents engaged and committed to SUTD as they waited for the university to formally open its doors over two years later.

Similar to the education system, the process and schedule by which Singaporean men enter National Service appears confusing to an uninformed outsider. Although NS is meant to approximately coincide with one's years from 18-20, the time of year an individual enters National Service depends on both the branch of NS they enter as well as the type of post-secondary education they pursue—for example, graduates of Junior Colleges all enter NS at approximately the same time, in the early months of the year. Thus, since most universities in Singapore follow traditional agrarian calendars, men often have at least a few months of spare time between completing NS and enrolling at university later in the year; in the case of the first batch at SUTD, this time period could be much longer, depending on the stage of

NS at which the future student applied. For the women, international students, and older students admitted to SUTD in the early admissions exercises, some had even longer to wait to join the new university.

In considering how to keep these students engaged and occupied as they prepared to officially enroll at SUTD, the school's administrators turned not to their friends and colleagues at MIT, but to another Boston-area engineering institution: Olin College, a small but competitive engineering school opened in 1999. Always eager to get the best advice possible, on visits to MIT SUTD's leadership would also pay visits to the Olin president's office in Needham (as described in Chapter 4), seeking to gain insights from others who had started their own engineering college just a few years before. It was at one such meeting that the SUTD team heard of an early program called "Olin Partners," described by one MIT faculty member with experience at Olin as follows:

> [Olin] had a plan to open in 2000. And then the construction clearly was not going to make it. They had this problem. They had made announcements, they were going to open and it was going to be the first class [entering in] the year 2000. That was symbolically important to them. It was going be the first university of [the millennium]...even though it's not really the millennium, doesn't matter. [They wanted to be] the first one. That year was a nice clean slate, and then they weren't going to have a campus [ready in time]. What were they going to do? They decided, 'Well, we'll admit a little class and they'll work with us and they'll build up the curriculum with us. And we'll call them the Olin Partners.'

According to an SUTD administrator, inspired by this idea from Olin, the SUTD team decided to create a similar "Campus Builder" program, through which they would invite incoming students – particularly those that had finished NS or JC, who were looking for activities to fill their time – to help staff as they set up various aspects of the university. As one SUTD administrator described in May 2017:

> We start[ed] thinking how to ensure [that] these student[s] have a good experience, good time with us over the next two years. We talked very hard. Obviously we want[ed] to start some program like entrepreneurship but then, you know, we don't have a lot of expertise. Entrepreneurship to some kids could be quite new, you

> know, and these are something that they may not be able to relate to. So we say, why not we start something that they can actually co-develop, co-plan, co-work with us. […] We talked very carefully and I think we started this Olin College version of Campus Builder program here. […] So we sa[id] that why not - we tell the student why don't we work together, you know, we can have someone help us to design the library. We can have someone to maybe go for maybe open houses, admission talk. We can - someone maybe help to do other policy, try to shape the university. And this is how it started.

Eager to join SUTD as soon as possible after completing his National Service, Jun Kai was one of the first to respond to an email from the SUTD Student Life office asking for volunteers for the new Campus Builder program, which would pay admitted students (not all of whom had formally committed to SUTD at that point) to work on various initiatives at the new university. In time, 20-odd other accepted SUTD students joined him in the program, each of whom was assigned a project on which they would work after indicating their personal interests from a list of possible options supplied by the Office of Student Life. Originally, Jun Kai was assigned to work on the design for the campus' student hostel, a project in which he had little real interest; eventually, however, he was able to convince the Student Life staff to allow him to transition away from that project, instead joining a group of five other students to design an outdoor light display to be constructed in Singapore's Chinatown to celebrate Chinese New Year[95]. Outside of this project, Jun Kai also found other ways to help out around campus, even representing the Office of Education at SUTD's first open house, where he helped explain the undergraduate curriculum (which he had not actually experienced at that point) to prospective students and their parents.

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[95] In the early years of SUTD, many organizations across Singapore were said to have approached SUTD with requests to develop student or faculty projects or submit entries to national-level competitions. Clearly, there was some national-level interest in seeing SUTD succeed as an institution, which I would infer to be the driver these requests.

Despite some early logistical challenges, for those that were affiliated with the Campus Builder program, most regard that time at SUTD with a fond nostalgia—said one SUTD administrator who worked with Campus Builders to design campus infrastructure during this period (from March 2017):

> Here, looking at the pioneer students who were waiting to matriculate but contributing to the development of the campus was actually very interesting. And they were very creative. They were very passionate about what they want[ed] to do. On my first day, I had one student reporting [to me], then within the hour he came back with a second student who wants to help me. And eventually the team of students grew to six, but amongst them they would compete—like whenever I [would] give them work to do, they will compete with each other like, 'Mine is better than his,' that kind of thing. So it is very interesting that they were so passionate that they wanted their design to be chosen.

Outside of these formal Campus Builder activities, however, another subculture was blossoming at the institution, due at least in part to a young MIT graduate student, who found himself at SUTD in early 2012 almost entirely by chance.

When Brian Zhang arrived at MIT as a Technology and Policy Program (TPP) master's student in August 2011, he was not entirely sure of what his time at the Institute would hold. Taiwanese by heritage but a native of Vancouver, Brian hoped that during his time as a graduate student either his on-campus research or an extracurricular might give him the opportunity to travel or work overseas. With this goal in mind, Brian sought out a graduate research assistantship (RA) with an international focus, citing the desire to work or do research overseas as a key requirement of any RA for which he interviewed during his first fall on campus. At the same time, Brian also describes himself as holding a longstanding interest in entrepreneurship and innovation, and hoped to use his time at MIT to further his entrepreneurial endeavors as well, joining the MIT $100k pitch competition planning team in his first term.

Within a few weeks of arriving at MIT, Brian found a research opportunity with one of the leaders of the IDC, who offered him an RA position funded through the newly formed research center. In this position, Brian would perform research under his advisor's supervision on a topic relevant to the IDC, and would spend at least six months of his two-year master's program at MIT on SUTD's campus in Singapore. Ultimately, Brian enjoyed this initial stay in Singapore so much that he opted to return again, in his second visit participating in the MIT-SUTD Graduate Fellows program, through which he taught SUTD introductory physics while working towards his mechanical engineering PhD at MIT.

In April 2011 – just over six months before Brian's initial arrival in Singapore – the small SUTD staff (totaling no more than 100 people) finally left the Ghim Moh office, moving to a temporary campus in the Dover neighborhood of western Singapore. Situated a short 15-minute walk from the National University of Singapore, this small cluster of buildings was located on an old campus of ITE, Singapore's vocational and technical education school. In marked contrast to the cozy environment of Ghim Moh, at Dover SUTD's 100-plus administrative staff and a few early faculty members transitioned into a four-story administrative building, which was located at the front of the campus and above the university's main entryway. By the time SUTD left Dover in 2015, this building would be stuffed to the brim with university faculty and personnel; in the months after the initial move, however, the building felt nearly empty, with the sparse staff distributed across what would become the various administrative offices and pillar groups.

As the SUTD administrative staff settled into their new offices in Dover, renovation crews worked to update the campus to fit the needs of SUTD's curriculum and planned academic life. Organized in the style of most Singaporean educational institutions, the campus at Dover had few interior hallways (which are viewed as unnecessarily expensive to

air condition against the Singaporean heat and humidity); rather, academic buildings were organized as stacks of large classrooms, with exterior walkways and patios connecting the various rooms (see Figure 9 below). Inside each classroom, remodeling efforts progressed to change the classroom configurations to those of the cohort classrooms required of the SUTD freshmore curriculum (as described in the opening pages of this manuscript), with campus planners preparing for an estimated first intake of 500 students organized in 10 50-member cohort groups.

Figure 9. A courtyard outside of cohort classrooms on SUTD's Dover campus, since repurposed as a campus of the Singapore Institute of Technology (July, 2017).

Although the Dover campus was small, some space was designated for campus activities and student life, and the Campus Builders and early administrators set to work developing a campus that could serve as a home to the university's first few intakes of students. Together with a team of six Campus Builders, university librarian Marjorie Patel worked to design a temporary library; a short walkway away, another Campus Builder opened Bread Yard – a small, Western-style café – which would eventually become a beloved SUTD institution[96]. On the other side of the campus, a compact gym was stocked with exercise machines and a small rock-climbing wall, sitting next to a large multipurpose hall to be used for sporting and social events on campus. Finally, a "Space Bar" lounge was opened on the first floor near the center of campus (next to a central "oasis" of tropical plants, also meant as a spot to sit and gather, but unfortunately home to many biting tropical critters), intended for use by campus clubs and for informal student gatherings and social events.

Of all the student spaces on campus, none received more attention than the SUTD student hostel, where students would be required to stay[97] for at least their first year on campus. During initial planning for SUTD's student life, MIT faculty and the SUTD Board of Trustees agreed that in order to be truly engaged in the campus community, it was

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[96] When I would ask faculty and staff with experience at Dover what changed after the campus moved to its permanent home in Changi, more often than not I would hear wistful descriptions of Bread Yard, and how SUTD folks missed having such quality, reasonably priced lunch offerings on campus. Bread Yard was ultimately so successful that its Campus Builder founder opted to delay starting SUTD, instead spending a few years growing the business, and even expanding to an off-campus location. Should you ever find yourself at their outlet at Fusionopolis, I strongly recommend the various bread puddings.

[97] In the Singaporean vernacular, one would use the word "stay" in lieu of "live" with regards to one's housing accommodation. For example, the question "Where do you live?" generally elicits a slightly puzzled response from many Singaporeans, while "Where do you stay?" will likely yield a decisive response like "Tiong Bahru!".

important for the SUTD experience to be residential, unlike that of the other universities in Singapore (none of which required their undergraduates to live full-time on campus at that time). Imagining late-night study and project sessions, club and arts performances, and sporting events, these initial stakeholders described feeling firmly that students should be required to stay on campus, particularly in their freshmore years. Thus, a repurposed Housing Development Board (HDB) building located next to the Dover campus (see Figure 10 below) was also acquired as part of the new university's infrastructure plan, and a small group of Campus Builders set to work developing a plan for student living in early 2012.

Figure 10. SUTD's first student hostel, now used as public housing (July, 2017). Although it has been repainted since the campus moved to Changi, a large, vertical version of the SUTD logo is still visible through the top coat of paint along the side of the exterior elevator shaft, the last remnant of the university students who once called this building home.

Like most HDB buildings, the SUTD Hostel was organized into eleven identical floors of traditional three-bedroom HDB flats, each with a large living area, two bathrooms, and a kitchen and dining area. Together with the facilities team, the Campus Builders selected furniture to go in each unit, as well as for the large first-floor open area, which would be used as a student gathering and leisure space. As they planned the hostel space, students aimed to create a sense of community across the campus, making each unit feel like home for the six residents who would live there. Additionally, over time students sought to create unity across the apartment blocks as well, developing a system of "clans" to organize the apartments attached to the building's four stairwells into *Harry Potter*-like houses. For the SUTD students who lived in this building, they remember it fondly for its kampung[98] culture, in which students could invite one another over to each other's "homes," celebrating and spending time together as an "SUTD Family" (as described in Chapter 8).

Although all of these campus development efforts were ongoing when Brian Zhang arrived on campus in January 2012, his first impressions of SUTD were that of an empty, ghost-like campus. In his words (from May 2017):

> That whole area was pretty much empty all the time. And so it's kind of like walking through a ghost town. I mean we were on the, I think the third floor, or maybe second floor, and then two or three of the other floors were just completely empty. […] Like I used to just sit in the...they had that one big room there [Space Bar] where all the kids could hang out, and they had beanbag chairs, and there's like a TV. And nobody was ever in there, so I'd go take naps in there, because it was so lightly used. […] I mean, there [were] pockets of people that were doing things. But I mean it was still early on, compared to size of the place, yeah, it was definitely quiet.

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[98] "Kampung" refers to a traditional Malay village, either on land or so-called "water villages" built on stilts above bodies of water. When students use this term to describe the first SUTD Hostel, they refer to the close-knit and familial community associated with this type of village.

In his early days at SUTD, Brian primarily focused on his research, dropping in to see his advisor when he would visit Singapore, but otherwise focusing on his own work. Over time, however, Brian began to meet people on campus, and as the word spread about his interest and experience with entrepreneurship, he started to hear one student name over and over: Rachel Chua. According to the various administrators on campus, Brian simply had to meet Rachel, as she – along with a small handful of other students – was the pioneer most interested in making SUTD an entrepreneurial and innovative place.

In early 2012, Rachel was one of the first students I Skyped when planning the first exchanges of MIT students to SUTD, after administrator after administrator told me that she was the student to know if one was interested in developing and promoting campus entrepreneurship (a particular goal of Arjun Bhat as we developed SUTD's first student programs in early 2012). Similarly, during Brian's first weeks at SUTD, seemingly every staff member he met would suggest he meet with Rachel, as word spread on campus about his experiences with entrepreneurship back at MIT. Eventually, he and Rachel connected over tea and kaya toast[99] at Bread Yard, discussing her ideas for a new campus-based, social networking startup.

Although Rachel's first forays into creating her own companies began at SUTD, her interest in entrepreneurship actually predated her decision to apply to SUTD. As Rachel described of her decision to attend SUTD (in January 2017, almost five years after our first meeting):

> [After Junior College] I was like, doing a lot of small design projects. Like I created a bag and kick scooter combi[nation] for my friends. Then I designed a bath chair for my elderly grandmother who had difficulty showering and a bunch of other things.

[99] A Singaporean breakfast staple, kaya toast is essentially a sandwich of kaya (coconut, egg, and pandan leaf jam) and generous slabs of butter between grilled, white bread. It's absolutely delicious, albeit with little-to-no nutritional value.

> So I didn't realize like at the moment what was happening but then, I saw [an ad for] SUTD in [the] newspaper, and I was like 'Hm, design and technology, this sounds pretty interesting.' And then so, I went for the tea sessions. And then I realized that engineering is something really interesting and is a good fit for what I am good in and would like to do in the future—like, I want to create products that can help people's lives and can change the way that the world works in a good way. So, the more I learned from SUTD, the more I found that it was…engineering is a good way for me to use both my interest in the technical side – which is, know my, my math interest and so on – as well as, like, the design [interest I had] which I was actually until then not really pursuing officially. I was just doing projects, creative projects on my own. Yeah, but then I, I took the plunge. I signed up to be a SUTD pioneer.

Before her acceptance in an early SUTD admissions exercise, Rachel had already attended a young innovators program for entrepreneurially-minded youth from across Southeast Asia, and came to the campus eager to both pursue her own entrepreneurial projects and to share the lessons of this experience with her new SUTD peers. Upon arriving on campus in early 2012, Rachel received some support from early SUTD staff members, but found particular guidance and mentorship in her relationship with Brian, who both mentored Rachel individually and ran small workshops for pioneer students interested in entrepreneurship and innovation; said Rachel later: "He mentored us and helped us a lot in understanding [entrepreneurship]. Oh yeah, Brian played a huge part in us learning about this scene."

In time, Rachel and a few other students also created a formal entrepreneurship club on campus called "Indent," with guidance and support from Brian and two SUTD staff members with the charge of promoting entrepreneurship on the campus (among their other duties in the Office of Research and Industry Collaborations). This group organized entrepreneurship events, worked with staff members as SUTD set up curricular entrepreneurship opportunities, and also helped Brian run the "Start Something" program, an entrepreneurship initiative organized by MIT staff members for the pioneer batch of students in the summer of 2012. As Rachel later described of this period:

> I think we were a group of students who…being Pioneer[s], we are naturally quite entrepreneurial. And so the earliest students probably were all bounded by this

> similar mindset. And so, we were all interested in entrepreneurship. And then we want[ed] to start this club. And then again, our finding was that as people without companies, it's hard for us to say things like, 'you know, you should do user validation' when we have not actually done user validation ourselves. And then we decided that it would probably be better if we were examples ourselves. And then we wanted to focus on creating companies instead of telling people how to do things when we had no idea [how to do it].

As Rachel described, she and many of the other entrepreneurially-minded pioneers eventually moved away from SUTD's entrepreneurship clubs and formalized programs, choosing instead to focus their time on their own startups. In time, the few successful startups produced by SUTD's inaugural batch – including Rachel's – would aid in developing a narrative of entrepreneurship at SUTD, propagating this idea as a value of the students and the institution as a whole, as described in Chapter 8.

Without Brian, Rachel, and the other founders of Indent, it is not clear that entrepreneurship would have taken hold as an institutional narrative of SUTD. While a few early SUTD staff members were assigned the task of promoting and facilitating entrepreneurship within the student body, these individuals also had other responsibilities on campus, while Brian Zhang could devote a great deal of time to mentoring Rachel and her peers on his visit to SUTD. Even today, Rachel and other early entrepreneurially minded SUTD pioneers cite Brian as a key resource in encouraging them to develop and pursue their ideas, providing them with both the frameworks and the inspiration required to become an entrepreneur in extremely risk-averse Singapore.

In his work on organizational culture, Edward Schein argues that the cultures of organizations evolve from three institutional sources (Schein, 2010): (1) the beliefs, values, and assumptions of the founders; (2) the learning experiences of group members during organizational evolution; and (3) the beliefs, values, and assumptions brought in by new members. While the Singapore Government hoped that the country's fourth university

would spark entrepreneurship and innovation within the country, stating this goal alone could not produce the desired outcome, particularly given that risk aversion – or "kiasu," in the local vernacular – is a broadly recognized Singaporean trait (as described to me by students, staff, and faculty across SUTD). It was the particular institutional founders like Brian, Rachel, and the relevant SUTD staff members who ultimately realized this vision, bringing to SUTD a pre-existing orientation towards entrepreneurship, then learning and building the institutional culture together with similarly minded student and faculty founders. Notably, these early stakeholders came from both MIT and SUTD, representing aligned subcultures of each institution with existing penchants towards entrepreneurial pursuits. Without these individuals – and the creation of environments in which they could interact and collaborate – the idea of entrepreneurship as an institutional value may never have taken hold at SUTD as it has today.

On April 27, 2012, 340 freshmore students arrived at SUTD's newly renovated campus to participate in the school's inaugural matriculation day, consisting of a full day of paperwork, administrative briefings, and a logistics-heavy move in to the campus's repurposed HDB hostel. Although SUTD originally sought to recruit 500 students for its Pioneer Batch, this target proved impossible to meet, and SUTD formally opened its doors in 2012 with approximately two thirds of its projected student body[100]. As the Straits Times reported the next week (Z. Lin, 2012):

> The final enrolment at the Singapore University of Technology and Design (SUTD) stands at 340, falling short of the 500 students the school had initially projected for its inaugural class. Announcing this at its interim campus in Dover Drive yesterday,

[100] It is worthwhile to note that the campus' admitted applicant yield information is not publicly available.

> SUTD president Thomas Magnanti explained the shortfall by saying the university had gone for 'quality, not quantity'. He said SUTD could easily have filled all 500 places as it had 4,150 applicants. '(But) we've been very careful in admitting students because we will have a very rigorous curriculum. It's an MIT-like curriculum and we want to make sure that all the students that we admit will succeed,' Professor Magnanti said, referring to the Massachusetts Institute of Technology, a key SUTD partner in the United States. Due to the rigorous selection process, even academically strong students - such as those scoring 4As in the A levels - were rejected, said provost Guo Wei Xun.

After finishing their required paperwork and completing move in at the student hostel, the new freshmores officially began their journeys as university students, participating in an orientation designed and facilitated by the Campus Builders, snappily titled "advent(us)." Given the lack of existing upperclassmen at SUTD, these Campus Builders served as proxy leaders for the newer arrivals, working to set the culture they had imagined for SUTD during their time preparing and readying the university. With Jun Kai, Rachel, and other Orientation Group Leaders (OGLs) at the helm, small groups of SUTD students participated in four days of team building and social activities meant to promote community and a sense of family within the small student body. In their roles as OGLs, these SUTD pioneers began to promote their own cultural priorities within SUTD; as Rachel said later, for example: "I was consciously trying to create this culture when I was an orientation group leader about like, you know, doing things differently, not going [with the] status quo, things like that." After four days of activities that took the SUTD pioneers across the island of Singapore, advent(us) came to a close with a finale befitting the celebratory occasion: a large dance party for the incoming students at the Marina Barrage outdoor venue, just south of Singapore's iconic Marina Bay Sands hotel.

With orientation complete and the students beginning to bond as an "SUTD Family," the Pioneer Batch's academic work was ready to begin. What still remained uncertain, however, was how the academic vision of SUTD would really materialize—would

Tom Magnanti's vision come to fruition, or would SUTD's innovative approach prove untenable within the context of the broader Singaporean education system?

Part III: Formation

Chapter 7: Combatting the Paper Chase – Developing SUTD's Pedagogy, Curriculum, and Academic Culture

"It's quite difficult for them [the students]. Realizing that they will have to come up with the problem and then with the solution, not just the solutions. The problem will not be given to them, they will have to scope the problem. I think that is the biggest shock that they have to face because simply they are not used to that. They are typically given something that is quite well framed and that's it. […] They are looking for very specific problems to solve, and you will not be able to give them that specific problem, so you will struggle trying to explain to them what are the expectations, what do they need to do to get an A."
– SUTD Faculty Instructor, Introduction to Design

On a Tuesday morning in November 2016, two SUTD professors – Carsten Hopfeller of EPD and Loke Jia Hao of ASD – slowly circled the Cohort 10 Classroom, pausing to systematically advise small groups of students as they divided and conquered the numerous tasks they were assigned as part of their term projects for 3.007[101], "Introduction to Design." This late in their second semester, F10[102] seemed almost destroyed with evidence of the freshmores' various projects and classes—scribbled equations and drawings from math and physics filled nearly every inch of the room's numerous whiteboards; prototyping materials from the students' physics and design projects covered tables, chairs, and, in some spots, the floor; and a table at the back of the room was heaped with snacks brought by students as they worked on projects late into the night the evening before. The room's moveable tables and chairs – neatly organized into rows just a week before for the students' mid-term physics exam – had been grouped in small, disheveled islands representing the various design groups, scattered so irregularly around the room that Carsten and Jia Hao were required to constantly take strange and circuitous routes to avoid stray

[101] At MIT, the course number "007" has traditionally been used for design courses (particularly in Mechanical Engineering), a nomenclature SUTD aimed to emulate with this designation.
[102] The official designation for the Cohort 10 Classroom, meant to abbreviate "Freshmore Cohort 10."

backpacks and extraneous chairs stuffed between the clusters of tables and the odd moveable whiteboard. Amidst the chaos were a series of small signs by the main door to F10, which seemed to almost sigh as they ineffectively proclaimed: "No food or drink" and "Strictly NO personal belongings!"

When Tom Magnanti, Andrew Meyer, and the SUTD leadership team developed the idea of the freshmore cohort learning model in which Carsten and Jia Hao would eventually teach, the idea was to create learning communities to support the students in their freshmore years, basing this strategy on research that shows these communities to be beneficial to students, as several MIT faculty members involved in the decisionmaking process described (e.g. Light, 2004). In speaking to students about their cohorts – particularly those students who studied at Dover, where students could access their cohort rooms 24 hours a day, seven days a week – they generally categorize this plan as having been successfully achieved, describing how they developed deep bonds in their cohorts working on projects and revising[103] for exams late into the night. Said one SUTD Pioneer about the experience of building the SUTD student community:

> I think the cohort classrooms helped for sure. It builds…after the freshmore year, you can tell that the classes are not that close – students in class are not that close – because they're moving around everywhere. But in the first year, everyone sits together, they have classes together, they move around together, and all that stuff. So there is a bond that's created, and people are more…they feel more, like, care and concern for each other. And those who are really smart and driven help others to…organize sessions to make sure that everyone has a good revision before the exam.

In addition to the founders' intent of creating strong, supportive learning communities, the cohort classroom model was also designed to encourage active learning

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[103] In the Singaporean vernacular, students do not "study" for exams; rather, they participate in "exam revision."

pedagogies in all of the freshmore courses, in the style of the MIT TEAL and Olin College classrooms on which these rooms were initially modeled (as described in the Introduction and Chapter 4). Over time, the various freshmore teaching teams developed a fairly standardized model to teach in the cohort classrooms: one faculty member takes the lead in delivering course content in short bursts of lecture, which are then interspersed with lab and problem-solving activities, as well as cohort-wide competency checks using the MIT-designed Learning Catalytics software. In this model, as the lead faculty member delivers content or the students work on problems, other members of the teaching team[104] circle the cohort classroom, answering questions and supporting the students as they tackle problems either individually or in small groups. As one SUTD pioneer described:

> One thing I remember very clearly and I really enjoyed was the fact that there was a lot of active learning. They taught the concept – or a few concepts – and then there were breaks where we got up [and] we did problems on the whiteboard. There was social learning, there was peer teaching, there were at least three instructors in [the] class going around and showing that we know what we're doing. And it's great—I feel it's great, because for me, I learn and reinforce my learning through practice. And through…and even through teaching other people and looking what other people do. So I really like[d] that.

For most of the freshmore courses, these active learning cohort sessions are supplemented by large lectures delivered by the course lead; for the physics course, however, over time the

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[104] In its early days, SUTD planned (and advertised) that each cohort classroom would be staffed with three faculty members or lecturers for each class, but over time that number was reduced to two, as increasing student enrollments outpaced faculty hiring. In recent years, SUTD implemented an Undergraduate Teaching Opportunities Programme (UTOP) to recruit student TAs to aid the freshmore year faculty; however, given SUTD's complex and inflexible academic schedule – as well as the demanding undergraduate curriculum – TAs for freshman courses were often absent in the cohort classrooms I observed, presumably either in class or working on their own schoolwork. Scheduling for these students was so tight, in fact, that one math TA told me he actually had to skip one of his pillar courses to sit in on the cohort class he was ostensibly hired to TA.

teaching team opted to remove the lectures entirely, believing that student learning in the cohort setting was both superior to the lecture-based model and sufficient on its own.

While SUTD students, faculty, and administrators generally speak well of the cohort learning model in terms of student learning, this approach to education did lead to one unique outcome early SUTD administrators never anticipated: because the faculty come to the student classrooms – as opposed to the other way around – in a sense faculty are teaching in spaces implicitly "owned" or "belonging to" the students. As one SUTD faculty member described of the complexities of this teaching environment:

> The thing is, I kind of managed to do cohort teaching well. This is my personal impression of the thing, and I liked doing it, it was fun. I could handle the class, but I broadly...I had a feeling it's not the greatest thing. In the sense that the students think of it as their home, and you come to their home to teach, so they can do anything they want, you have to be careful. [Normally] if I go to a class, it's my class. So the difference is, I feel that in my class [if you are misbehaving] I can tell you, 'You cannot do this and get out.' In your home I cannot do this, that's kind of the difference I felt. And gradually, the entropy of the class gets higher. You see it getting messier and messier over time, that projects come in, 10th, 11th week, there are piles of shit—sorry! [There are] random things around, which kind of was odd. And then I…what I felt is also, it was hard to control them. Some would play video game[s], some would do stuff at the back, I could walk and see, they knew. They didn't have to think about going out of the class or in the classroom. So, the organization of the class, [I thought] it's too fluid for keeping it kind of cogent enough, so that was my concern. I still think, with two, three people, we could manage it and I liked it—personally I liked it if you have a good, good digital survey [to perform competency checks]. It's excellent, the class learns more also, because you can interact more you can think how people think about things, because even if they are not vocal you can vocalize that. They thought that, 'Oh, I didn't understand that.' So, that kind of is excellent, but I think we have to have a way to control this in a different way. It bothered me a lot that this class was not mine and it was theirs. It was odd.

Just as this faculty member described, in my observations I saw the benefits and challenges of the cohort model play out in real time: engaged groups of students collaboratively working on problems next to those doing homework for another class, one faculty member actively helping students as the other struggled to regain the full class' attention, and so on. Perhaps in no class was this more apparent than in 3.007, where the

sheer volume and diversity of the students' class activities seemed to drive the course towards a state of productive chaos as the weeks of the term progressed.

Although Carsten and Jia Hao's cohort classroom may have physically resembled the teaching environments of the SUTD pioneers, the content of their Introduction to Design class was significantly different than in the course's first offering in fall 2012. Unlike with many of the other freshmore courses delivered to the pioneer batch, responsibility for development of Intro to Design lay primarily with an SUTD faculty member, rather than with faculty course designers back at MIT.

After arriving at SUTD in 2010, EPD Pillar Head Andrew Meyer dove headlong into the process of realizing an innovative educational model within his pillar, developing plans for cross-course design projects, boundary-spanning content "streams" to offer to undergraduate students, and the like. In particular, Andrew was eager to leverage his expertise in design and design education to create a rigorous first-year design course that would set SUTD students on the path to becoming strong designers with both practical and theoretical expertise in the field of design. In the original conception of 3.007 in that first year, students received rigorous training in design methods, with which they were then asked to tackle an extremely open-ended problem: creating an exhibition for the Singapore Design Center within a broad theme (varying by cohort). As one instructor described of the plan for the course in its first year: "I would say [it was] deep in methods, driven by a long-term project with an exhibition, integrated between architecture and engineering[105]."

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[105] Given that the SUTD architecture students are required to take the same first-year curriculum as the engineering students (unlike at most other architecture institutions), faculty are often working to integrate architecture perspectives in their courses, particularly in Intro to Design, which is co-taught by engineering and architecture faculty. At a particularly

Although this first iteration of 3.007 was designed to include some structured deliverables for the students, this course was fundamentally meant to expose the students to the field of design, an open-ended discipline by nature. Given students' academic preparation before arriving at SUTD, however, open-endedness was a radical departure from many of their past educational experiences[106]; as one SUTD administrator described:

> This kind of course [is] called 'Introduction to Design'—it's always open ended. There's no right or wrong answer. It all depends on how you see the problem, right, and how you approach it. But for the JC students, most of them, they are more used to structure[d] problem[s]. I mean, they look for the answer, a model answer at the end, right? And they are not quite used to, let's say, I give them an open-ended design problem and then you work and come up with something—they try to say oh make sure I get…they are not used to it. So, they spend a lot of time. And they actually work as team…the team will get together after dinner they will work on it, you know. And, and they will over [stretch] themselves a lot because they really have no ideas, right?

Absent a clear understanding of what specific deliverables were expected in 3.007, pioneer batch students responded by attempting to maximize the volume of work they produced, in hopes that within the assignments they submitted would be the "right" answer sought by their professors. As the term progressed, students began to focus their efforts on being the team working the hardest or producing the largest volume of assignment content, hoping that that would yield positive outcomes in the course; as one early faculty member of this course described of the so-called "cohort effects" of this system:

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fascinating teaching team meeting, I was able to see instructors negotiate these different perspectives in real time, as they struggled to communicate and reconcile disciplinary differences in both pedagogy (studio-based in architecture versus project-based in engineering) and scaling (design of particular technologies or of larger, integrated spaces) when discussing changes to the design project for the next year's course.

[106] It is worth noting, however, that SUTD students hailing from the country's polytechnics (who make up approximately 10% of the SUTD student body) often have less trouble with the content of Intro to Design, as they are used to more hands-on, open-ended problems than their peers from JC. Said one alum with training from Singapore Polytechnic: "Design was my most favorite subject. […] I really enjoyed that. Like, finally it was something I was good at [compared to math and physics]. I think…so probably that's why I enjoyed [it]."

> We assumed the students coming in would adjust to an open-ended environment because they chose SUTD. That is not true. They have no background in this, right? That's not quite true—virtually none. They are in a very regulated, structured and they [have] virtually no choice [in the] educational system and now we give them full choice. And that caused huge problems. And here was an example—these are trivial examples. So I'd walk in—I spent many long hours here. I walk in at two in the morning into cohort. And there would be two of the design teams working. And I walk over and say, 'How's it going?' One team would be, 'We're struggling with this, doing this.' Okay, it'll work out. And then the other team, I'd go and say, 'Why are you here?' And 'Oh, because they're here,' [pointing to the other group]. What? 'We can't leave until they leave. We don't want you to think they're working harder than us.' And that just flabbergasted me, right? Then I have a team and I'd say, I meet with them and I say, you know, there would be six of them and I'd say, 'Okay. What are you guys doing?' They start [telling me what they were working on, then I'd realize], well wait a minute, that's one task. You guys have got to divide your tasks. You can't be one head and five bodies going around. And they could not get that into their heads because they had never experienced this before. And so they, you know, felt they always have to do everything together.

Similar to the incredible number of hours students devoted to their design projects, they also went to extremes when developing their written assignments—over and over again, I heard lore of students turning in 100-plus page written reports for Intro to Design in this first term, when their instructors expected no more than fifteen pages at the maximum. As one SUTD pioneer student described:

> The teachers were looking for what you learned, or what you…what knowledge you applied, right? But a lot of people were like, 'who does the most work?' That deserved the most grade, right? So they…that's what they felt—they would write so much, they would draw stuff, they would print and…scan and print things and paste it on the book. They would try to fill in as much as they can and expect a good grade, but then some guy would just like do a one page thing – like a very genuine, like this is what I learned, this is what I did…not learned, [but] this is what I feel, like, happened this week kind of thing – and he would get a tick [check] plus-plus. And because people failed to understand that [principle], that was the biggest problem.

Four or five weeks into this first Intro to Design semester, dissatisfaction over the course came to a head—students were complaining and sleep-deprived, work for their other courses was being ignored, and the provost's office was fielding calls from parents

concerned about the health and well-being of their children[107]. Eventually (and per the students' requests), the teaching team and SUTD's academic leadership convened a now-infamous town hall meeting, at which students expressed their frustrations with the Intro to Design course. As one SUTD administrator described in an interview in May 2017:

> So, after the town hall, we have to really reorganize the whole thing, yeah. And I remember for that in Dover, right? I mean from the feedback so we provide fruits for our students in the hostel, because they are really not, like taking enough nutritious foods. Yeah. So, I, we asked them what do they need so they say, why don't you provide fresh fruits. And so in the Dover hostel, every morning we have apple, bananas, yeah, that they just pick and eat, yeah. […] [After the town hall] the [teaching] team [also got] together again, and now they make sure that the information when they disseminate down [to the students], right, it has to be consistent. [It] cannot be one cohort class receiv[ing] a different instruction from the other class, right—then they got confused. I think, second, I think we tell them that, we are not expecting you to be perfect in getting the prototype or whatever. […] So they really [didn't] know what is their expectation, so I think they [decided to] tell them, this is an expectation. I think after that, I think things [got] better.

Learning from the frustrations of the 2012 offering of Introduction to Design, subsequent 3.007 instructors worked to adjust and reflect upon the level of structure in the course, in an effort to best support the SUTD students as they learn to approach open-ended problems—for example, in the second year 3.007 structures incorporated a structured design journal into the course, rather than having students attempt entirely open-ended assignments. As a current instructor of the course described:

> So the first year it was – I think from what I have heard from Andrew and from others – I think it was a real shock from the students. The second and third year it evolved slowly into something that was not such a shock to the students. So it evolved in a way to accommodate the students that we have here that are different from the students from other places where design is also taught, okay? So there was lot of structure in the first year, but also a lot of unknown; a lot of searching in terms of methodologies that they would need to do but a lot of unknown in what to do the

[107] Many Singaporean parents remain involved in their children's academic lives even after they leave to attend university—so much so that at the Changi campus, the offices of SUTD's senior management were ultimately outfitted with two levels of security in an effort to keep out parents who arrived unannounced, demanding a meeting with the president or the provost to discuss their child's grades or general well-being.

> project. So then the methodology started slowly disappearing more let's say towards this 2D-base[d] teaching and learning, which is bit more unstructured and relies more on critique and doing and redoing and doing and redoing. […] Now we are putting a little bit more of structure into it. So a bit more on methods and ways of doing things that help them, besides [just] the critique of the studio-based learning. So we're going towards a mix of project-based and studio-based. So some assignments, some critique and we're trying to find a kind of a balance here between more engineering project-based and more architecture studio-based.

Although Intro to Design is perhaps the clearest example of a course in which faculty struggled to adjust to the students' academic background before their arrival at SUTD, I heard from professors across the freshmore courses about their challenges in encouraging the students to think creatively and to approach open-ended problems. Said one instructor of his experiences teaching mathematics in the freshmore curriculum:

> You know, people might have the impression, myself included, would have the impression that, you know, Singapore, is this paradise when it comes to education. It does so well in all these standardized testing and so on. But, you know, after I had come here and observed how things went, I realized that, you know, they were just very good at getting good scores and memorizing things and so on. So, if you ask them to think outside the box then, you know, typically, they're not so good at that. So for example, you know, with the freshmore students here, you know, if you just…if you ask them a question that they are not quite equipped to answer but, you know, you ask them to use their common sense to guess on the answer, then they are very reluctant or incapable of doing so. Or, if there's like an equation with many different solutions or many different solution methods, then they get stuck because they cannot, you know, recall a method, you know, a recipe for solving such an equation. So as a result, you know, it is a bit of a struggle in their first year to get them to think creatively or to just to forego that study habits like, you know, they just want to memorize things and, you know, they want to be spoon-fed and so on and so forth.

Perhaps more than any other course in the SUTD curriculum, Intro to Design is described as explicitly challenging new SUTD students to think outside of this established educational paradigm, reflecting the values of creativity and innovation that MIT faculty – and early institutional leaders EPD pillar head Andrew Meyer – sought to foster as part of SUTD's institutional ethos. As the course exists today, the first several weeks are explicitly

designed to challenge students to think outside of the rote, solution-oriented mentality with which they arrive at university; as one instructor of the 2016 iteration of 3.007 described:

> So the first three to four weeks of the course are quite difficult because we need[ed] to put them in a rather uncomfortable situation for them which is not to know what to do. And because they are used to knowing exactly what to do when they have guidelines typically and they have close[d], formed problems, let's say, and very well-defined problems to solve and when they come to design they don't have that. And they have to come up with their own problem to solve which is quite difficult for them, but not for all of them but for some at least. So there is I think the most difficult thing to tackle, but before tackling it to realize it. So that's basically my understanding what Introduction to Design [is], the problems of Introduction to Design. After those four weeks they then realized, 'Okay, this is different.' So that's the objective: we don't know exactly how we're going to get there but we'll get there, so let's do some work. And then things started to evolve positively, but the first few weeks are quite difficult.

In Carsten and Jia Hao's 3.007 course in 2016, I was able to see this process in real time—students struggling as they attempted to identify important problems to address with their design projects, with faculty and staff pushing back on them as they clearly attempted to reverse-engineer a problem to fit a clever design they had already brainstormed. Ultimately, students succeeded in addressing this challenge to varying degrees; while some groups in F10 seriously and constructively went through the design process (coming up with truly impressive projects as a result), others delivered final products eerily – and suspiciously – similar to their very first prototypes.

As noted above, this educational model for Intro to Design – as well as the other freshmore courses taught in the cohorts – largely grew out of the ideas from SUTD faculty members themselves, rather than from collaborative partnerships with faculty or instructional staff at MIT. Thus, Intro to Design and the cohort pedagogy serve as two examples of components of the SUTD educational model developed entirely "on the ground" in Singapore, illustrating cases in which local actors created emergent educational solutions using their own experiences teaching at SUTD.

While some classes – like Intro to Design – developed and evolved solely or predominantly on the SUTD side of the collaboration, in other courses MIT faculty played active, hands-on roles in delivering the coursework, particularly for the first few batches of SUTD students. In SUTD's first full term in summer 2012, half a dozen MIT faculty could be found constantly crisscrossing the SUTD Dover campus: Joyce Williams serving as an active member of the chemistry teaching team, IDC Co-Director Luis Sosa coordinating SUTD's early research efforts, and Arthur Foster making himself a now-infamous SUTD figure as a guest instructor for first term physics lectures[108]. For his part, Arjun Bhat also found himself in and out of Singapore that term, both aiding the SUTD administration in logistical and planning matters and serving as a drop-in instructor for SUTD's first formal entrepreneurship program, jointly coordinated by Brian Zhang and the Indent student group. For this first batch of SUTD students, MIT faculty involved in the collaboration played a very visible and supportive role on campus, providing the students with at least a sense of exposure to – if not immersion in – the "MIT DNA."

Of all of the 80-odd MIT faculty that would ultimately perform either short-term (one week plus) or long-term (one month plus) residencies on the SUTD campus, Joyce Williams had perhaps the longest and deepest engagement with both the SUTD community and the country of Singapore more broadly[109]. Although originally asked only to develop the

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[108] Due in large part to a notable occasion in which he carried a student on his shoulder across the lecture theater to demonstrate the concept of potential energy. In a less widely known piece of campus lore, one student also described to me how in a particularly exciting lecture Arthur threw a chair across the back of the lecture theater, apparently in an effort to demonstrate one of the laws of thermodynamics.

[109] With the notable exception of Arthur Foster, who – in addition to a five-month residency to support implementation of the first-year curriculum in 2012 – travelled to Singapore on a seemingly bi-monthly basis during his time as Collaboration Director from 2013 to 2017.

first-year chemistry curriculum for SUTD, Joyce eventually agreed to travel to Singapore to aid in implementation of the curriculum she had designed. While Joyce's original plan for on-site involvement was limited to the first iterations of the chemistry course, her engagement on the ground in Singapore grew over time; in the end, Joyce and her family spent every summer from 2012 to 2016 effectively living in Singapore, allowing Joyce to serve as an active member of the term one chemistry teaching teams.

Per individuals familiar with this period, upon her arrival in the middle of the first term in 2012, Joyce discovered how little the SUTD chemistry curriculum reflected the plan she had carefully developed back at MIT. While her original plan for the course had leveraged the SUTD cohort model by infusing the class with labs and cohort learning activities, the chemistry course she entered in the summer of 2012 had essentially reverted to the mean of traditional Singaporean higher education instruction, with the course lead delivering long lectures at the beginning of the various units, and with very little active learning in the cohort breakouts. Despite the familiarity of this approach, the SUTD students were not succeeding in this revised model; in the words of one MIT faculty member familiar with this period, SUTD's chemistry instruction was, at that time, just "not working."

With the majority of the chemistry teaching team behind her, that summer Joyce worked to reshape chemistry back to the original active learning model, reorganizing the lecture-cohort structure and personally assuming teaching responsibilities in both the lectures and in individual cohort rooms. By the conclusion of the first iteration of term one,

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Arthur has become such a beloved figure that when he comes to Singapore, he is often brought out for feasts of local food by his Singaporean friends on the SUTD faculty. I was lucky enough to attend one such dinner, which quickly evolved into a fury of inside jokes and reminiscing about the past.

freshmore chemistry was again an active learning experience, with the curriculum having undergone a complete turnaround from the state it was in just a few months earlier. As Joyce left Singapore at the conclusion of that first summer, she was described by her colleagues at both MIT and SUTD as having deep connections to the chemistry teaching staff, bonds that would continue to grow as she returned to Singapore summer after summer, continuing to support the chemistry team as they refined and reshaped their course moving forward.

In areas such as the chemistry curriculum – where MIT faculty had both the skills and the enthusiasm to deeply and constructively collaborate with their well-qualified counterparts at SUTD – the process of implementing the freshmore courses went largely as planned by the original framers at MIT and founders at SUTD. Over and over, I heard similar stories of this process, particularly from the freshmore chemistry and physics faculty, the groups with perhaps the most sustained and meaningful collaborations with MIT faculty members. In these and other, similarly supported courses, MIT and SUTD faculty described participating in an iterative process of collaboration and mentorship, in which MIT faculty would provide the original curricular plans (as per the MIT-SUTD Collaboration agreement), then work with SUTD faculty as they modified these plans to better fit their own expertise and the background of the students, both during and between course deliveries. Over time, MIT faculty gradually handed over the curricular reigns to their SUTD counterparts full-stop, providing guidance or additional materials when requested, but largely leaving SUTD faculty members to manage and deliver courses on their own. Of course, the extent to which the MIT faculty member served as the driver of educational initiatives largely depended on the particular course and the personalities of those involved; while Joyce strove to negotiate roles of leader and collaborator, in other cases – like that of biology described below – MIT

faculty served as more explicit drivers of reform, with the consent and support of the SUTD administration.

While Joyce continued to work with the chemistry instructors during the first few iterations of the freshmore courses, the biology team received no such prolonged mentorship from MIT, and were left largely on their own to execute their course from the original plan created by an MIT instructor. In contrast to chemistry, in subsequent years MIT and SUTD administrators did not see the biology courses improve—rather, the biology curriculum received consistently poor evaluations from students, who were vocal critics of the course. Concerned about the lack of progress in this course, Arthur Foster (who had been named MIT-SUTD Collaboration Director in early 2013, after Arjun Bhat received a new administrative role at MIT) sought out help from the MIT biology department, searching for a faculty member interested in helping to improve delivery of the SUTD biology curriculum. In this quest, he eventually reached Jack Powell, a professor in the department who had recently stepped down from a role in MIT's administration. Back in his role in the biology department and with some newfound time on his hands, Jack eventually agreed to look into the biology curriculum, agreeing to visit Singapore to investigate the situation at SUTD.

Upon his first arrival at SUTD in early 2014, Jack discovered that the biology curriculum was struggling due in large part to the structural issues surrounding the school's biology personnel—because SUTD's rigid curriculum stated that biology was only to be taught in one term per year, it was difficult to find qualified biology instructors to commit to the institution, and equally as hard to create a full teaching load for those biology instructors that did join SUTD. In addition, the pragmatically-minded Singaporean students saw little

need for future engineers or architects to have a firm grounding in biology; as one faculty member described:

> SUTD students are very different than MIT students. There are no biology majors and there's precious little…there are no science majors. And so you're essentially teaching biology to engineers and architects, essentially. And so, that curriculum, the biology that you'd want to teach engineers is very different than the biology you want to teach people that are…that let's say want to go to medical school or something like that. […] So, there was an attempt to essentially explain to them why – explain to these, you know, ostensible, you know, future engineers and architects – why biology is important. And I felt that that really missed the boat. Okay? So, and this is something that's sort of part of MIT's DNA. That it's not, it's sort of so deeply engrained in the educational – the MIT education that people don't really talk about it that much explicitly. But it's the way – so the way that the Singaporeans would do this was just sort of say, 'Well, you know, here's a biological process. Let's take photosynthesis. Okay, photosynthesis is essentially a way of, you know, converting – whatever – sunlight into chemical energy and you know, this is very…this is going to be very important for bio fuels or something like that.' So, you know, I felt that there was – that the more they tried to – the instructors tried to make this case, like make biology relevant, actually, the worse it got from my perspective because it was just such a sort of small ball way of kind of explaining to somebody – like, you know an 18-year-old, whatever – like the importance. […] So really the part that was missing is the notion that science in general – and certainly biology but, you know, obviously chemistry and physics – provides the intellectual foundation of understanding all of engineering, right? And so, you're really, what you really should be trying to do in a biology class, you know, taught to engineers is teaching them the molecular life sciences that they will need to make new inventions 15 years from now. Not to apply it today. And that was the part that was completely missing.

After an initial visit to SUTD, Jack returned to MIT and – with input from Arthur Foster, Lee Yam Keng, and other MIT and SUTD faculty – set about reimagining biology education for SUTD, free of the institutional and curricular constraints of the MIT environment. At the end of this process, a two-course curricular sequence emerged, consisting of one combined biology-chemistry hybrid course in term one (teaching the interconnected topics of the two fields) and two short, modular chemistry and biology courses in term three (teaching the remaining topics of each subject's freshman course content). With Lee Yam Keng's blessing and Joyce Williams' help and support on the ground in Singapore, the revised curriculum was piloted with the SUTD freshmore class

entering in 2015. Although not without its implementation bumps along the way, it was ultimately decided that this course structure should continue, and the revised course sequence is in its third iteration as of this writing. As one MIT faculty member described:

> And it was not possible to do this all in, you know, in one shot but ultimately the plan is to actually teach it in a way where the students are not aware of whether a chemist is teaching or a biologist is teaching. It should just be kind of a seamless whole. And one of the reasons that I love it is because it comes back to this kind of supporting this…the notion that the sciences are foundational. And this notion that a concept in chemistry is not a concept in chemistry, it's a concept connected to biology, it could be connected to physics, I mean, these things are all…you know, [they] work as sort of an integrated whole.

Unlike with the other pedagogical adaptations described thus far, these revisions to the chemistry and biology curricula were driven in large part by faculty at MIT, albeit with support and input from SUTD faculty, particularly its administrative leadership. Thus, it is clear that curricular and pedagogical evolution at SUTD could emerge from both sides of the collaboration, particularly when an MIT faculty member's area of interest aligned with a self-identified need of SUTD's academic leaders. Despite these successes, however, in other, lower-priority academic areas of SUTD, the process of curricular adaptation and localization was not quite as smooth.

While Joyce and the chemistry, biology, and Intro to Design teams made great strides over the terms in improving delivery of the first-year content, members of SUTD's HASS department struggled to even implement the course plan provided by MIT for the two-course freshmore HASS sequence. As described in Chapter 3, the SUTD conceptual design conceived of the introductory HASS courses (HASS 101 and 201) as globally-oriented introductions to the Great Books, in the style of Columbia University or the University of Chicago's undergraduate curricula. Given that no such course existed at MIT at the time, however, faculty in MIT's School of Humanities, Arts, and Social Sciences \opted to hire a

postdoc to develop and pilot the course at MIT, supporting this individual using the funding provided by the collaboration for the purpose of course development. At the end of this process, MIT delivered to SUTD a syllabus – essentially a book list, as one early SUTD faculty member described it to me – for the course, designed to cover the books of four major cultural "groupings" spanning both East and West (the Bible, the Koran, Confucian writings, and so on).

Based on the agreement between MIT and SUTD, this syllabus was the sole requirement of "delivering" a course to SUTD—essentially, participating faculty at MIT were required to deliver a syllabus and some course materials, as well as responses to any questions the receiving faculty at SUTD might have about the class. After this clarification process for HASS 101 was complete, the Office of Education endorsed the course's delivery, and MIT faculty's responsibility for the HASS core curriculum formally came to a close. Unlike in other departments, no MIT humanities or social science faculty member appeared eager to spend months and months supporting faculty on the ground in Singapore, as Joyce Williams had done for the SUTD chemistry team; thus, Elena Lipohar and the other early HASS instructors were left on their own to actually implement HASS 101 during the pioneer batch's first semester.

With the content of the first-year courses set and delivered by the team at MIT, Elena and the SUTD faculty then set out with the task of modifying the HASS 101 and 201 curricula to fit their expectations of SUTD's future students, as well as the short semester length dictated by SUTD's year-round academic schedule[110]. As described in Chapter 5,

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[110] Whereas MIT terms are fourteen weeks, the SUTD terms include only twelve weeks of instruction, with one week at the end of term for revision and examinations. During the freshmore terms, one additional week is devoted to "2D" activities (see Chapter 4), reducing the weeks of formal instruction to a total of eleven.

early faculty in the HASS cluster largely had little-to-no experience teaching this type of course; said Elena of the process of organizing the freshmore sequence for the first time:

> So, we sat down and went through the syllabus and that was painful, because really none of the people on the team at that point was trained in literature. Zero. We had a psychologist, sociologist, two historians, [one] who was management studies, and then sociologists and other sociologists, six of us. Oh, and then another historian of military, modern military stuff. Seven of us. [One] who is a quantitative sociologist. He works with numbers, stats. So there was eight of us. Some of those were hired right before the semester started. So, there was eight and then we added […] in the subsequent semester. […] So, roughly about eight or nine, to begin with. Zero [experience] until [the new people] came [during the second term]. Zero experience teaching literature. Zero experience doing any of this.

Although the HASS faculty were able to pull together HASS 101 and 102 in that first year – and many students I spoke with had vivid and fond recollections of those courses[111] – members of the cluster continued to struggle in the first few years, as they attempted to reconcile their expertise with the plan set forth by MIT. As one early HASS instructor described:

> The first run, it actually wasn't a disaster. I mean, I think—it was okay. Nobody knew what to expect. There was a lot of tension within the team, because we had different ideas of how to teach. […] We would have fights about that, not that…when we were making the syllabus we had fights, but when we had…when we [we]re teaching it and during the semester we would have fights about it, how to teach it. What should be on the exam? What was the form of the exam? How to mark the exams. All kinds of stuff, right? […] Anyway, so that was just a lot of problems, we ran through 101—surprisingly it went okay. I mean, except for the background fighting that we had. Yeah. I mean, I think we hid it well. I think we really hid it well.

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[111] When I asked Yap Jun Kai about early memorable experiences at SUTD, for example, he responded: "So our first lectures, I still remember, it was I think [the] second day of school – maybe it was the second week – I remember my HASS professor – I mean, you know, everyone's HASS professor – he painted his face white and he talked not as a lecturer but he's, like, talking through the voice of Plato. And he just spoke the whole lecture is like that—he never introduced anything, just talked. And at the end he's like…he acted like he's dead and just lied on the table and paused like that. And that's the end of the lecture. I wasn't used to that—I didn't expect that."

In the words of an MIT faculty member familiar with the hiring of SUTD's HASS cluster (from March 2016):

> It was a flawed model, in terms of who they'd actually hired, and the fit of skills, and the fit of the students' abilities, and who had authority to implement things. There's been a lot of work done on that. […] For about the first two years, on the HASS side, there was the recognition that they had hired probably more social scientists than humanities scholars, and pretty much no one in the arts. They had, with the exception, one person who does literature and film, who was not there the first semester either. […] What became clear, over the first three years – I would say it took about three years – was the recognition that, while the concept was great, they had not hire[d] for it and had no intention of hiring to fit that concept. So you have to rethink, 'What can we actually do?' And once you have human beings there, you have to work from them, and create a community of them, and have them feel comfortable in owning it, to have it effective. So that's what you do.

In the first few years, the curricular and administrative organization of HASS eventually began to improve, thanks to both the SUTD HASS faculty themselves and their advocates at MIT, notably Arthur Foster. First, after years of requests from the HASS faculty, the SUTD administration agreed to create a cluster head position for the HASS group, analogous to the pillar heads of the degree-granting departments. After a long search and recruitment process, the SUTD administration was eventually able to hire Peter Eide, an anthropologist from the University of Chicago, to join the institution on a similar basis to the other pioneer pillar heads (with the understanding that he would eventually leave SUTD, and wouldn't commit to the institution in perpetuity). Notably, during his short time at SUTD from approximately 2014 to 2016, Peter was able to advocate for the HASS group in a way that the junior faculty could not, spearheading a hiring push that broadened and diversified the cluster.

In the midst of the cluster head hiring process, another debate was brewing among those in the HASS department: whether the HASS 101/201 sequence should remain as MIT originally designed it, or if it should be reimagined to include introductory material in the social sciences, in addition to the existing content in the humanities. As noted above, HASS

hiring had primarily occurred in the social sciences, and in addition to their discomfort with the existing HASS 101/201 material, faculty began to note that the upper-level students in their elective courses demonstrated no familiarity with social science concepts. As one HASS instructor described:

> There was also a lot of bickering among the humanities group that term in terms of what to do with these two courses, right, the [HASS] 101/201. So, one solution was we found it…and that students weren't – they had no clue what 'social sciences' was. It's just 'HASS,' right? It wasn't working. So, okay, we'll [divide] these two things. […] This particular [social science] group too is very kind of, like, pragmatic. Okay. You want us to teach that? We'll teach it. So, Peter gave us the syllabus from Chicago. We sat down. […] We pared it down to our calendar to cut what we couldn't fit. Picked the ones that we thought were useful here, like Marx, Weber. I mean, the standard stuff, [and we] ran it last year.

During my period of data collection, a new equilibrium had been reached within the HASS cluster as a result of this change: freshmore students took two introductory classes (one in humanities and one in social sciences) taught by a balance of faculty from the various disciplines, who also were provided opportunities to teach their own elective courses[112] to upper-level students. Although HASS faculty still discussed struggling in many ways to define a role for their department within the university as a whole, the situation as I observed it in 2016 and 2017 seemed greatly improved from that of the university in its early years.

Despite the internal turmoil of the HASS cluster over the years, the courses offered by this department have proven to be some of the most formative for at least a subset of SUTD students, some of whom came to SUTD with pre-existing interests in these subjects,

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[112] Although most HASS faculty are given the freedom to design elective courses that interest them (without any considerations of a broader curriculum), a few per year are asked to teach courses that fit into special degree programs, like the SUTD-SMU Dual Degree Program.

with others convinced of their merits along the way[113]. As I interviewed SUTD alumni for this study, over and over I would hear stories about how HASS classes were some of the most formative or memorable educational experiences of SUTD students' academic careers, particularly in terms of teaching these alumni the reading and writing skills they lacked upon entering university. As one SUTD pioneer student described: "I think most of the things I use on a daily basis – not work related – is actually knowledge given to me through HASS class. Understanding about religion, film, and all the humanities are based on HASS. So I actually use more HASS in real life than engineering." In listening to employers and alumni talk about the strengths of SUTD's graduates, in fact, HASS appears to have an outsized role in shaping the institution's alumni to be desirable in the Singaporean workforce (as described in Chapter 10). Thus, while planning and development for the HASS cluster and curriculum clearly was not a high priority of either the MIT framers nor the early members of SUTD's administration, its inclusion in the curriculum clearly has a perceived impact on many of SUTD's students, either personally or professionally.

As described in various examples in this chapter, over time teaching at SUTD evolved from a somewhat frenzied delivery of courses in the first years to a more steady-state form, in which instructors became comfortable and familiar with both their course's content and the SUTD educational approach more generally. As instructors developed comfort with their course materials, they started to propose class-level curricular reforms

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[113] As is likely the case at any engineering school, some SUTD students were never really won over by the idea of HASS, which the faculty certainly understood—as the old adage goes, "you can't win 'em all." For a subset, however, HASS courses offered a real escape from their outcomes-oriented technical classes, where they could investigate topics in which they had real interests, but were considered "impractical" to study within the broader context of Singaporean society.

(like those in chemistry and biology and HASS 101/102 as described above) and propose new courses to fill gaps they saw in the MIT-designed curriculum. At the same time, the pillar heads also began to consider reforms to their pillar curricula more broadly, particularly as the founding pillar heads returned to their home institutions and replacements began to arrive on campus.

Although faculty certainly proposed classes across the pillars, there was perhaps no greater course-approval frenzy than in the HASS cluster circa 2014-2016. Unlike in the pillars, MIT designed no structure for the HASS curriculum outside of the first two semesters; instead, students are simply required to take five additional HASS courses of their choosing after they complete their freshmore year (with the exception of ASD students, who have "archi HASS" courses of their own, and are only allowed to take one general HASS course with the engineering students). Thus, new HASS faculty generally opt to create 1-2 classes in their area of training, leading to a series of course offerings as disparate as "Sages Through the Ages: Readings in Early Indian and Chinese Religion and Philosophy" to "Normalcy and Deviance: Philosophical Approaches to Sexuality" (both offered in fall 2017). As described above, when Peter Eide arrived at SUTD in 2014, he pushed through a surge in faculty hiring in the cluster; this surge, in time, led to an incredible growth of new courses, providing many new – albeit rather disparate – opportunities for the undergraduate students.

2014, 2015, and 2016 also brought changes to the curricula of the pillars, primarily driven by the various departments' pillar heads and their external advisory committees. In the case of EPD, for example, Andrew Meyer had discussed creating numerous interdisciplinary "streams" to offer to the pillar's students since his arrival at SUTD—in time, this vision would manifest as nine curriculum "tracks," including two tracks in

mechanical and electrical engineering certified by Singapore's engineering board[114]. Similarly, after professor Frank Jacoby was appointed as the second ESD pillar head in 2016, he also opted to reform the curriculum of his department to better align with his vision of an "engineering systems" education, in consultation with his pillar's faculty.

As is clear from these descriptions, over time at SUTD curricular reforms began to be driven by those "on the ground" in Singapore, rather than the initial group of institutional framers back at MIT. These developments are reflective of how MIT's approach to oversight of the collaboration changed over time; as one MIT faculty member described in November 2016:

> So ultimately, if you look at the interactions with MIT and SUTD, we're not consulted anywhere near what we were early on—we were calling all the shots in 2011, and I would even suggest that in 2012 we were calling most of the shots. But by the time we hit 2013, we had some functioning stuff, we had faculty doing things. On top of it [was] the fact that you have pillar heads, the pillar heads there. You have four people that are strong academics in their own right, and it's very, very difficult for us to come in and say 'You will do this.'

Despite this shift, MIT faculty did retain some oversight as the years progressed through their participation in a formal "Education Committee" (EC), consisting of three MIT faculty and three senior academic leaders of SUTD (although, perhaps notably, not SUTD President Tom Magnanti). The EC was responsible for approving all new academic courses, initiatives, and curriculum changes at SUTD, including those described in this chapter. Of particular concern to the EC members – particularly of those from MIT – was the question of rigor, and how SUTD would maintain academic excellence in the face of societal and environmental pressures.

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[114] This certification allows graduates of these tracks to sit for Professional Engineer (PE) qualifications post-graduation.

Underlying all of the curricular and pedagogical adaptations, modifications, and evolutions discussed in this chapter is the Singaporean phenomenon of the "paper chase": essentially, an unending competition towards achieving the highest primary and secondary examination scores, then the best grades at university, and then the most prestigious and well-paying job one can attain based on one's academic qualifications[115]. Within the context of this near-obsession with grades, MIT and SUTD faculty opted to implement another policy important to the Institute's undergraduate educational experience: the pass-no record policy, which in essence provides students with a grade-free freshman year[116].

MIT's Pass/No Record (P/NR) policy actually dates back to the 1960's, when MIT faculty voted for a temporary experiment to make undergraduate students' experience of the Institute more positive (and, as the institutional lore contends, less stressful and anxiety-inducing). As *The Tech* (MIT's longtime student newspaper) reported in a 2000 feature (Wang & Keuss, 2000):

> The MIT Pass/Fail policy was initially an experiment, as MIT sought to offer students more freedom in choosing classes and less emphasis on grades. The growing academic strength of admitted MIT classes, coupled with the general spirit

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[115] In Singapore, the influence and importance of grades on a college transcript extends past one's university and into one's professional life—when employers seek applications for entry-to-mid level positions, one's university honors are an important criterion on which recruiters may assess an application. Originally, the non-Singaporeans in the SUTD administration had paid little heed to developing a system of honors for SUTD graduates, expecting that GPAs alone would be enough academic information for students to successfully apply for jobs in Singapore; however, in time an honors system was ultimately developed, and an astounding 98.4% of the undergraduate Class of 2016 graduated with some Latin honor (cum laude, magna cum laude, or summa cum laude), perhaps illustrating some dilution of the meaning of these terms in the SUTD context.

[116] Interestingly, at SUTD P/NR only applies to a subset of the freshmore courses—as of this writing, only the first term courses are pass-fail, but in past years third semester biology was also pass-fail, as it was considered a "core" course along with chemistry, physics, mathematics, and HASS 101. As the other third-semester courses were graded at this point, this system had the unintended consequence of implicitly encouraging students to devote essentially no time or effort to biology, instead devoting their time to the other "world" courses that term.

> of non-conformity in the 1960s era, led to changes in academic policy. Partly to ease pressures on students, MIT voted in 1968 to eliminate letter grades for all freshmen and to impose a credit limit. Originally intended to end after four years, the program has lasted over three decades. […] Although the program did reduce the amount of competition for grades, it did very little in alleviating the anxieties and pressures about academic progress, according to the Stannard study [of this policy].

Hoping to promote similar student well-being at SUTD, MIT framers opted to recommend a similar policy to the new institution, in addition to other student-focused policies like the limitation on the number of courses in which undergraduate students could enroll per term (as described in Chapter 3). Although it was ultimately decided that SUTD's first term would be ungraded, this policy did little to quell students' focus on their scores in these classes, as from the perspective of SUTD's students, the need to achieve high grades stems from both societal pressures – particularly the high stakes exam-based nature of their previous schooling – as well as their perception of SUTD's institutional priorities when it comes to its students. As one SUTD pioneer student described of students' perceptions of this system:

> So Singaporeans are very cynical—even when the first term is not graded, everyone knows that there's a secret, hidden grade that they keep. Like, it was very obvious when there was some selection internally for a certain program—there was one in 2012, I think, where there was a free trip to Japan, because after [the] tsunami, the Japanese government was giving free trips to students from all over the world. So you could see the eight people who were selected probably all did very well in term one. It was very, very obvious. […] When the whole school saw that list of eight people who went, they were like, 'Actually, the school is bullshit.' Because the only grade they had at that point in time was term one.

In speaking with SUTD faculty, the push from students to improve their grades was a constant theme. In one grading meeting I observed at the end of term for a freshmore course, the course lead explicitly directed the cohort instructors to adjust participation grades to ensure that no student's course average was within a quarter point of a letter-grade cutoff, in an attempt to preemptively quell the student complaints that he was sure would arise from those at the margin; similarly, said one ASD instructor: "The grade mattered so much for

them, that was kind of a difficult part. So they would, you know, want to…not want to necessarily learn, but they just want to get [an] A. That was kind of like a difficult attitude some of the students had in a pretty strong way."

As another freshmore instructor described, mirroring similar observations of his peers:

> You know, so for example, the…some of them would cry after a test because…you know, these are like, you know, 18 or 20 year olds. You know, the boys have been older because they had actually come through military service, right? You know, they would cry after a test because they think they had done badly, you know, like that is before they even see the results, you know. […] [Over the years], essentially they've kind of driven us to make the course easier and easier. Instead of more and more [it's] less and less theory, they're like more application-based and just sort of force us to do more work in terms of, you know, making the material available to them as opposed to getting them to sort of teach themselves a bit.

Despite this push from SUTD's undergraduate students to make the course material more manageable, SUTD's leadership has maintained an external commitment to rigor, in both the students the university admits and the content of its academic programs. Given that MIT agreed for its name to adorn SUTD's masthead for the course of the formal collaboration, MIT stakeholders – including Tom Magnanti – also had great motivation to push for rigor at the institution given that the Institute's own reputation was so closely connected to that of SUTD. As one MIT professor described:

> We certainly pushed for academic rigor. There are some arguments that do happen with the cohort-based stuff. Some people—I mean, in terms of the physics and the chemistry I think it's just been every bit as rigorous, we've had two major players, you know, [two MIT faculty members that] I think have been real beacons ensuring…first of all, doing the hands-on stuff in the cohort based classrooms but also ensuring that there's rigor that is maintained. I think the chemistry group has done that, I think the physics group too has done that.

Interestingly, despite the intense focus on grades within the SUTD student community, undergraduates are also often willing to help one another with course content or exam revision, clearly having adopted the espoused value of the "SUTD family" described in

Chapter 8. Many SUTD students attributed this mentality to the cohort learning environment of the freshmore year, which allows students to help others in their areas of academic strength and receive help in areas in which they might be less strong. As one SUTD pioneer described:

> So you help each other, but yet you are still very competitive—you will go back and do mid-term practices by your own self[117], you'll continue to work harder and all that. You don't actively…few people actively reach out to try and help others; and often when there's help involved, I think it takes the form of 'Okay, let's get together and help each other.' So there is mutual benefit. […] But there are a few people who actually say 'I'm going to go around the class and make sure everyone knows what I know.' Yeah, there are people who are like that.

In particular, this collaborative environment drew upon the differences in academic preparedness between the JC and polytechnic students—while JC alumni were generally strong theoretically (and therefore could help poly graduates with topics like physics and math), poly graduates were much more comfortable with hands-on activities like in Intro to Design, where they often led groups of JC students wary about tackling loosely framed design challenges. Despite these supports, many students still ended up in SUTD's "boot camps," intensive, post-term review sessions that allow students to review course materials and re-take examinations for courses they have failed[118].

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[117] As I got to know SUTD undergraduates during my earliest stages of data collection, I was particularly taken aback when a student told me that when performing group work at SUTD, if a student is not pulling their weight, it is likely because they are sneaking home to study for exams rather than contributing to the group (since exam grades represent a comparatively high proportion of students' final course grades). He seemed astounded as I and another American described how those not pulling their weight in group projects in the U.S. are generally up to much more nefarious ends than individual exam revision.

[118] Another artifact of MIT, "boot camp" was modeled after a similar program offered by MIT's physics department. In SUTD's case, the ability for failing students to re-take final examinations was particularly important given the university's strict academic schedule—if a student was not allowed to move on in the curriculum due to a failing grade, they would be forced to wait another year for a particular course to be offered again, and may well choose to leave the university in the interim if faced with this option. Thus, the SUTD administration instituted a policy of boot camp for most of the freshmore core courses,

In many ways, academic life for undergraduate students at SUTD seems to represent a multitude of tensions: competitiveness versus collaboration, open-ended projects versus traditional exams, rigor versus retention, and breadth versus depth, just to name a few. As faculty worked during SUTD's first semesters to adjust and stabilize the school's undergraduate curriculum, SUTD's students were also hard at work attempting to create a thriving and engaged student life like the early framers and founders had imagined. In this pursuit, however, yet another fundamental tension emerged: could SUTD's students create and commit to a vibrant student life, particularly as their career prospects remained inextricably tied to the outcomes of the so-called paper chase?

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requiring a faculty member from the relevant pillar to re-teach the course material to all the failing students in the weeks following the conclusion of the term. As an SUTD faculty member described: "During that two weeks, it's sort of like an intensive crash course of the course. So they will…it's four hours per day. And, yeah, so they go through the materials…because they have seen it during the terms, so we go through the materials very quickly and then do a lot of practice problems. I mean the whole thing is to help them to solidify the concepts and hopefully they will pass. So after the boot camp, so within the two weeks, after two weeks there's another final exam. And if they pass then they'll pass the course. If not, then they will be given…well, we give students a lot of chance[s] here. So if in fact if they fail the boot camp, they will be given another chance before repeating it next year. So the third chance actually is self-study. So I still have four students who are self-studying [for a class last term]."

Chapter 8: "Stay Up 'Til Dawn" – Creating the SUTDent Culture

"[On my exchange], I spoke to this MIT student and she said that…she really displayed this character where she pursued her passion without any regard for pragmatic returns. And I was very, like, inspired by that. And I saw that MIT students are not the kind of geniuses, like, incredible supernatural people that others perceive, but they are just very hardworking, and they're very passionate and driven with what they do, and that's what brings them to where they are. And it was very revealing to me." – SUTD Pioneer

On the first Saturday in March each year, Nanyang Technological University puts on a show of force as the university attempts to recruit Singapore's top JC graduates to its numerous academic programs and departments. At its annual open house event, NTU's massive, brutalist campus is packed to the gills with prospective students, to whom cheery NTU employees shove handfuls of candy, slick informational packets, and free academic notebooks stamped with the university's distinctive crest, consisting of a roaring lion, two atomic diagrams, and a captain's wheel. As they wander NTU's enormous campus, students – and a handful of parents – sample all the university has to offer, from its individual academic programs to the campus' student groups, who organize small displays in one of the campus' many plazas to recruit future students to their various co-curricular activities.

At the 2017 iteration of this event, the highlight of the day was "Discover NTU," a presentation headlined by the university's president and its director of admissions, held in a cavernous red and gold auditorium at the campus' center. In his talk – titled "World's Fastest-Rising University" – the president touted at length the institution's meteoric rise up various global ranking schemes, from its recent leaps up the QS World University Rankings to its newfound place on, rather surprisingly[119], American Express' *Travel+Leisure* "World's

[119] Given the prevalence of concrete on the NTU campus I remain extremely skeptical of this honor, although I am, of course, by no means a scholar of architecture or landscape design.

Most Beautiful Universities" list. As the president spoke, those in attendance – particularly the parents – listened attentively, seemingly pleased both by NTU's impressive academic credentials and the respite from the bone-crushing crowds of the open house event just outside the auditorium's doors. At the end of this address, those in attendance slowly shuffled out of the auditorium, consulting maps and the schedules posted around campus as they attempted to locate the discipline-specific information sessions occurring in the remainder of the afternoon.

Just over 35 kilometers east of NTU – at the exact opposite end of the island of Singapore – the students, faculty, and staff of SUTD were at their own open house[120], seeking to recruit top Singaporean students away from NTU, NUS, and, to a lesser extent, SMU. While to an outside observer the NTU open house seemed crushingly packed and claustrophobic[121], the atmosphere of SUTD's session was decidedly more relaxed, as students and parents casually crisscrossed the school's new Changi campus (described in the next chapter) talking to faculty, admiring student projects, and participating in various hands-on workshops organized in the Fabrication Laboratory (Fab Lab) and by the pillars' academic leadership teams. Along the campus's main walkway, eager students showed prospective freshmores and their parents the outputs of their clubs and co-curricular activities, from the Electric Vehicle Club (who set up a small outdoor track for prospective

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[120] Of course, even the most intrepid ethnographer cannot observe two events at once—thus, these descriptions of the SUTD open house stem from my attendance on the second day of the event, Sunday, March 5, 2017 (which, as my informants from the SUTD faculty assured me, was quite similar to the Saturday iteration of the event, albeit with a bit higher attendance).

[121] Particularly to an American graduate student constantly pushing her way across campus through steady rain, trying (in vain) to make it on time to the various engineering program information sessions.

students to try out their scooters) to "Scratch!", a group of amateur student DJs spinning tracks to provide a musical backdrop to the frequent campus walking tours.

In between large information sessions in the campus auditorium, performance-based clubs and extracurriculars put on shows and demonstrations, illustrating the incredible diversity of co-curricular offerings of the small SUTD student community. After a performance by Vertex, SUTD's cheerleading team, a small group from the TAAL Indian Dance Club performed a short routine, supported by whoops and cheers from the assembled members of the hip hop group Dance DerivativeZ, who enthusiastically danced key moves of the routine from their spots in the audience, reflecting the movements of the TAAL members as they danced onstage. By the time Dance DerivativeZ took the floor for the performance showcase's finale – a fast-paced hip hop dance to the Black Eyed Peas' "Let's Get it Started" – dozens of SUTD students were gathered around the stage, cheering and supporting their friends as they danced their hearts out for the assembled crowd.

While NTU and SUTD open houses nominally included many of the same elements – talks by the institutions' respective presidents, showcases of student activities, and information sessions from the schools' various academic programs – the relative emphasis across these elements was decidedly different across the two institutions. While the NTU administration emphasized the rigor, prestige, and – perhaps most importantly – the rankings of the school's academic programs, leaders of SUTD emphasized the opportunities for students to think creatively and follow their passions, and the extent to which the new institution could serve the types of students for whom this approach was a good fit. From the Fab Lab to the dance floor, students professed their institutional ownership of SUTD across the open house activities, constantly emphasizing and extolling the virtues of the student community the school had built over time. Given the structural similarities between

the institutional presentations of NTU and SUTD, however, from where did this institutional narrative of student involvement and ownership emerge, and to what extent is it actually unique within the Singaporean higher education context, as SUTD staff, students, and administrators proclaim?

In MIT's original conceptual design for SUTD (described in Chapter 3), faculty outlined a series of possible "opportunity programs" for students in teaching, research, and technical leadership, describing these co-curricular experiences as integral to the SUTD experience (as club and co-curricular experiences are to many of MIT's undergraduates). With Arjun Bhat at the helm of the MIT-SUTD Collaboration, this vision expanded to include all types of co-curricular and extracurricular activities, ranging from student government to sports to startups to electric vehicle design[122]. Ever one for good branding, Arjun eventually christened the co-curricular and extracurricular space at SUTD as the "Fifth Row," acting as a complement to the four classes that the students would take each semester. At that time, it was the understanding of many MIT faculty and staff – myself included – that these types of activities did not exist at other Singaporean higher education institutions, hence MIT stakeholders' strong insistence that they be prioritized as part of the collaboration. Over time, however, I would learn that these initiatives were widespread at both the secondary and university levels, although they are generally referred to as "CCA's," or co-curricular activities[123].

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[122] Arjun placed such an emphasis on these initiatives, in fact, that he would eventually hire me (as a young graduate student) to develop exchange and leadership initiatives between MIT and SUTD to support students as they developed the co-curricular life of the university (as described in Appendix C).

[123] In speaking over the years with members of the SUTD community, this choice to tout the Fifth Row as one of the unique aspects of SUTD – despite the fact that clubs exist at every

To encourage students to become engaged and involved outside of the classroom, MIT framers and founders took a two-pronged approach, seeking to influence student behavior through both institutional policymaking and exposure to the ideas of MIT. In the policy realm, MIT faculty (with collaboration and support from SUTD administrators after their arrival) instituted two policies to encourage students to participate in co-curricular activities: firstly, students would be limited to four classes per term to reduce their workload and provide time for extracurricular involvement (as described in Chapter 3) and secondly, SUTD's course schedules would be designed so that Wednesday and Friday afternoons were free of classes, so students could organize club meetings and team practices at times when all group members would inevitably be available (in Tom Magnanti's words at the 2017 SUTD open house, the administration "gives that time back to the students").

Despite these intentions, in practice it was not long after SUTD's formal opening that this dedicated "Fifth Row time" gave way to more practical considerations. In SUTD's very first term in 2012, faculty and the administration swiftly scheduled the students' many mid-term examinations on these afternoons, much to the chagrin of MIT faculty – particularly Arjun Bhat – who had hoped that these afternoons could be kept free for purely co-curricular endeavors. In addition, the original MIT framers met yet another surprise upon official implementation of this policy in Singapore: since the country is so small (and Singaporean students' parents are not accustomed to their students moving out of the house for university, as described below), nearly all of SUTD's Singaporean students return home to their families every weekend in search of familial time, uninterrupted study environments,

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Singaporean university – is cited as an example of how MIT stakeholders misjudged or misunderstood the Singaporean context when designing the plan for the university. While certainly incorporated into the SUTD lexicon, the term "Fifth Row" has also been known to promote an occasional eye roll from SUTD's faculty and students.

or clean laundry (or some combination of the above). Thus, while MIT faculty imagined a vibrant, engaged campus on Friday afternoons, most students ultimately took these blocks as an opportunity to head home to their families a few hours earlier than they would if enrolled in Friday afternoon classes.

Given the realities of implementing this policy, the institutional narrative around the Fifth Row blocks gradually changed at SUTD, from its description by MIT faculty as time formally devoted to students' passion projects (from clubs to entrepreneurship) to scheduled breaks that students could use however they would like (from sleeping to working on group projects for class). In speaking with members of SUTD's academic administration in 2016 and 2017, they emphasized that in Fifth Row time, they are giving students the opportunity and the freedom to pursue whatever they would like, allowing students to take responsibility for their own journey at SUTD (which yes, they conceded, could include sleeping or studying). Thus, when the Fifth Row time policy devised by MIT framers was implemented in the Singaporean context, it shifted both in practice and its surrounding narrative, operating in a fashion appropriate to SUTD but notably different from its original planned intent.

As noted above, the original plans for SUTD sought to promote a vibrant and engaged student life in several ways, including by implementing policies related to Fifth Row time. In recruiting freshmore students to SUTD at the 2017 open house, discussion of the Fifth Row at SUTD was widespread, as faculty and staff sought to demonstrate to prospective students how engaged they and their fellow students would be after enrolling at the institution. The far greater draw, however, (and particularly for SUTD's early batches, as numerous administrators described to me), was the opportunity for SUTD students to be exposed to the ideas and culture of MIT in person, another means by which MIT framers

hoped the engaged and entrepreneurial student culture of the Institute would be transferred to the new university.

On a sunny, near-cloudless Saturday at the end of July 2016, the Charles River boathouse of the Massachusetts Institute of Technology was awash with activity. Across the wide dock that sits at the edge of the river, 45 MIT and SUTD students frantically buzzed around half a dozen small boats they had constructed over the course of the 2016 SUTD-MIT Global Leadership Programme (GLP). While the GLP students participated in many programs and activities at MIT – including architectural drawing classes, field trips across New England, and company tours and visits around Boston and Cambridge, among many others – that Saturday's event was by far the academic highlight of the summer. In small, cross-school groups, the students had spent eight weeks designing and building small boats to prepare for the day's event, during which they participated in a series of timed trials testing the boats' speed and agility in a small course of buoys set up on the Charles. As I wandered among the groups, it was clear that some boats were more seaworthy than others—while a group with a classic, rowboat-shaped design decorated with the red and white moon and stars of the Singaporean flag merrily tested their boat on the water, another group with an ambitious (and fairly monstrous) white and blue amphibious vehicle struggled to get both of their propellers to run as their already-heavy boat began to slowly take on water.

Amidst this organized chaos, Arthur Foster happily leapt onto MIT boathouse's one motorized boat, normally reserved for the coach of the MIT Sailing Team during practices on the Charles. Spying a unique vantage point from which to observe the races, I quickly asked if I could join this expedition, and together, we spent the next few hours serving as a

rescue boat to the students and shooing kayakers and paddle boarders away from the course, yelling that the student projects may not have the most precise steering (or braking) mechanisms and that they best get out of the way. As the day wore on and groups finished the formal tests of their boats, Arthur invited more and more SUTD students to join us on our vessel, encouraging students to take photos of their friends as groups begin taking turns on one another's' boats, enjoying brief joyrides out onto the Charles. As they joined us on our significantly faster (and better-steered) boat, the students were happy and carefree, joyfully snapping photos and poking fun at those trying out the day's most peculiar boat design, which required the driver to lie face-down on a foot-wide board, using their feet behind them to control the vessel's steering mechanism (see Figure 11 below).

Figure 11. Boat race day of the 2016 Global Leadership Programme, as a student prepares a boat with a particularly innovative design to undergo a timed test.

Unlike many of the student exchange programs eventually coordinated by the MIT-SUTD Collaboration described below, the GLP had its roots in the original contract between MIT and SUTD, which stipulated that at least 25 SUTD students would come to MIT on exchange each year[124]. Given the logistical difficulties in accepting full-time, enrolled undergraduate exchange students at MIT (which is a rare practice at MIT, except for students affiliated with the Cambridge-MIT Institute, described in Chapter 2), the MIT-SUTD Collaboration staff opted to create their own summer program for SUTD undergraduates, which they hoped that MIT students would join as well, per interviews with two staff members affiliated with the program[125]. Although the GLP underwent small modifications across the five years of its offering – most notably, with the inclusion of more and more MIT student participants and the introduction of a wilderness-based education course spearheaded by an MIT graduate student – the structure remained essentially the same: students lived in an MIT residence hall over the summer, attended workshops and seminars across campus and the greater Cambridge area, and worked in groups on one large design project (in early years small electric go-karts, and in later years the aforementioned

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[124] In addition to the GLP, another SUTD-to-MIT exchange program – called the SUTD Winter Abroad Program (SWAP) – was launched in 2015, through which 40-60 students visited MIT for three weeks during the January Inter Activities Period (IAP) term. Although not part of the original contract, MIT-SUTD Collaboration staff knew that the SUTD administration was eager for more opportunities for SUTD students to visit MIT, and decided to use extra money in the Collaboration's budget to develop and run this additional program for SUTD students to experience MIT in person.

[125] A chief complaint of GLP students – particularly in the program's early years, when there were virtually no MIT participants – was their lack of exposure to actual MIT students, since the campus feels largely empty during the summer months, as MIT undergraduates tend to seek out prestigious or lucrative internship opportunities during their summers. Over time, however, word about students' positive experiences in both MIT-SUTD exchange programs spread, and in the 2016 iteration of MISTI-Singapore (for example), I helped MIT staff members to narrow 92 total applicants to the 30 students we would eventually bring to SUTD. In addition, several MIT students even opted to participate in both the MISTI and GLP programs or participated twice in MISTI, first as a participant and then a TA.

boats). Given the exposure GLP students received to MIT during their time in Cambridge, this program was by far the most prestigious – and competitive – of all of the SUTD exchange programs during its offering, and was even used as a recruitment tool for top students SUTD hoped to enroll (who were on occasion promised coveted slots in the GLP following their freshmore year should they agree to attend SUTD).

Given that relatively few of SUTD's students would be able to visit MIT through the GLP, Arjun Bhat and the team at the MIT-SUTD Collaboration office also spearheaded creation of an MIT-to-SUTD exchange program to complement this initiative and provide SUTD students with more exposure to MIT. This program – which was coordinated with logistical and administrative support from the MIT International Science and Technology Initiatives (MISTI) office – ran in the summers of 2012 to 2016, during which 15 to 30 MIT students traveled to Singapore each year to participate in internships and a joint leadership program with their peers at SUTD. In early years, this program was framed as part of the larger "transfusion" effort, imagining that the students from MIT would serve as "surrogate upperclassmen" to the SUTD freshmores, helping them to set up clubs and initiatives at the new school (Fisher, Bagiati, & Sarma, 2012). In later years, however, the narrative and structure of the program changed due to the initiative of some eager SUTD and MIT students, who found that the situation on the ground in Singapore was very different from how it had been described to the MIT students before their departure. Said one MIT alumna of MISTI-Singapore:

> It was pitched to me as a leadership program. I was supposed to go with a group of MIT students to SUTD and help foster and facilitate campus culture because they're such a new university and they didn't really have upperclassmen there. So it was pitched to me as I will be their surrogate upperclassman to help them develop a sense of identity. That's basically what I thought I was getting into. […] [But when I arrived,] they totally already had a very…not super established, but pretty established student culture where people were really active about forming different clubs and extracurriculars. The impression I had was that there were no extracurriculars and

> we were supposed to help them form things, but they actually had a wide range of extracurriculars and they all demonstrated a lot of energy, passion, and leadership potential. And they were really looking to just be our friends, and I think that was something that we had to learn over time, because we were so primed to be their mentors, and we forgot that ultimately we're basically the same age and it's more of an eye-to-eye cultural exchange, not like [that] MIT students are these super awesome, super experienced mentors that are supposed to teach everything to SUTD students. So it was totally different than what we had been told.

Based on these types of experiences, MIT and SUTD students pushed MIT-SUTD Collaboration staff to make the MISTI program more collaborative, and by its final iterations the MISTI program had evolved to a truly joint program between students of the two universities, through which MIT and SUTD students participated together in an eight-week cross-cultural leadership program.

One such student pushing for change in the MISTI program was Lauren Wong, an MIT undergraduate from northern California, who participated in MISTI-Singapore twice, eventually serving – with a friend from SUTD – as one of the main drivers of reforms to the MISTI curriculum. When she speaks of her time at SUTD, Lauren is particularly effusive when describing the friendships she forged during her stays in Singapore, and the way her perspectives on life changed as a result of her MISTI experiences. Even after her formal participation in the MISTI programs ended, Lauren still routinely sought out opportunities to schedule flights with long layovers through Singapore, where she is always joyfully greeted by half a dozen of her closest SUTD friends upon her arrival at Changi Airport.

In all of my interviews with MIT alumni of MISTI and GLP, I would ask about their sense of the extent to which the MIT and SUTD student cultures were similar to one another. After her years of experience at SUTD, Lauren shared an insightful reflection, describing how despite MIT's multitude of student cultural groups (entrepreneurs, jocks, members of fraternities/sororities, math nerds, etc.), SUTD students seemed to gravitate towards the "maker" culture of MIT's East Campus, perhaps best exemplified by the

concept of the MIT "hack[126]". As Lauren described of her understanding of her SUTD friends' perspectives:

> SUTD wants to be more East Campus-y. They want to be a little bit more the, like, hacker, cool, builder-type people that walk around barefoot, as compared to a little bit more of a broader range of people and interests at MIT. […] They want to take it to the extreme because they're like 'we can'. And you also see they want to separate themselves, they want to make themselves unique compared to NUS, NTU. And they're trying to see where can that be and then they want to leverage MIT's role. And then they've heard about all the legacy and all these things that happen at MIT that shape an undergrad experience and they want to take the best that they see from that and take it forward. And a lot of the media attention, a lot of what comes into paper and what comes into folklore, in a sense, is this East Campus-y, hacker-y type mindset. And so I think it's a lot from their perspectives based on what they've read, what they've known, and what they've envisioned is cool because they have that MIT connection. And that's I think where things kind of spawn.

For the early classes of SUTD in particular, this idea of the hacking culture at MIT seemed to be of particular interest; after one student brought back a book on hacking from a visit to MIT, members of the pioneer batch attempted a few hacks around the Dover campus, a practice that decreased in frequency over time and ceased completely after the school's move to the new Changi campus (where rules for students' use of the campus were much more strictly enforced, as described in the next chapter). In a country where the local culture emphasizes respect to figures of authority (and allows for hefty fines or the possibility of capital punishment for vandalism offenses), it is rather remarkable that student hacks at SUTD took place at all; as Samuel Keyser described in his book *Mens et Mania* (2011, p. 101): "An MIT hack is a practical joke played on the Institute to make it look silly. It is meant to debunk the Institute's authority," a sentiment that is clearly antithetical to

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[126] From Leibowitz's book on hacking at MIT (1990, p. 1): "Student pranks at MIT have come to be known as hacks. A hack differs from the ordinary college prank in that the event usually requires careful planning, engineering, and finesse and has an underlying wit and inventiveness. The unwritten rule holds that a hack should be good-natured, non-destructive, and safe. In fact, hackers sometimes assist in dismantling their handiwork."

norms of Singaporean culture (deriving from its strict legal system and rigid and respected structures of organizational hierarchy and authority). Thus, it seems logical that the practice of hacking did not persist at SUTD, despite MIT faculty and early SUTD students' ideas that this practice would be a good one to bring from MIT to Singapore. As a SUTD student from the class of 2019 described of his experiences on the Changi campus:

> We don't have the MIT hacker culture here—we can't put a police car on the roof or stuff like that […] because we would get punished for it. Like so much so, like there is called…even if we may not get punished actually for it, there is a fear of being punished over here. In fact, some of my friends they [made] a full hammock outside of the hostel – over the long staircase – and they got fined for it. […] [Or] I think they just got a warning, something like that. […] [We want to do hacks] but the fear of getting punished or expelled or your scholarship revoked is just too, too great for students.

While this particular student cultural practice did not take hold in the long term at SUTD, the institutional idea of "a maker culture" (which was far more culturally and legally appropriate for the SUTD context) did, in fact, persist. As a member of the pioneer batch reflected:

> I think there were a few attempts at hacks. And like, I think that this like concept of [*mens et manus*] – mind and hand – was…is quite evident at least in like a few people. Not everyone, definitely and…and it's kind of…it's kind of interesting there are like people who are super passionate about building things, and technology [and] engineering and then there are people who are just there because maybe they couldn't get into any other school. So there was a bit of [a] divide but there was definitely some people that I really respected in the sense that they were creative and technical and brilliant, yeah.

Thus, as SUTD students gained exposure to the ideas of MIT through the GLP and MISTI programs, they gravitated towards the institutional narratives of the school that fit both their interests and the broader Singaporean cultural context, while other, less-appropriate aspects of MIT (like the practice of hacking) do not appear to have "stuck" at the new institution.

Over the years of GLP and MISTI, the narrative and rationale surrounding the MIT-SUTD exchange programs shifted in response to the changing relationship between MIT

and SUTD, as SUTD became a more established institution. In the case of the early exchange programs between MIT and SUTD, these initiatives were developed with the idea that this type of collaboration would help "transfer" or "transfuse" the idealized MIT student culture of boundary-breaking, entrepreneurship, and irreverence to authority to the student community at SUTD, particularly in the case of the MISTI program (see Bagiati, Fisher, & Sarma, 2012; Fisher, Bagiati, & Sarma, 2012). Over time, however, the narrative of these programs changed, orienting more towards exposing the SUTD (and MIT) students to new ideas in an effort to promote engagement with diversities of thought and experience, empowering the students to gravitate towards their own particular areas of interest across the cultural boundaries. As one MIT staff member said of the GLP in 2016:

> We wanted the Singapore students to get an understanding and a feel of what MIT feels like, and the sort of culture of MIT; to get a feel of the environment, the teaching environment, how the students learn, their learning processes, and basically how that may differ from theirs. And so we did a lot of—the first year we tried really hard to get a lot of MIT faculty to come in and talk to them about their experience at MIT and their story and, you know, some other students that had been in startups. The first year was all about entrepreneurship—all the students wanted to come over and they were psyched about going into startups, and, you know, learning about the pros and cons of starting a good startup. And so we took them to a bunch of startups around the Cambridge area. […] That was our goal—our goal was to expose the Singapore students to just a different perspective, being in the United States and especially being at MIT. Yeah, it's just a different way to learn, and provide them with a different perspective.

Besides the on-site visits of MIT faculty in the early years of SUTD's operation, participation in the GLP, MISTI, and SWAP exchange programs was the only real, first-hand exposure SUTD students received to MIT during the course of the collaboration. In these programs, MIT and SUTD organizers intended that SUTD students be given the opportunity to experience the lauded and famed MIT culture for themselves, letting their own interests guide their exploration of the Institute's many activities and subcultures. In turn, these students would bring ideas and practices of particular interest to them back from

MIT to SUTD, and these practices would take hold if culturally (and legally) appropriate to the broader Singaporean and SUTD context[127]. Thus, framers of the MIT-SUTD Collaboration created transfer mechanisms for SUTD's student population that were quite different from those for the school's academic programs, based on exposure to ideas and then an empowerment to implement them, rather than on planning, collaboration, and eventual handoff of responsibility (as described in the previous chapter). While the development of these programs was a priority for some stakeholders at MIT, they in no way received as much time or resource allocation as the SUTD academic programs, demonstrating the relative prioritization between these two components of the collaboration. Given this difference, student life at SUTD was left largely to develop on its own, with MIT stakeholders only becoming aware that the on-the-ground realities were misaligned with their original vision after the university's programs and policies had already been largely institutionalized.

As described in Chapter 6, during the "Campus Builder" period at SUTD, a group of pioneer students worked in tandem with university staff to set up the policies and facilities at the new institution, setting the stage for the narrative of student ownership of SUTD. While students like Yap Jun Kai and Rachel Chua tackled projects like the student hostel and the campus' entrepreneurship programs during their stints as Campus Builders, other students spent long hours with staff from the Office of Student Life (OSL) attempting to

[127] For example, students from early iterations of GLP quickly set up an electric vehicle club at SUTD after participating in a similar project while at MIT. Relatively safe and well-functioning electric go karts were a much better fit for the Singaporean context than the idea of hacking, and this component of the SUTD culture has persisted over time as a result of this alignment.

establish an SUTD student government, which would eventually serve as oversight to the university's other Fifth Row clubs and activities.

One such student was Jacob Lim, a tall, wiry Singaporean who would eventually pursue his SUTD degree in the ASD pillar. After completing his military service, Jacob came to SUTD as a Campus Builder, and was quickly steered towards the group of students aiming to set up a "pro tem" student council given his interests in starting a student club. With several other students, Jacob established a Student Initiatives (SI) department of the pro tem council, with the charge of developing policies and procedures to govern all the Fifth Rows that students would eventually create at SUTD. To generate ideas for registration and governance policies, the team of students on SI did not turn to MIT; rather, Jacob and his colleagues went on a listening tour across the other Singaporean universities to hear how they organized their student government and CCA registration. As Jacob described of this period: "I did kinds of stuff like…mainly it's more of getting – what do you call it – procedures in place, so how are students going to apply. So what we did was we interacted with a lot of local universities, their student unions. We have a lot of meetings, tons of meetings to figure out what documents they use."

In addition to the SI team's work on the logistical matters of setting up a club registration system, they were also responsible for setting the vision of what SUTD's Fifth Row organizations would ultimately look like. As Jacob later reflected:

> We were coming up with the policies for SI—so, imagining what SI would be and what we sort of stood for, in that sense. So, we…like, having a vision for SI. Like what do you want to support, what don't we want to support? What is the direction we want to go in—is it to only do clubs, or do you want to support any initiative that the students come up with…as our name suggested, initiatives, so like all initiatives in school?

As a result of these visioning sessions, Jacob and the SI team – with input from Brian Zhang, who was also at SUTD during this period – eventually came up with the idea to

integrate entrepreneurial practices into the Fifth Row registration process in an effort to further integrate the idea of entrepreneurship and innovation into student life at SUTD. In time, this vision manifested in the practice of "pitching," wherein the leaders of student clubs would be required to create a "pitch" to request funding from the school, rather than just submitting a paper application. As Jacob described:

> The idea for pitching came from, sort of like, imagining that we are investors in their, sort of, 'company,' right? 'Cause we wanted to…we were thinking of, like, what is the best way to actually try to get people involved in the inner workings of, like, setting up a real company? Because our school is more, like, entrepreneurial, and stuff like that. So we wanted to see what is the best format and to see how to engage students to be running the club as if they are running a real like – how do you say – society or organization, in a sense. So we imaged…and since we were, sort of, funding them, it's easier that they present to us what they wanted to do and stuff like that.

Throughout this long period of policymaking, Jacob and the SI team worked in close collaboration with the staff of the OSL, who were mostly Singaporean (and often hailing from the country's other existing higher education institutions). Given their backgrounds in more traditional Singaporean higher education institutions, these staff members had strong ideas of what student initiatives could and should look like, often pulling Jacob and the other student council members into hours-long meetings to negotiate about particular details of the Fifth Rows. These sessions were often convened to discuss organizational funding procedures, over which OSL staff sought to consolidate and maintain their power and leverage. Said Jacob of his relationship with the OSL in an interview in March 2017:

> Our pioneer batch has a lot of people who want to work against [the administration] – like, they're rebels or something [laughs], you know what I mean–but I guess for our committee, we knew that we were going to work really, really closely with Student Life, more than any of the other departments [in the student government would]. So it was really collaborative because we know that going into this relationship, we kind of need to like – how to say – see eye to eye on a lot of things because we have to at least...not really agree, but come to a compromise, right, on a lot of things. So yeah, so we discussed with [OSL staff members] a lot, hours and hours, like hours. […] So it [the discussion] actually usually comes in when there are…it comes down to the details of, like, the policies that we want to make. So

> especially when it comes to funding, because money is always a sensitive issue—there's always that gap, gap of information between them and us. Because they know how much funds they have set aside, but they will never tell us. So we don't know how much the bank has – how much we have in our bank account – to disburse the money, but they do. So whenever SI is working on, like, the budget and funding, we are in the dark as to like how much we can actually…how much we actually have in the bank to actually give to students.

In addition to the oversight and requirements brought to the student government by the staff of OSL, students also created bureaucratic headaches for one another as the student council team expanded and became more complex. In its first years, the student council – later re-branded as "Root[128]" – had over twenty members of its executive council organized into a complex series of departments, each with its own (or occasionally overlapping) purviews. For example, Root's "Finance Department" was responsible for oversight of Fifth Row funding procedures, while Jacob Lim and his SI team were responsible for general oversight of the clubs and student interest groups. In the end, this bureaucracy within Root in turn produced bureaucracy for the student body as a whole—by the time the Fifth Row founding process was set in early 2012, for example, SI and the Finance Department had developed six lengthy forms for students to complete to create a club or interest group (two different Fifth Row organization types with distinct regulations and registration processes), including a "Training/Events/Projects Risk Assessment Worksheet" for any activity the club or interest group would choose to pursue. Thus, while students would later complain

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[128] As Jacob described of this peculiar nomenclature: "Because we didn't want it to be like a normal high school student council, you know what I mean? […] I guess we always…we wanted something fresh, something new, something different, so didn't want to always have that same 'student council.' Because in Singapore every, almost every JC [student government] is called student council, like their student council is called 'student council.' So I guess we didn't really want that—we wanted something different." After several other names were vetoed (notably the idea of a "student union," which was apparently nixed by Tom Magnanti due to its labor union implications), "Root" was the one that eventually stuck, although most students still often refer to the organization by its more generic – but comprehensible and straightforward – title of "student government."

of school-level oversight and restrictions on their initiatives, bureaucracy was created at all levels of the school, including by the students themselves, reflecting Singaporean acceptance of the bureaucratic process as important to ensure safety and the responsible use of funds (as described in Chapter 9).

While Root and the plans for SI were taking shape in Singapore, Arjun, Arthur, and the MIT-SUTD Collaboration team remained largely removed from the endeavor—as Arjun's graduate student during this period, I was the only person explicitly assigned to work with these students from afar, and my role was largely limited to providing feedback on policies and procedures when asked by the students or by Brian Zhang. Over the next three years, several MIT graduate students (myself included) would occasionally try – largely in vain – to push back on some of Root and OSL's student life procedures, particularly when they appeared misaligned with our Western notions of the democratic process[129]. In the end, however, the Singaporean approach persisted, as it was the framework of understanding how to organize a representative student government most appropriate for the SUTD context. Thus, student government is one area in which the lack of early prioritization by MIT stakeholders led to a quintessentially Singaporean outcome at SUTD, due to both the students' choice to model their system on other Singaporean universities and the demographics of the staff and students tasked with setting up the system of student

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[129] Rather than holding school-wide elections for roles in SUTD's student government, for example, the pro tem council and OSL eventually came up with an election scheme wherein the outgoing student government would endorse presidential candidates with an internal vote, who were then allowed to run in a vote of the student body as a whole. After the school-wide election produced a winning candidate, the president-elect would then hand-select the rest of his leadership team. At MIT, this system was viewed as fairly antithetical to American understandings of democracy or "elections," and thus members of the MIT-SUTD Collaboration pushed back on this scheme for several years. Ultimately, however, the Singaporean values of the importance of social harmony and outward-facing status won out, and Root elections are still organized in this manner to this day.

government. Despite the efforts of MIT stakeholders to intervene in these processes in cases where they were clearly misaligned with Western perspectives (for example, by pushing SUTD administrators and students to hold a university-wide vote for student council without pre-vetted candidates), these efforts largely failed due to the extent to which contextually appropriate policies and procedures had been institutionalized at SUTD (a phenomenon discussed at length in the next chapter).

While Jacob Lim and the rest of the student government team spent long hours with Office of Student Life staff attempting to set policies for the SUTD student government, other students focused their attention next door, on the Dover Campus' temporary SUTD student hostel. As described in Chapter 6, SUTD's campus infrastructure team had acquired an old HDB building to serve as the hostel, where SUTD students were required to live for their three-term freshmore year. Given that the vast majority of Singaporean students live at home throughout their time studying at university, SUTD planners expected that the new school's students would similarly want to move home after their required year on campus, commuting to school as they would to NTU or NUS. Thus, the units were primarily designed to accommodate just those students in their freshmore years, plus the international students that were expected to remain on campus during subsequent years. To meet these housing requirements, each three-bedroom flat was assigned to a group of six students, leaving a few extra units for a Hostel Manager, faculty overseers, and visiting students (like those MIT students participating in the annual MISTI exchange program).

As the members of the first batch settled in to their lives at the Dover student hostel, their six-member flats quickly became places of comfort at the university, acting as the social complement to the academically-oriented cohort spaces on the campus itself. When

recalling their time at the Dover hostel, students described the joys of the communal homes they built in these buildings, and of inviting one another over to each other's flats for late-night study sessions or social gatherings, often involving a late-night McDonald's order[130]. As Rachel Chua said of the Dover hostel:

> But the hostel is one thing that…it was a big part of our community in…at the start, right? Like kampung spirit. Living in like groups and then being very close to your roommates. […] I think at least for the starting batch like we understood that the, like we purposefully knocked down two…the adjoining wall between two rooms so that there will be more interaction between the students.

As another SUTD alumnus described:

> The compulsory hostel stay meant that, you know, most of them stayed in the school. So, when we stayed in school together, you know, we go through and study together, we order Mac's [McDonald's] together. […] So, when…I think when we do things together, it brings us all closer together as a big group, of course there are a lot of cliques here and there, but I think when it comes to doing things together, that is where it all came from, the camaraderie.

From all of these experiences – particularly the hostel living and cohort learning structure – in the first batches lore quickly evolved of the "SUTD Family," a cultural narrative that has persists to this day. As one SUTD pioneer said of her batch's sense of community:

> It's partially the cohort learning and also because it was just like a very small community, so we would pretty much know everybody, just even by face. And there was a lot of chances for us to meet each other and then gradually became more and more close knit. Yeah, and because we are all…we were all bounded by this commonality that we were pioneers. That we were in it together like if the school goes down, we all go down. [laughs]

After spending a full year building their homes on the Dover campus, in May 2013 most members of the pioneer batch abruptly left Dover, leaving campus to participate in

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[130] In Singapore, one can order McDonald's delivery 24 hours a day, which speedily arrives on the back of a delivery scooter. SUTD (and visiting MIT) students at Dover found this service particularly handy for "supper," the late-night fourth meal of a Singaporean day.

their required summer internships, the GLP program, or the Asia Leadership Programme (ALP) in Hangzhou, China, the exchange program coordinated by SUTD's Chinese collaborator, Zhejiang University (ZJU). These Pioneers were swiftly replaced with members of the "second batch," consisting of 283 students (down from the 340 matriculated at SUTD the year before[131]). Because of SUTD's peculiar academic schedule, members of the second batch arrived at SUTD just as most of the pioneer batch students left campus, leaving only a few upperclassmen on campus to socialize these new students within the traditions and organizational norms the pioneer batch of students developed at SUTD. In the words of Van Maanen and Schein (1979, p. 3), "New members [of an organization] must be taught to see the organizational world as do their more experienced colleagues if the traditions of the organization are to survive"; in the case of SUTD, this task of communicating the university's norms and traditions fell on those few students able to devote time to socializing the new freshmores in between the requirements of their internship responsibilities.

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[131] As The Straits Times reported of the institutional rationale for the lower-than-expected enrollment in the second batch (Teng, 2013): "So why have numbers dropped this year[?] This was because the school had a smaller pool of applicants to choose from, an SUTD spokesman told The Straits Times yesterday. For its first batch of students, the school started accepting applications about a year before the term began in April 2012. That allowed it to draw applicants from two different cohorts of students - boys who were completing their national service obligations after taking their A levels and other qualifying exams in 2008 and 2009, and girls who had graduated in 2010 and 2011. Some of the students had been willing to wait a year for the university to start classes. But for this year, the school could draw its applicants from boys and girls who finished their qualifying exams in 2010 and 2012 respectively. When asked about the school's latest enrolment figure, chairman of the Government Parliamentary Committee for Education Lim Biow Chuan thought its intake would have gone up. 'Any new university has its challenge trying to attract students,' he said. 'Even with the MIT branding, people are unsure of curriculum that does not have a track record. They have to think very hard about trying something new.'"

One such student was Shafiq Abdul Rahman, a Bruneian international student raised primarily in Jakarta (where his family still lived), who stayed on SUTD's campus during the summer months of 2013 as he participated in a research internship at nearby NUS. With three other members of the Pioneer batch, Shafiq was selected as a "Guardian of the Stairways" – later renamed a "House Guardian" – a position which was essentially analogous to a resident assistant position at an American university. With the other House Guardians in 2013, Shafiq worked to create community for the new SUTD students, organizing group events for students living in the units adjacent to the hostel's four, multicolored staircases, and designating these groups as "houses" or "clans," a scheme that has persisted (in various iterations) at SUTD even after the move to the Changi campus. In addition, the members of the first batch remaining on campus also tried to communicate the culture of SUTD to the members of the second batch, primarily through assurances that the university would come alive with its unique personality once again after their peers returned to campus in September. As one member of SUTD's second batch described:

> The big confusion that we had [was that] not everyone was there. Oh, [when we were recruited], we were promoted, like, the Fifth Rows in school. But no one ran it – like there were no seniors running…I mean there were one or two or maybe more, slightly more but just a handful of them in school. But like a lot of the Fifth Rows were closed, you know, they say, 'Oh, training will resume after term one.' So, for us, you know, we were like, 'Oh, but you throw us all this like on day one, you know, during our matriculation camp…our freshmore [orientation] camp. So, like why, like why suddenly, you know, everybody disappear[s]?' So, to us it was a very confused year—term one/two year. But I mean, at the end of the day we understood there are no senior[s]. We are just alone in school. And that was where all the, honestly, the nonsensical clubs came over. You know, they were like, 'Oh, since there are no seniors and no one running it, let's run…let's create a new Fifth Row.' And like even though - here's the problem. Even though you know there are…there is that particular Fifth Row available but…say for example, Dance Derivativez, it's there. But during our term one, I remember my friends saying, 'Oh, there are no trainings until like week eight or week nine, when it's closer to the end of term, which is like, ridiculous…what do we do for week one to week seven or eight, right?' So, then, they say, 'Oh, let's set up a new Fifth Row that is slightly different from this Fifth Row, but we create it so that it's different? So, we can run it, like, now, like not wait until term week seven, week eight.' And because of that, when that happened, it also

> happened for the third batch. The next batch after mine, right? […] That happened twice. And then because of that, you know, all the Fifth Rows are…when they are trying to clean up the Fifth Row [later], they realize that a lot of people's [clubs] actually are very similar. And when we see the date of creation [of the club], you know, it's during this term one/two year. […] Because like, they say 'Oh, no one's running it, lah, so let's just [create it].' So, back then you know, it was very confusing. People creating ridiculous Fifth Rows like gaming club, Dota[132] club and stuff.

When members of the first batch returned to campus in September 2013, they returned to a campus quite different from the one they had left as they departed for their internships: members of the second batch had taken over their cohort classrooms (leaving members of the first batch without clearly designated places to do their work after hours), new Fifth Rows had been created, and, perhaps most notably, their three-bedroom, two-bathroom hostel apartments had been reorganized to house nine students instead of the previous six, as SUTD administrators sought to accommodate the surprising number of requests from students who wished to remain on campus in their second year. Amidst all of these shifts, student dissatisfaction on campus – which had certainly brewed in the first year, as illustrated in the previous chapter – began to grow, as students continued to push for a role in defining and shaping SUTD as an institution.

In the midst of a 1977 speech to the Singapore parliament, Prime Minister Lee Kuan Yew turned to the nature of the Singaporean, proclaiming to the assembled politicians (Chew, 2015), "You know the Singaporean. He is a hard-working, industrious, rugged individual. Or we would not have made the grade. But let us also recognise [sic] that he is a champion grumbler." Over the years I have spent living and traveling in Singapore, this

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[132] Apparently Dota is a popular online game, as this interviewee laughingly explained to me when I expressed my lack of familiarity with this term.

(largely endearing) grumbling became more and more apparent—as I came to know Singaporeans well, I found that it was culturally acceptable to grumble about whatever was on their minds at the time, from work to politics to train delays on the MRT (which generally lead to wait times of between three and five minutes[133]).

Particularly in the early days of SUTD, there existed an institutional narrative that the students were helping to create SUTD – perhaps best manifested by the concept of the "Campus Builders," described in Chapter 6 – and thus deserved a great deal of say on both the direction of the institution and its day-to-day practices. As school began – and students became unhappy with various aspects of their campus or academic lives – many felt that the school's senior management should take their views into account when developing policies for the campus, "grumbling" both in and among themselves and to members of the senior academic administration directly. In response to these concerns, a series of near-monthly town halls were held at SUTD in its first few years, providing students with opportunities to provide feedback to the campus' senior management face-to-face. As Jacob Lim later described:

> [Town halls began with] who would be announcing their next update of SUTD. Like, 'Oh, this thing is building up.' [or] 'Oh, I have this initiative that we are launching.' It's just [the] provost, mainly opening with [the] provost. […] [And then] yes, we'd just be sitting there and then we get to have a chance to speak up. So it's usually organized in Dover [in] the hall, the big hall at the right hand side near the sports [hall]. Yeah, so we were just sitting down and everyone would just like, 'Does anyone here want to comment on anything?' So usually a few people would ask us some like touchy issues at that point of time, lah, maybe funding, housing and stuff.

In addition to these formal town halls, in the first few years of SUTD students also developed myriad other ways to share their feedback with the administration: as Shafiq

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[133] A fairly laughable delay to anyone who has ever commuted to work on a North American public transit system, particularly one in a cold climate.

Abdul Rahman and the House Guardians lobbied the facilities department for better Wi-Fi in the student hostel, Jacob Lim and Root requested more funding for student clubs from OSL, and other students would take it upon themselves to reach out individually to senior administrators about particular issues they saw on campus. As Shafiq laughingly recalled: "Senior Management would get...like, Tom [Magnanti] would get emails about the shower water pressure being too low [in the hostel]. You know, things like that, which…so now they [senior management] cannot differentiate between what is a serious problem and what is not. They were getting everything[134]."

While students often expressed frustration about the extent to which the administration actually yielded to these requests for change, there are numerous examples of cases in which student opinion affected policy at SUTD—as Yap Jun Kai later noted: "We got responses. Maybe different people have different opinions, [but] I feel like they [senior management] heard us, they hear us." As described in the previous chapter, SUTD faculty and administrators responded to students' concerns about the Intro to Design curriculum; similarly, OSL acquiesced to student requests for a "Fifth Row Transcript," a supplement to the students' academic transcripts listing every club or activity to which they belonged, as well as their leadership positions within each[135]. As SUTD grew, however, the logistics of

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[134] Although members of the pioneer batch were willing to approach senior management with their plumbing issues, in later years this feedback was streamlined through the Root Senate, established by SUTD's 2014-2015 student government president.

[135] Students requested these transcripts in an effort to document proof of their Fifth Row experiences to their potential employers, yet again illustrating the pragmatic and results-oriented approach of many Singaporeans. As one member of the pioneer batch described: "So previously we are very academically inclined; like we are thinking everything must be written down. Whatever, I don't care because for me...a lot of students were worried and saying, 'Hey, so I joined all these things. Is it possible for me to have some[thing] to show that,' you know? […] I believe at that point in time the mentality was like no…like there's no record of me spending my time doing this instead of academics. And then I kind of

receiving consensus-based student feedback on school-wide issues gradually decreased, particularly as students moved on from the common freshmore year to the diverse and wide-ranging experiences of the academic pillars.

As the student culture of SUTD evolved and became more established in the first few years of the school's operation, dynamics at the university also shifted as students began to enter their pillars, which they select en masse at the end of the three-term freshmore year. Of the students and alumni I interviewed who had experienced SUTD as both freshmores and as pillar students, many spoke wistfully of the communal, school-wide nature of the first year, missing the community fostered by the cohort approach and lamenting the changes in their academic lives that came with this shift.

Once SUTD students enter their pillars, both their educational and social lives change drastically from their experience in their first three semesters. For those in the engineering pillars, many expressed frustrations with the change in the pedagogical style from the active learning, cohort-based freshmore year, while others complained that they no longer had communal spaces to gather and work together late into the night on course assignments and projects[136]. As one SUTD alumnus with an ESD degree described:

> The most obvious [difference] would be that it's no longer a cohort classroom. So the closeness of the people in the class isn't that, like, strong. And one thing that was lost almost immediately was the active learning—there was very little Learning Catalytics being used, there was no three instructors in one class. There wasn't the solve problems on the board thing, yeah. And it reverted to similar to, like, JC-style,

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showcase the talents that I have on paper. You know, the time I spend on honing my other skills instead of just pure academics. Yeah, so the school bought into that."

[136] In their final year capstone course, students are again assigned permanent spaces in capstone classrooms, where they can gather with their groups in a similar fashion to the cohorts of the freshmore year. Many of the students I talked with expressed frustration about the intervening three terms between freshmore and capstone, wishing that they could have communal spaces to work to draw them out of their hostel rooms.

> where it was one directional [information flow]. But because several of us were already, like, comfortable and used to the way we interacted in freshmore year, so we were asking questions and speaking to the teacher, all that happens after class, during class. And what was great was the teacher[s] are always accessible and available, so we would find them whenever they are available and we would go chat with them. That was actually where most of my learning happens.

For SUTD's ASD students, their academic lives also change drastically after the freshmore year, albeit in a far different manner than for the university's engineering students. As is traditional in the field of architecture, ASD students' schedules transition to revolve around time-intensive studio-based courses, interspersed with ASD-only non-studio courses. Sometimes to the dismay of SUTD's engineering students, the school's architecture students seem to enter into their own world in the pillar years, due in large part to the sheer number of hours they spend together in and preparing for their studio courses. Whereas engineering students often take courses across pillars – particularly as they begin to pursue their pillar tracks – they rarely see their friends in architecture before the interdisciplinary capstone course in their final two terms. Given the amount of time they spend together as both undergraduate and graduate students, however, ASD students do seem to forge an incredible bond, supporting one another through their three plus years together at SUTD.

Through my discussions, I found that in general students planning to pursue their studies in architecture are generally set on this course when entering university; however, the engineering students face real (and often difficult) decisions when choosing their pillars, particularly given the content overlap between many of the pillar tracks[137]. Although many of SUTD's first students seemed to choose their pillars on academic interest alone, later batches were strongly influenced by the employment and salary outcomes of the various pillars (as described in Chapter 10). As one SUTD faculty member described:

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[137] Students can choose tracks in business analytics in both ISTD and ESD, as one example.

> The way the kids choose their pillars here is a bit the same. I guess in the, you know, at first batch, you know, they more or less had an idea of what they wanted to choose but now I mean this is what I hear from the students. They have this algorithm, you know. It is like, something like, you know, if you like coding, you know, then go through ISTD. And, you know, if you are not so good in coding, but you are still good at math, then, I'm paraphrasing here, you know, then go to, you know, ESD. And, you know, ESD is always a bit different, you know, so you really need some passion in that area if you go. And then it is like, if you have no passion, you are not good in coding, you're also not so good at math then just go to EPD. You know, we are [using] just completely not the right approach. But they like to think about things that way.

In my conversations with students, I did hear some cases in which students were particularly drawn to or passionate about an engineering pillar when entering SUTD; however, in most cases students described general senses that the pillar was the correct fit for their interests, or that they had, in fact, chosen their pillar through processes of elimination similar to those described by the faculty member above. For the ASD students, in contrast, most came to SUTD with a clear drive towards architecture, and had chosen the school with this academic track in mind. For all students, however, their transition to the pillars represented a fundamental shift in their SUTD experience, viewed either as for better (in the case of the students who found the freshmore courses irrelevant to their future work and therefore pointless in the scheme of their education) or for worse (in the case of students who missed their cohort communities).

When I first began my fieldwork for this dissertation in January 2016, I spent a great deal of time with the SUTD students participating in the 2016 SWAP exchange program at MIT. Given that at this point I had not been at SUTD in over three years, I often asked these students about the changes on campus in the intervening period, particularly in regard to the move to the Changi campus (described in the next chapter). Much to my surprise, in response to my queries student after student described the Fifth Row as "dead" or "dying,"

adopting a rather dramatic interpretation in discussing how student life had changed in the years since my last visit to Singapore.

After arriving at SUTD in May 2016, I saw little evidence of the "death" of the Fifth Row these students had described, as the campus elevators were often filled with fliers advertising club events and showcases, and the school's various social media accounts constantly highlighted the interesting and innovative initiatives on which SUTD students spent their time. In speaking with students, however, many noted that they believed these activities to be largely filled with freshmore students, as upperclassmen often drop their Fifth Rows due to the heavy workload brought on during the pillar years. Said one SUTD junior:

> The fact is that Fifth Row will only be…Fifth Row activity will only be active during the first year. After that, a lot of people actually drop it. […] Not say 100%, but like most [likely more like] 70%. Like, we can really see the trend in a lot of the Fifth Row, because school workload is just heavy, is just very heavy. […] Usually as we go into pillar year we…like it's just that...it's the trend that like people don't really join events any more, yeah.

In addition to the workload brought on in the pillar years, for SUTD upperclassmen approaching the point at which they will enter the job market, grades also become increasingly important (particularly in contrast to the partially ungraded freshmore year), further impacting the extent to which SUTD students are willing to devote their time to the Fifth Row. As one SUTD alumnus described:

> I think that SUTD started with the vision of not wanting to grade the students. Just like MIT doesn't grade their students in terms of Latin honors. […] It started with that belief [that grades were not the only thing that mattered] – people joined the school with that belief – because the first semester is not graded, [that] thing. But after a while, people in Singapore just realize that their GPA matters. So people started to do more GPA-focused stuff and neglect what they do on the side in Fifth Row. So I think that's the biggest change that I see over time. […] I think for most people, they just got back into the paper chase.

While many on campus attribute the perceived decline of the Fifth Row to be attributed to the change in the pillar years, others consider this trend to be a reflection of the

types of students that SUTD has enrolled in its more recent batches. When speaking to faculty and staff on SUTD's campus, most describe the first – and in some cases, also the second – batch of SUTD students in absolutely glowing terms, calling them the real risk takers who were willing to gamble on the idea of a new, boundary-breaking university. As one student described: "The pioneer batch was a bit more different from the future batches. In the sense that in general the pioneer batch attracts a bit of people who are willing to take more risks and they are just more open, more outgoing, willing to try new things. So the culture was about [the fact that] we wanted to create stuff."

In contrast, as SUTD becomes more and more established within the Singaporean higher education ecosystem, increasing numbers of students described viewing the institution as just another choice, comparable – if not 100% equivalent – to NUS or NTU. Thus, students in later batches at the university might be more reflective of the traditional Singaporean mentality towards education, particularly when compared to those in the early batches (who were perhaps more driven by their passions and desire for something different). Said one member of the pioneer batch:

> One interesting thing about [the] batches [is] because we were first batch, right, there were, there was a, a wide range of ages…like there are people who waited like three years to enter, or four years. So, to some extents, there was a bit more kind of, like, maturity and people who understood that academics isn't everything. So, it might be different for the later batches because they are simply like transitioning from one school to another. And then to them, studying is life.

Thus, while the reality of student life at SUTD may or may not be similar to that of other Singaporean universities, the perception of many of those on campus – particularly the students – is that the institution has at least partially reverted to some Singaporean norm, despite the outward-facing narratives of student engagement and innovation that persist in fora such as the SUTD open house.

As described in this chapter, SUTD's student life developed quickly on the Dover campus, where the cohort classrooms and communal living structure led students to rely on one another, creating the notion of a small, close-knit "SUTD Family" tackling the academic and structural challenges of the institution together. As the end of 2014 approached, however, SUTD's Dover campus was bursting at the seams, with three batches of students stuffed into the campus' small hostel and limited cohort classrooms, and staff members crowded into offices in the few buildings available on campus. Although the campus was not officially complete, it was time for the SUTD community to move to its permanent home in Changi, a change that would profoundly affect the students, faculty, and staff of the institution.

Chapter 9: "Its Campus will be in Changi" – Building and Managing a Cross-Border Campus

"The design, contour, color, and natural and man-made configurations of a learning environment are both extensions of the operative educational principles which pervade a campus, and influences on the practices and aspirations of those who live and work there."
– William F. Sturner (1972, p. 98)

On May 8, 2015, a caravan of rented tour buses and SUTD-branded trucks left the university's temporary campus on Dover Drive, ceremonially marking the end of SUTD's physical presence in western Singapore. Filled with SUTD students and mobile displays showcasing various projects and inventions from the first years at Dover, these vehicles made regular stops at Singapore's top Junior Colleges as they trundled their way eastward, slowly making their way towards the university's permanent home just up the road from Changi Airport, northeast of the cavernous exhibition halls of the Singapore Expo. At each of these stops, SUTD students sporting matching "From Dover to East Coast" t-shirts poured out of the buses, setting up exhibitions where eager students could try out the school's many Fifth Row activities. As uniform-clad JC students excitedly tried their hands screen printing or tested student-built electric vehicles, SUTD Marketing and Communications staff members – who had masterminded the day's activities – pulled some aside, interviewing the young students about their impressions of SUTD. In time, these filmed interviews would be integrated into one of SUTD's numerous slick promotional videos to be shared on the university's various social media accounts.

Upon completing their stops at Singapore's top Junior Colleges, the caravan of buses arrived at SUTD's east coast campus, dropping their passengers off at the university's main driveway abutting the airy Campus Centre (see Figure 12), a glass-walled, two-story atrium connecting the campus' Buildings 2 and 3 (so numbered as a derivative of MIT, where

buildings are referred to by number rather than by name). Pouring off the buses, these SUTD pioneers were greeted at their new home with a joyous Night Fest celebration, featuring food, activities, and student performances to mark SUTD's arrival at its permanent – albeit not quite then-completed[138] – home. As the sun set and the outside air began to cool, the students pushed beyond the U-shaped Campus Centre, walking among exhibitions along the campus' main "spine," an architectural void meant to serve as the dramatic focal point of the campus' design. With the academic buildings behind them, students were greeted by the blocky black, white, and orange student and faculty housing blocks, then-illuminated by a fast-moving light show befitting the celebratory nature of the occasion. As the night wore on, student musical groups performed one by one for a large crowd of students – as well as Tom Magnanti, sitting in the front row – on a small stage set up adjacent to two antique Chinese heritage buildings, which were (rather surprisingly) donated to SUTD by Hong Kong film star Jackie Chan[139].

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[138] Despite the planners' best efforts, the Changi campus was not quite ready for the arrival of its first students; as one member of the pioneer batch described, comparing the Dover and Changi campuses: "There [at Dover] we had limited facilit[ies]. Here we have everything like gym and swimming pool. Everything came up, not immediately, surely. It took a while before it started, we it got up and running. 'Cause when we moved in, it was still a construction site. […] There was still renovations going on. There were lots of barriers where you can't cross because they were working. The swimming pool was not up. The gym was not furnished yet. It took a while. It took three, four months, I think, before we got all of them in." Furthermore, the extension of the MRT Downtown Line to SUTD's campus was not completed until October 2017, a sad – and frustrating – two months after the completion of my Singaporean fieldwork.

[139] As The Straits Times reported (Zachariah, 2015): "Before its completion, the Singapore University of Technology and Design (SUTD) in Changi made headlines for a celebrity donation: Hong Kong action movie star Jackie Chan had gifted four ancient Chinese structures to the campus. These heritage buildings, which included a Chinese opera stage and a pavilion, are studded near the hostels of the university's 15.8ha site. The buildings, from China's southern Anhui province, are said to date back to the Qing and Ming dynasties, around 370 years ago." After several conversations about these structures, I have yet to truly understand the connection between Mr. Chan and SUTD; however, the buildings are really

Figure 12. Students participate in a career fair in the SUTD Campus Centre (January 2017).

Of all of the major aspects of creating a brand-new university, the physical design of the Changi campus was the element of SUTD given the least consideration by MIT stakeholders in developing their plan for the new institution. When asked about their input on the campus' physical design, most senior MIT faculty involved in the collaboration expressed little-to-no familiarity with – or opinions on – the decisionmaking process at all. The closest any of my MIT interviewees came to expressing a strong opinion on the matter

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quite lovely and provide a nice contrast to the very modern architecture of the rest of campus, so you'll find no complaints from my end.

was one senior MIT faculty member, who expressed in his interview a vague preference for a design including an "iconic central building" reminiscent of the Jeffersonian architecture of the University of Virginia (or the so-called "Great Dome" of MIT). Given the campus' proximity to Changi Airport (and the resultant seven-story height restriction on office buildings in that area), however, such an iconic central building was not to be, leaving even this faculty member with limited opinions on the matter of the campus' architecture.

Given MIT faculty members' lack of enthusiasm on the subject of the campus design, this decision was left entirely to a committee consisting of members of the inaugural Board of Trustees, Ang Chok Tong (SUTD's Senior Director of the Office of Campus Infrastructure and Facilities), and other early SUTD administrators such as Tom Magnanti and Guo Wei Xun. After reviewing various architecture firms' submissions for the campus project, the campus design committee ultimately chose the proposal submitted by UNStudio, a prestigious and well-known Dutch architecture firm. Said a member of the Board of Trustees of this decision:

> So we liked UN Studio's approach, which was almost like actually an industrial kind of complex. It's almost like an industrial complex. […] We thought that, first of all, it was quite fitting, [be]cause Singapore is quite an industrial kind of place, and we're not ashamed of it. Number two is that we are about technology and design, and even if it is that kind of...again, where we are, there is height control, because we are very close to the airport. So, the sort of factory look, the post-industrial look, seemed to me to fit quite well. And what was very important to me in this whole element was that there would be a central spine. Much like MIT's infinite corridor, that there has to be a central spine that goes through[140]. And that in our thoughts as trustees, we felt that it was very important for the kids all to spend one and a half years or three semesters in the dorms. We wanted a residency sort of education. […] So, therefore, the hostels had to be...or the dorms had to be designed well and flow into the...be a very integral part of the campus and flow into the educational spaces very easily. We don't see that in the other universities in Singapore. [That was] not [included] when

[140] Although this interviewee referenced the Infinite Corridor as an inspiration for the campus' "central spine," it is worthwhile to note that this feature is not unique to SUTD in the Singaporean higher education context, as NTU's campus is also organized around a series of "spines."

> they first started it, but that was clearly in our minds. And also because what allowed that and facilitated that was actually the fact that our campus, though very prime land, I mean, in terms of monetary values, huge amount, billion or billion-plus dollars, but it's a small piece of land compared to the other universities. But it made it very urban, the feel, which is very much like Singapore itself. And I think it works very well.

Upon arriving at SUTD's Changi campus for the first time in May 2016, I was indeed struck by the futuristic – and somewhat industrial – feel of the campus, as well as its relative isolation by Singaporean standards[141]. After its first phase of development, SUTD's academic campus consists of four buildings – numbered 1, 2, 3, and 5, making room for a building 4 in the campus' second phase – organized around two tropical plant-filled "spines": an academic spine running roughly north-south between buildings 1 and 2, and a residential spine running roughly east-west out from the Campus Centre towards the student and faculty housing blocks, as described above (see Figure 13 below). Designed in identical architectural styles, each of the academic buildings feature sweeping white lines marking each of the seven levels, interspersed with architectural accent colors of lavender, mauve, and pale green and dotted with the odd vertical garden (see Figure 14 below). In its final stage (which will commence when SUTD expands in size), each of the main buildings will be shaped as an oddly-formed figure eight, providing each building with two light-filled courtyards meant

[141] Given that my period of fieldwork predated the opening of the Upper Changi MRT station, for my first visit to campus I traveled to the Expo MRT station, the penultimate stop on the Changi Airport extension of the East-West line. Upon arriving at Expo, I was surprised to find that the SUTD campus was nowhere in sight, and only found my way to the university by following two flip-flop clad teenagers – who I hoped were SUTD students – around the Expo and up a well-worn (but clearly unsanctioned) path to Somapah Road, which we then jaywalked to make it to the campus entrance. More important guests to campus – who would surely opt for a taxi-based arrival – would no doubt have a more distinguished first impression of the space than a budget-minded graduate student ethnographer.

to serve as gathering spaces (while also representing an "8," a lucky number in the Chinese tradition).

Figure 13. A digital rendering of the SUTD East Coast campus (photo: Singapore University of Technology and Design, as reproduced in Zachariah, 2015).

Figure 14. SUTD's academic spine, running between buildings 1 and 2, as viewed from the second floor. Elevated walkways connect most buildings on the SUTD campus, providing a quick path between buildings and much-needed respites from Singapore's pounding sun (or pounding rain, depending on the season).

As a new arrival on campus, it was at first difficult to discern where the campus' academic buildings began and ended, as the ground floors of each of the buildings are lined with seemingly identical glass-walled spaces, most of which are designated as current or future "F&B" – or "food and beverage" – outlets[142]. To reach the academic buildings' upper levels, one must first find one of the campus' many outdoor "lift lobbies" tucked into the

[142] Despite the availability of these retail spaces on campus, SUTD has faced issues in attracting or maintaining food operators on campus, as the student, faculty, and staff population is too small to support an outlet of a major retailer (and the smaller start-up organizations who have opted to rent space have struggled to be financially solvent). During my fifteen months on campus, for example, I saw two F&B outlet openings and three closures (including my beloved Aria, my go-to location for Western comfort food at a reasonable price).

buildings' corners[143], each of which is adorned with a large, flat screen TV playing the Office of Marketing and Communications' many promotional videos silently on loop (most of which I could now likely describe by heart). As with most Singaporean academic buildings, all lifts on campus open into outdoor corridors or lobbies, as air conditioning is only available in enclosed academic offices or within the classrooms, which open directly to the hot and humid Singaporean air. Given the figure eight design of SUTD's buildings, most classroom and meeting spaces open into balcony-like open air corridors, which provide vertigo-inducing views into the campus' many courtyards and water features. This overall structure – combined with plentiful greenery characteristic of Singaporean architectural design – lend the campus the distinct feeling of a futuristic urban oasis, particularly as the campus appears to glow during the "golden hour" as the sun sets each night.

With the university's exterior design selected, decisions about the practicalities of the campus' interior transitioned away from UNStudio, with Ang Chok Tong and his staff in SUTD Campus Development taking the lead on the remainder of the project. Chok Tong – whose previous experience was with architecture and development at NTU – naturally set out on a structured and traditionally Singaporean approach to designing the interiors of the buildings, albeit with one modification described as key to creating the ethos of the institution: rather than organizing faculty offices by pillar, they would be organized in an interdisciplinary fashion, with faculty from different pillars – although ideally with similar

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[143] I suppose that one could theoretically use the plethora of outdoor staircases on campus in lieu of the lifts; however, it is not a common practice for students at SUTD to do so. As one SUTD administrator described of this socialized behavior: "Okay, we created a lot of staircases, right? These are open staircases. The intention at that time was to let students walk up and down. But I think the lifts are too attractive and they just take the lifts."

research interests – "sitting" near one another (a particular desire of the Board and SUTD's senior leadership, who thought that such a scheme would promote innovation and interdisciplinary research). In speaking with faculty, most viewed this model as a largely effective approach to organizing the campus, although some of those with offices far from their head of pillar (where pillar faculty offices are generally loosely clustered) sometimes felt removed from the inner workings of their particular department (for better or for worse). For those faculty in truly interdisciplinary office spaces like the IDC, many find the arrangement to be an inspiring and effective work environment; as one faculty member with experience sitting in the IDC described:

> The seating arrangement in IDC was great for me because I wasn't sitting at architecture department where I would just see architects, but I was in [the] IDC. Next to me is [a] material scientist, next to me [are] physicists, down the street, it's mathematicians. It's just…and then, you just know them naturally. We don't have to force collaborat[ion] or anything, but we can bounce ideas off of each other. And then some of them [these conversations] result in very big research projects or connections. Basically…I don't know, it was really great. Like really, really [great]. I really had [a] good experience there.

While SUTD's leadership showed some interest in how faculty would be distributed across the new campus' various buildings, the actual design of the interiors of the buildings was largely left to Ang Chok Tong and DP Architects, the Singaporean firm tasked with this endeavor. Although Ang Chok and his team did receive some input from the pillar heads on how they wished their departments and labs to be structured, his office solicited no feedback from students or rank-and-file faculty on how they wished either the residential or academic spaces of the campus to be designed[144]. Thus, the final interior layout of the campus buildings represented a very traditional Singaporean view of the architecture of higher

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[144] In the words of one Campus Development administrator, for example: "Because I've been doing housing for a long time, so I know what students needs are. So we design[ed] and we show[ed] them and we did a mockup and they are happy."

education, serving as a physical manifestation of the strict hierarchy of Singaporean organizations and the focus of the university as a means to pragmatic ends. For example, despite the grumblings of many faculty members, the interior of the faculty offices in Building 1 was designed so that lecturers would be allocated physically smaller offices than tenure-track professors (nine as opposed to twelve square meters) and organized in the interior of the buildings so as to have worse views than their tenure-track counterparts (who receive large-windowed offices with exterior views of the SUTD environs[145]). Similarly, the administrative offices in Building 3 were allocated vertically, with the most powerful and longest-serving administrators – like the Senior Directors of Finance, Marketing and Communications, and Human Resources – allocated office spaces just below those of the senior academic administrators, and above more academically-oriented – but potentially less influential – departments like the Office of Graduate Studies or the IDC. Finally, in contrast to the comfortable and well-situated office spaces created for these campus administrators, SUTD's students were originally allocated no interior spaces on campus for non-academic activities such as Fifth Row meetings, artistic or musical endeavors, or student performances[146], with the expectation that they could gather for these events in exterior spaces without air conditioning[147] or in repurposed academic rooms.

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[145] As well as a common flight path of planes landing at Changi Airport, which provide an excellent distraction when one's eyes need a break from dissertation writing.
[146] Eventually, members of Root were able to negotiate for a new iteration of the Dover Space Bar on the second floor of building 1; however, this space is rarely used given that the air conditioning turns off at 10 PM, a relatively early hour for SUTD students (who tend to subscribe to a work late/sleep late mentality).
[147] It really is impossible to describe how brutal and suffocating Singapore's year-round heat and humidity can be, making these spaces rather undesirable if not entirely unusable (particularly for those visiting the campus who are used to cooler climates).

Throughout this design process, stakeholders at MOE also continued to play a role by providing input and guidance to SUTD staff, particularly when the institution's plans were outside of accepted Singaporean norms. For example, as one senior SUTD administrator described in May 2017:

> We now had to start building this campus. So, the master plan, I think [was] completed in 2010 also. And then we have to start going to the government to justify for the budget because in that thing…I mean today, if you are going to build something like this kind of infrastructure for certain value, you have to go to […] meeting[s], explain, you know, to different, different agency. And in the process they always ask you 'Is it very [important] to build this, to build that' and so on, yeah. […] One of the things that we really put a lot of effort to justify is our auditorium. […] It can seat 1,200 people. We have to justify for it. Because they only allowed us to build 800-seaters. That is their norm, there is some planning norm in the government. […] And the other thing is, they try to sell it. Yeah. [Because] our neighbor is Expo, [they say], 'If you want to create bigger auditorium, they have there, you can use it.' But then we said 'no, no, no.' We cannot be like this because part of our educational experience is that we also have [a] 1,000[-student] cohort coming in, right? You know, we may have a situation where we want our 1,000 student[s] gathered together, you know of this is still a bit difficult to say because, you know, they still can say, you know, 'you can go over there [to Expo].' So, anyway, we fight for it and we got it and we never regretted it[148].

As noted earlier in this chapter, during all of this decisionmaking process, MIT stakeholders played virtually no role, leaving a key set of SUTD administrators and members of the Board of Trustees – the vast majority of whom are Singaporean – to plan the campus based on their priorities and understandings of what a university campus should be. Although perhaps understandable that MIT faculty did not consider this aspect of the

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[148] Rather poetically, MIT Dean of Engineering Gordon Brown similarly served as an advocate for constructing a 1,200 seat auditorium at Singapore University during one of his trips to Singapore to advise the institution; as the notes of one meeting during his visit report (Institute Archives and Special Collections, 1969): "Asked by the Minister whether the idea of the Great Hall was an outdated one, Prof. Brown said that a great hall (auditorium) in the M.I.T. which could accommodate 1,200 was used several hours a day. Among the many uses, the great hall was used as a cultural centre of the town (Boston) and apart from cultural activities, the auditorium was also used to hold Faculty meetings, conferences, scientific meetings, and even meetings sponsored by the Chamber of Commerce. […] Prof. Brown said that he strongly recommended that there should be a great hall in the Campus."

campus to be within their purview when designing the institution, campus architecture has an important role in shaping the culture of a university, and the design of the Changi campus has had profound impact on the lives of students and faculty at SUTD. As Schein describes, synthesizing existing research on the topic (2010, p. 138):

> Where buildings are located, how they are built, and the kind of architecture involved will vary from one organization to the next and may well reflect deeper values and assumptions held in the larger culture and by the key leaders. Because buildings and the environment around them are highly visible and relatively permanent, organizations attempt to symbolize important values and assumptions through the design. The physical layout not only has this symbolic function but is often used to guide and channel the behavior of members of the organization, thereby becoming a powerful builder and reinforce of norms (Berg & Kreiner, 1990; Gagliardi, 1990; Steele, 1973, 1981).

In the case of SUTD, the values and assumptions manifested through the design of the academic campus represent Singaporean understandings about the functions and structure of a university, given the limited role non-Singaporean stakeholders played in the design and decisionmaking process. Thus, in the case of this component of the MIT-SUTD Collaboration, local stakeholders did not "localize" the MIT educational model at all; rather, they constructed this aspect of the institution almost entirely on their own, building – both metaphorically and literally – a Singaporean institution within the larger construct of a cross-border higher education collaboration.

As described in passing in the previous chapter, SUTD's move to the Changi campus, although lauded as an opportunity for the campus' growth, in some ways brought more constraints on the institution's students than were in place on Dover Drive. Given the newness and the substantial cost of constructing the campus ($470 million SGD – approximately $360 million USD – as *The Straits Times* reported upon its completion), the school's various administrative departments quickly implemented numerous rules and

regulations to protect the university's new facilities (as well as the safety of its students, attempting to mitigate risk in a classically Singaporean fashion). Thus, new rules appeared in quick succession after the move to Changi—for example, administrators swiftly implemented a total prohibition of alcohol, which had been allowed (albeit discouraged) on the Dover campus for students of legal drinking age. With the implementation of these regulations, students described developing a consuming fear of punishment if they stepped out of line on the new campus, with some even citing the possibility of expulsion (or revoking of a scholarship) if they were caught breaking the school's rules.

In addition to these straightforward rules, the campus' administrative offices also created layers upon layers of administrative hoops for students as they sought to organize their Fifth Row events or initiatives on the new campus. As one student described of her experience planning the school's freshmore orientation:

> There's a periodical review with them [the SUTD administrative departments] and meetings. […] Actually, we have to submit…they give us, like, tons of deadlines that we have to meet and…yeah, meet lah, for every department, yeah. Like [in the] at program department they have…there are like four or five rounds of submission for proposal. Because for whatever activity that we propose, we have to…they have to vet them through and then the activity has also…like, we have…they have to work with other department also. Like EHS Office – Environment, Health, and Safety Office – for like okay, I don't know, safety measure – safety like whatever. Then Office of Facilities for the facilities and then housing if we want to use housing area, yeah. It's…and logistics also for like room booking also. Actually, it's a…[sighs] it's a lot of red tape. […] And the worst part of all that is that…okay, there are a lot of…the worst part about that is the department[s] at this school doesn't…do not really work together. So what happens is that right, if we propose…okay, after we submit our proposal, we have to book the venues, right, for the programs. But a lot of time our booking request was rejected because they say that on the orientation day there'll be like event – they'll be like [an] external event – held in the school and hence we cannot, like, have that room. But the thing is that this school is very small to begin with—we don't have a lot of space to…we don't have a lot of space to utilize, lah, in that sense. And the events are…were mostly held at very critical spaces. So there were a lot of conflicts of interest between the admin side – the school, the office of student admin – and like the office that rent[s] the space out. […] Sometimes we were like, 'Is the school…?' Like, we felt that the school was not really support[ing]…like, it's not the OSL office, it's just that, in the grand scheme of things, we feel like the departments are not working together closely enough.

In my time on the SUTD campus, I saw and heard evidence of these types of regulations wherever I went—in the elevators (where student posters were hung up by administrative staff if and only if the students acquired the appropriate "chope[149]" – see Figure 15 below), in conversations with students (who desired open access common spaces with late-night air conditioning to spend time together, a request that was repeatedly denied[150]), and even in completing my own check-out form prior to my departure from SUTD (an arduous task that necessitated at least eight visits to six different administrative offices in search of the required signatures). As one SUTD alumnus succinctly described: "This is Singapore, right, things need to be – or [in] Asia in general – they want things to be within their control, it's just easier that way in terms of governing things[151]."

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[149] In Singapore, a chope is a stamp or a marker, most often used as a verb describing the act of reserving a table at one of Singapore's numerous outdoor hawker centres with a well-placed pack of tissues.

[150] As one SUTD alumnus described: "The school, because it's situated here in Singapore, it's got a very different set of leadership that is being run by certain people like from this country, you know. So because of that, you know, they say 'Oh I cannot do this, I cannot have an open concept school and stuff like that.' Because I remember one of the key issue[s] that we brought up when we were Root was why can't the classrooms be open 24/7, like why can't I open it as in when I want like anytime of the day? Why must there be locks? Why must I book this? But in MIT like all doors are open and, you know, you can go anywhere. Why can't this be an open concept? Open school concept? And they were like, oh, because of security this and that."

[151] Or, alternatively, as a slightly crasser SUTD Redditor put it: "Hostel is alright but regulations are a bitch. Administration loves to play the devil and quash whatever crazy idea we have." (iamasutdent, 2017)

Figure 15. The chope – or stamp – students and faculty were required to obtain before their event flyers would be hung in campus common spaces (most often in the elevators, as pictured here[152]).

In describing these complaints of the SUTD student community, it is worthwhile to note that undergraduates at any university often have a penchant to complain about how the institution is run, and in many ways the SUTD senior administration has been quite receptive to student feedback, particularly in the school's early years, as described in the previous chapter. However, upon the move to the East Coast, these complaints about administrative gridlock expanded to include the faculty as well, who over time grew more and more frustrated by the administrative hoops through which they had to jump to execute their basic teaching and research responsibilities on the campus. As one ASD faculty member described of the SUTD procurement process, for example:

> Administrative bureaucracy is horrendous. Like I'd say, every kind of academic support is there to tell yes or no to faculty. So let's say, for example, I want to buy this equipment, there's the money, dah dah dah, instead of helping, they say like,

[152] Unfortunately, not all flyers would be hung by the facilities staff in all the elevators, so those of us without access to campus email lists would often miss interesting events if we happened to take a poorly informed elevator a few days in a row.

> 'Well, why don't you fill this [form] up?' [Then they say], 'No, this is not okay.' 'No, this is not okay.' You know, this type of attitude is all over the place. So in order to buy one [piece of] equipment, you have to write a thesis. [laughs] I did a few of them. Yeah [my requests were approved] at the end, but like, you know, you want to do timely research, and then like by the time…like it takes two years or something at the end and like, you know by the time [you get what you need], other people have done it [the research]. Like, are we stupid or are we stupid?

Similarly, as another ASD faculty member described:

> I'm really frustrated [with] the way it works at SUTD right now. Because you've got the classic workshop problem, where the manager is the bottleneck, right? You have amazing equipment and amazing resources, but you cannot access it because someone needs, the management…of course there are safety issues, there's a lot of money involved, so that's of course understandable. But then because of, as I said, a culture of avoidance, you'd rather have equipment lay dormant for months, than risk that someone is using it and might break a part and then you'd have to replace it. Then you'd have to deal with a problem, right? So that's a huge part of the whole issue. That's what I would say is the biggest difference between a world class university and a university that wants to become a world-class university.

In synthesizing faculty and lecturer complaints about the administrative bureaucracy of SUTD, the majority of the criticism about SUTD's policies related to the levels of authorization required to spend the university's resources, be it on air conditioning (which faculty originally had to request to be turned on at night over the weekends if they wished to work after hours), conference travel (for which some lecturers reported four required levels of administrative authorization), or use of campus space (for which faculty reported having to pay for out of their teaching or research accounts, even if they requested to use a large hall for a class examination). As described in Chapter 5, these regulations are particularly tiresome for faculty and lecturers with experience at universities in North America, Australia, and Europe, who expected much more autonomy in their work at SUTD, particularly given the promise of the MIT influence on the institution. As one SUTD administrator described of his conception of balancing his perceived responsibilities to the institution with the requests of students and faculty:

> Operation is…goes back to the word sustainability. We have to be very careful or mindful of being sustainable in terms of using resources. So electricity, water, we…I mean, we try to educate, right? And we started with a very tight control; now we are relaxing because we try and understand the users. Researchers need to work long hours, weekends; faculty need to come back. So now we allowing them to turn on the aircon. Some of them are automatic, it means the faculty can actually turn on his aircon in his room, it's all computerized. And if students want to stay back late they can request, and if we think it's justifiable, we support. Architecture students rushing for a project, towards the last two, three days they will be around, we give them longer hours. So these are the things that we try to understand their needs and support them. So it's a forever evolving, you know, because the students are very active—the demands are there. So we try to meet their demands; at the same time, we cannot waste – we should not waste, right – the world is limited. So we try to balance, lah.

As with many organizational practices in Singapore, the bureaucratic structure at SUTD – particularly around issues of spending – can actually be traced back to Lee Kuan Yew and his principles in founding Singapore's governmental and administrative systems. When working to attract American and European multinationals to Singapore in the years after independence, PM Lee assured the leaders of these organizations that Singapore would be an entirely corruption-free environment, as part of his sell for these companies to set up facilities in the young country. Thus, in his early years in government, Lee Kuan Yew went to great lengths to ensure that the Singapore Government would be entirely corruption-free, publically shaming any member of the government found to be accepting a bribe in any form (see K. Y. Lee, 2000). As he described in his memoir, *From Third World to First: The Singapore Story, 1965-2000* (K. Y. Lee, 2000, p. 159):

> We made sure from the day we took office in June 1959 that every dollar in revenue would be properly accounted for and would reach the beneficiaries at the grass roots as one dollar, without being siphoned off along the way. So, from the very beginning we gave special attention to the areas where discretionary powers had been exploited for personal gain and sharpened the instruments that could prevent, detect, or deter such practices.

In Singapore's 52 years as a sovereign nation, this commitment to corruption-free enterprise and government has persisted and been imbued as a widely held cultural norm, and as of

2016 Transparency International classified Singapore as the 7th best scoring country in its annual Corruption Perceptions Index, placing the country between Norway and the Netherlands (Transparency International, 2017).

Given that SUTD is a publicly-funded institution, the necessity for rigorous accounting is viewed as an imperative by the institution's Singaporean staff, as administrators believe that any perception of fraud or waste within SUTD's accounts (which are partially filled with the Singapore Government's funds) could discredit the institution or even lead to severe penalties for its employees or its leadership. Given the pervasiveness of this mentality within the Singaporean staff of SUTD – as well as the fact that Singaporeans make up the vast majority of administrators at the institution – the push for financial accountability has driven the creation of many of the bureaucratic practices of which faculty and students complain. As one Singaporean SUTD affiliate explained:

> I would feel that over here [in Singapore] there are more rules and regulations; Americans might feel a little astonished in the beginning, but after some time they might understand the reason why we do things this way if they are here for [a] long [time]. […] [In Singapore], rules and regulations are there to guide actions and prevent fraud. And so it really allow[s] people to do things to do things automatically if you know the rules and regulations, so that you do not need to think too much. The other thing is whether the culture believe[s] that the society in general is good or the society in general will tend to cheat if there is no rules and regulation. So of course those things come from the past history, and slowly it moves towards this. I think in most society it's like you hope to have a free system, but as time goes by you find that it is not very efficient.

Finally, this concern about accountability also has led SUTD as an institution to implement layers of authorization to further ensure that resources are used appropriately, reducing the autonomy of lower-level members of the organization. As one MIT staff member described:

> They're run—it's a very, like—they're run by the government, and their funding, all that comes from the top. And so that's a huge difference, and it makes a difference for everyone. Most of the administration that I work with [at SUTD] don't really have—can't really make bottom line decisions. I don't think they're given that…they

> have to ask the higher ups for, like, really small things that I do here and that most people at MIT would be able to do. And that's because I think that they want to have a lot of control and oversee decisions that are made—who's responsible for this, who's responsible for that. And there's a lot of, like, structure—a lot of structure.

As with the design of the physical campus, MIT stakeholders payed essentially no heed to the operational aspects of SUTD when developing the vision of the university, leaving decisions about the day-to-day operations of the campus to their Singaporean counterparts. Given this dynamic, SUTD operationally evolved into a classically Singaporean organization, with the characteristic accountability measures, bureaucratic structure, and regulations of any Singaporean entity – particularly a government-affiliated Singaporean entity – despite the inherent conflict between these practices and the culture of autonomy fostered and touted by faculty and students at MIT. Thus, as with the physical design of the Changi campus, the operational procedures of SUTD evolved largely independently of any influence from MIT, again demonstrating that in cases in which MIT stakeholders did not prioritize a particular aspect of the collaboration, SUTD stakeholders developed the components to be classically Singaporean, with no discernable traces of the "MIT DNA."

In discussing their various frustrations with the design and operations of the SUTD campus, I would often ask SUTD faculty – as I had the SUTD students – how they provided feedback on campus policies to members of the administration. To my surprise, as of my period of fieldwork in 2016 and 2017, there was no formal mechanism for faculty governance on SUTD's campus; rather, faculty were generally only invited to provide formal feedback at campus town halls (which many stopped attending over time, viewing the gatherings as largely unproductive) or at end-of-term "reflection meetings," which Tom

Magnanti, Guo Wei Xun, and Lee Yam Keng convene with the heads of the semester's courses at the end of each term. In practice, faculty seemed to have questions about the efficacy of these structures, preferring to either raise concerns with their pillar head (or other faculty mentors within the administration) or to try and discern the administrations' moves by discussing with their peers in their departments, hoping to anticipate changes before they came down from senior leadership.

When developing a plan for SUTD as an institution, MIT faculty did not push to establish a formal faculty governance structure, perhaps due to the relatively small role that MIT's faculty officers play in decisionmaking at the Institute (or, alternatively, because they expected that such a governance body would emerge over time, particularly with an experienced MIT faculty member like Tom Magnanti at SUTD's helm). In the flurry of activity during the early days of SUTD, however, no such initiative ever came to fruition, despite repeated formal proposals from the SUTD rank-and-file faculty for such a body. As one faculty member described of the situation in November 2017:

> There were many cases...many instances that we brought this up in the early days. Like, 'Come on, we need faculty governance because it's [the university is] run by the admin people, we need to have organization as well.' But I wasn't in the front doing this, but I always supported that kind of scenarios and this and that. You submit it [a proposal], you'll never hear from them [senior management]. Then it fades.

As one pillar head reflected further:

> I think over the last five years, things are becoming slightly better—there are more committees, and whenever I suggest to the provost to sort of meet with the faculty or students, he immediately says yes; however, I think a lot, lot more needs to be done. Because I am used to the way things happen at [an American university]. Any decision that comes in front of faculty and they don't know about it, faculty gets quite upset. […] Here, no, that's not the case. The decisions just come from the top. If you…I don't know that you have talked to faculty or not, but if you talk to [my pillar's] faculty, I think they will just…they will say 'We do our work, and we are not part of any decisionmaking.' I think that's what they will say. So…and also the budget, et cetera is completely at [the] provost's discretion. And I cannot blame the provost, because he is under those constraints. So he makes decisions and he says 'This is what I have and this is what I can give you.'

Over time, this structure – wherein policies are made within the senior administration and then communicated downwards towards the faculty, with little-to-no faculty feedback or input – added to the frustration many faculty members I interviewed felt at SUTD. Of particular concern to SUTD's many assistant professors were issues related to awarding of tenure, which remained unclear for many of SUTD's first hires as they approached the six- and seven-year marks of their time at SUTD. Although some of these individuals have received tenure at the time of this writing, others still face great uncertainty as they approach the process, particularly for those in disciplines that evaluate tenure cases based on different standards than in the engineering fields well represented by the school's academic leaders who make up the Presidential Promotion and Tenure Committee (for example, professors in the HASS cluster or in ASD). Over time, a combination of this uncertainty, frustrations with the administrative structures of the campus, and – in many cases – a personal or professional pull back to Europe or North America led many faculty to leave SUTD all together; said one member of the senior academic administration, "there's been, in my view, quite a bit of attrition," estimating that SUTD may have lost up to a quarter of its faculty hires since the institution opened (exact data on faculty attrition is not publicly available). As this administrator continued:

> I think the culture and the rigidity…in many ways the culture's difficult for a lot of people. I think if you asked everybody why they left, nobody will say, you know, 'the culture is not amenable to what I want' or something. It's always something else. But I think that - for at least the western folks - that's a big challenge. Is it 100% why people leave? No. But if there's any kind of a systemic issue, I would say that's it.

In all of this policymaking, discussion, and debate on the SUTD campus, one key figure became increasingly absent, particularly after the institution's move to Dover in 2015.

While Tom Magnanti was a staple of SUTD's recruitment and operational efforts in its early years, over time he began to spend more and more time at home with his family in the United States. In many ways, this shift in Tom Magnanti's presence in Singapore is understandable, given that his initial commitment was to serve as the SUTD president for a three-year term (as described in Chapter 3). After extending this tenure into the first few years of SUTD's academic operation in 2012, Tom Magnanti was again asked to extend his contract as the SUTD Board of Trustees searched for a viable candidate to replace him in his role as president[153].

With Tom at home in the U.S., day-to-day administrative operations of the university were left to SUTD Provost Guo Wei Xun, himself a "true blue Singaporean" (described at length in Chapter 4). As one pillar head explained:

> I mean, Tom comes here…he's a very nice guy. He's a very, very nice person. He comes here, everybody loves him, he has a meeting, and then he goes away. Then he's in Boston somewhere. I don't even go to complain about anything to him—I decided no, what'll happen if I go and talk to him? Well, maybe he will say something to the provost. [So] I just go straight to talk to the provost, that's it. So for me, Tom being here or not here doesn't matter, really. I mean, when he's here I like it, I like to see him, I like to say hello to him, but whether it has an impact on the day to day things here in [my pillar] I don't know, I don't think so. So whereas if he was here, he could actually have an impact on decisionmaking at the university level. So I don't know what are the decisions [at] the university that have his seal, other than the ones that were taken at the university['s beginning], like you know pillar naming, and this and that, and so on. […] The power is focused and consolidated in [the] provost, yes.

Given the size of SUTD, this decisionmaking structure created a system in which almost all decisions on campus – be they major or relatively minor – run through the office of the

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[153] Perhaps revealingly, when I discussed this presidential search with faculty, administrators, and members of the Board of Trustees, most expressed the need for the second president to spend most of their time in Singapore as a key requirement of the position, emphasizing that while Tom was a positive influence on the campus, his routine absences lessened his effect on the school's culture.

provost[154]. Given Prof. Guo's professional experience in Singaporean, government-affiliated organizations like A*STAR, his influential role on the campus further instilled Singaporean organizational mentalities to the functioning of the campus. Thus, the localization of the university's organizational processes occurred not just due to the lack of prioritization of these aspects by stakeholders at MIT, but to the roles and positioning of the founding members – particularly the Singaporean founding members – of the university as well.

Amidst the search for a new president for SUTD, other negotiations were quietly taking place behind the scenes at the institution, in coordination with the senior leadership of MIT. Come June 2017, the seven-year contract for the academic collaboration between the two institutions would expire, and for over two years before that date, Arthur Foster and the MIT leadership were in near-constant negotiation with SUTD and MOE stakeholders in efforts to renew the agreement between the two institutions. As I spoke to stakeholders at both institutions during this period, I was consistently assured that an agreement for some formal collaboration between the institutions would eventually be reached, although this arrangement would certainly be far smaller in scope than that of the original collaboration (perhaps only including a few academic exchange programs, for example). As one senior MIT faculty member described:

> If both parties decide that it really isn't worth [it] – you know, that they can't find enough common ground to really go forward – there'll still be something. It will just be…the way you'll know it didn't work is that it [the renewed collaboration] will just be, you know, like one fifth or something like that in magnitude of what it is now. But it's not…there's not going to be a messy breakup because both entities have so much at stake in terms of making…saying that this…you know, declaring this was a

[154] As one example, along with another senior administrator, Prof. Guo even personally conducted final-round interviews with the students selected for the GLP exchange program, hand selecting the students who would have the opportunity to spend their summers at MIT each year.

> success and this was great that we, you know, did this with Singapore. And they'll be able to say, you know, it's great…our university was, you know, templated off of MIT.

As the SUTD and MIT communities were to discover in late June 2017, however, hopes and assurances do not always lead to the intended results, even if these sentiments stem from both sides of a negotiating table.

Part IV: Future

Chapter 10: ~~Established in Collaboration with MIT~~

"[When I decided to attend SUTD], my close relatives, you know, they [had] doubts and they were like, 'You know, you could get into the good university like, you know, in NUS, NTU, or other overseas universities, why apply to this one who is very, you know, shady? You know, you don't know what's going to happen.' But I think…one thing that my mom told me is that, 'You have to understand that this is a government university, you know, it's not like SIM per se where it's a private [institution], you tie up with other universities in Singapore. It's a government university, it's a top one. So, you can be certain the Singapore government will not allow this to falter, you know. It's a good university, you know. Whatever that they will do, they will make sure that this goes through.'" – SUTD Student, Class of 2019

On the morning of Friday, June 23, 2017, faculty, staff, and students across SUTD received an email from the office of the president, titled "SUTD Completes Successful 7-year Educational Collaboration with MIT." In this message to the SUTD community, President Tom Magnanti announced that as of June 30, SUTD's academic partnership with MIT would come to a close, while the research partnership coordinated through the IDC was planned to continue[155]. Although this message did note the role MIT played in developing SUTD's undergraduate curriculum, most of Tom's message to the SUTD community was oriented towards the future, reiterating SUTD's commitment to providing a world-class education to serve both its students and the needs of the Singapore workforce

[155] In fact, some administrators even expressed hope that the institution's research partnerships could expand past the IDC in the period after the academic collaboration's end; as one SUTD administrator described: "The research we will continue because the IDC is much longer. And not only that we also felt that, now we can work directly with the, MIT faculty. Either to SMART here, their SMART program and they are renewing, […] they had to renew it. So in the renewal they get, now there's more, I would say emphasis to work with the local university. So, we could be one of them. Or we go directly to work with faculty. […] So, I think we can work like this and continue to see other areas that we can work together, yeah. So, definitely we want this [to be] a very long-term relationship. But it could be changing the framework of collaboration, right? I think it's good to have a institute-to-institute collaboration like what we have. But when it come to…it's a collaboration, it actually has a bit of disadvantage, that it is difficult to go to, reach out to more. We must go through this [collaboration], and then they go right, but here, there's nothing stopping us from that, from the faculty to work with all the other, you know, faculty who are not in the IDC for example, right, yeah."

more broadly. In addition, Tom's message also emphasized that SUTD would be broadening and reinforcing the institution's other international collaborations, particularly with Zhejiang University, SUTD's partner in China.

As this message of assurance arrived in inboxes across SUTD, news outlets across Singapore published similar stories about the end of the MIT-SUTD academic partnership, having been briefed on these developments at a closed-door press strategy meeting the day before the formal announcement. In this seeming deluge of media coverage[156], even the television station *Channel News Asia* ran a segment on the termination of the collaboration during its daily news program, showing brief clips of Arthur Foster and Tom Magnanti as they made assurances that the collaboration was ending in good spirts, having drawn to its logical conclusion. As *The Straits Times* reported in its coverage of the news (Davie, 2017):

> The ending of the education agreement will, in practice, mean that SUTD will lose some of the MIT branding. The tagline that accompanies the university name, 'established in collaboration with MIT', will go and opportunities for student exchange at MIT will lessen. The dual masters program and the post doctoral programmes which enrol [sic] a small number of students will also be discontinued. SUTD president Thomas Magnanti said the partnership SUTD and MIT had accomplished more than they set out to do. 'The curriculum is well in place and the SUTD faculty have been teaching the curriculum, so there is really no need to extend the education component of the agreement with MIT,' he said. […] Professor Arthur Foster, who serves as the director of the MIT-SUTD collaboration, said it was not a divorce but an 'evolution' of the relationship. He said: 'In the first seven years we were tasked with helping to develop a new university here and we have done that in spades.' He said SUTD was on an 'excellent trajectory and has a very bright future,' adding that MIT was very proud of the university's progress.

Although administrative leaders of SUTD expressed enthusiasm about and commitment to renewing the MIT collaboration contract in the early stages of the

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[156] Particularly for those of us who subscribe to automated Google alerts for the term "SUTD".

renegotiation (as described in the previous chapter), over time sentiments on the campus shifted, as stakeholders began to consider what would really be gained from the renewal of the arrangement (particularly in light of the cost to MOE such an arrangement would entail). As one SUTD trustee explained in August 2017:

> MIT had been very important at the start, for two reasons. One is that there's an MIT way of doing things that we implanted, but the implementation has been completed. Number two is that they must sell a brand. Suppose that we just started with SUTD on its own. […] You won't be able to attract the bright students. Again, the branding over time is not as strong—it's not needed as strongly as at the beginning. So I thought there need[ed] to be a separation at some time. [And] better early than late, because the later you are, the more dependent you are—you can't be on your own. So on the Board [of Trustees] I was the one who said yes it's the right time, as opposed to wait[ing] another three years. Because what do you get for another three years? In doing so, you're not building your own self-confidence. So I think it's necessary. Anyway, we have to separate, so then the question is, 'Is it better later or earlier?' So my sensing is that earlier is…right now, because it's the logical time on completion of the agreement. As opposed to 'Let's drag on, you know, with an extension of the agreement' or 'Let's have another agreement for another seven years.'

In late 2016 and early 2017, enthusiasm for such a renewal also waned within the SUTD student and faculty communities, particularly as rumors spread on campus regarding the cost such a contract extension would entail[157]. As one faculty member described of the events of June 23:

> There was some sort of meeting for faculty to explain this, like actually senior management side was very worried that it will be seen super negatively by the faculty and they will leave. They were very worried about it. So they hosted these sessions, but the mood was like 'Oh, that was coming.' So it was taken very lightly in some ways, at least internally to the junior faculty. It's like, we didn't see much problem. Basically we didn't have that much…we didn't…probably in the junior faculty level too, we didn't see that much contribution from that, the presence of the MIT. Maybe they were big and then we just didn't see it [later], I don't know.

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[157] In preparing to conduct the research for this ethnography, I was warned that as an organizational ethnographer, my informants on campus may in time become eager to share rumor and speculation as we discussed life at SUTD. During my fieldwork, I experienced this phenomenon first hand, finding myself (at times) at the center of what felt like a gossip tornado on campus.

As described in Chapter 7, in the early years of SUTD's operation MIT faculty members played visible roles on the SUTD campus, working with faculty and students to support the educational functions of the institution. For students and faculty that came to SUTD after this period, however, it is likely that many never interacted with a student or faculty member of MIT, particularly given the limited scope of the inter-university exchange programs (described in Chapter 8). Thus, in the later years it is perhaps understandable that SUTD stakeholders viewed MIT's role as not imperative to SUTD as an institution, hence the passive reaction of many (like the faculty member quoted above) to the news regarding the conclusion of the partnership.

Finally, as noted in the quote from the trustee above, as SUTD concluded its academic partnership with MIT (even ceremonially removing the Institute's name from its logo and masthead), it at least partially lost the institutional legitimacy the MIT affiliation had afforded the university. Particularly in its early years, SUTD recruitment practices emphasized the MIT "tie-up" (as it is referred to in Singapore) as a method of assuring uneasy parents and students that SUTD's undergraduate programs were trustworthy and legitimate. Without such an arrangement, SUTD's leadership would rely on other methods to establish institutional legitimacy, which were in some ways even better aligned to the particularities of the Singaporean higher education ecosystem than the partnership with MIT had been.

At the end of March each year, SUTD publishes the results of its graduate employment survey, an annual assessment of the employment status and income of the institution's previous graduating class. A standard practice for all universities in Singapore, students and their parents routinely utilize these figures – which compare across universities

as well as individual departments – as they survey the higher education landscape in preparation to submit their undergraduate applications, according to both faculty and students at SUTD. As one SUTD administrator described: "We know that in Singapore people were worried about this, right? They look at the university, and a lot of the parents would still look at what salaries their kids are getting, right? So we knew that was going to be important." Thus, as SUTD prepared to release their first employment figures in March 2016, the campus waited almost with bated breath for the results—would the pioneer students' earnings be viewed as sufficient to Singaporean stakeholders, or would these statistics show SUTD's graduates to be inferior to those of NUS and NTU[158]?

Much to the delight of students and administrators across SUTD, the university's 2016 employment figures proved remarkable for a new university: not only were the job prospects and salaries for SUTD graduates comparable to those of NUS and NTU, but the median monthly salary of SUTD's ISTD pillar graduates proved to be one of the highest of any engineering program across the island of Singapore[159]. As *The Straits Times* reported, with all figures in Singapore dollars (SGD) (Yuen, 2016):

> It may be only four years old, but the Singapore University of Technology and Design (SUTD) has produced graduates who are just as marketable as those from the more established local universities. The first graduate employment survey released by the university yesterday showed that the gross median salary of graduates from its three engineering courses last year was $3,600 [per month, equivalent to approximately $2,750 USD]. Their overall job prospects were similar to those of

[158] Of course, many in the field of higher education – particularly in the United States – would argue that the quality of a graduate cannot be assessed on starting salary alone; however, in extremely employment- and income-conscious Singapore, to many this figure is by far the most important measure of a university graduate's worth (as SUTD students and administrators explained to me).

[159] In a fascinating turn of events, after the release of these salary figures, enrollment across the pillars experienced a stunning shift—while ISTD was by far the least popular pillar for SUTD's early batches, after the release of these salary figures, students experienced a remarkable (and fairly suspicious) growth in their interest in the field of computer programming, and ISTD's enrollment has ballooned in the subsequent years.

> graduates from similar courses at the National University of Singapore (NUS), Nanyang Technological University (NTU) and Singapore Management University. SUTD provost Guo Wei Xun said graduates from some courses even commanded higher median salaries than their peers in other varsities' engineering programmes as these courses were multi-disciplinary and design-centric. For instance, the engineering product development course covers areas like materials, mechanical and electrical engineering. Its graduates earned a median gross salary of $3,600, more than the median $3,300 that an NTU electrical and electronic engineering graduate took home last year. "We do not offer traditional degrees like mechanical or civil engineering degrees. This is the right choice for us... (as) the challenges that companies face today are pretty multi-disciplinary and multi-faceted," said Professor Guo. Some 85 per cent of SUTD's 187 graduates in the labour [sic] force were employed within six months after their final examinations last year, slightly behind the 90 per cent overall employment rate for graduates from the other universities, which released their yearly survey results earlier this month. Prof Guo attributed the lower overall employment rate to the university's small cohort, and how some graduates might have taken a gap year.

In the second iteration of the graduate student survey released in 2017, SUTD reported even higher salary figures, with the mean gross monthly salary increasing from $3,709 SGD for the pioneer batch to $3,853 SGD for the university's second batch of graduates (Y. Lin, 2017), further bolstering external legitimacy for the institution.

In early 2017, SUTD's leadership received yet more good news to aid in developing SUTD's legitimacy within the Singaporean higher education system—after years of compiling documentation, crafting and delivering presentations, and attending high-level meetings, all of SUTD's pillar programs (three undergraduate programs in engineering and one dual undergraduate-graduate program in architecture) were to receive accreditation from the relevant Singaporean educational governing boards. Having reached this important milestone in establishing the institution's legitimacy within the Singaporean higher education marketplace, SUTD's leaders began routinely touting this achievement to prospective students and their parents—at the 2017 SUTD Open House, for example, Andrew Meyer included a large virtual "ACCREDITED" stamp on his PowerPoint slides outlining EPD pillar's curriculum, mentioning throughout his presentation that graduates from his

department would receive an accredited degree. Similarly, in the months before and after the accreditation decision was made, nearly all of my interviewees from SUTD's senior management brought up and discussed this process at some length, further demonstrating the perceived importance of this endorsement to stakeholders around SUTD.

One truly cannot understate the effect of these developments – or at least the SUTD administration's perception of their effect – to SUTD's legitimacy as understood by prospective Singaporean students and their parents. Whereas the MIT brand name provided some sense of far-off support and prestige for SUTD as an institution, the university's accreditation and the salary figures of its graduates are broadly understood within the institution to be particularly important factors to Singaporean families as they choose their children's higher education institutions[160]. As one senior administrator described these developments and their relationship to SUTD's recruitment prospects:

> And it is a constant struggle because [we] always have to, you know, advertise to [do] outreach. But at same time, the same question [prospective students and their parents] will keep asking. 'How good is your school?' 'What is your, you know, curriculum?' 'Are you sure I can find a job later?' You know, all this keep coming up. 'Your degree, will it be recognized?' We [hadn't] gotten any accreditation. So, but I think over the last five, six year[s] we continue[d] to push, and the number [is] going up steadily. And, and the turning point I would say will be [when] the first batch graduated. Two years ago, after the employment summary came up they actually did very well. And, and then last year, we got the second batch graduated, and they just had their survey about in March and we are now still surveying and they even have done better than the first batch. And early this year, we've gotten

[160] It is worthwhile to note that the MIT name might serve as a bigger draw to SUTD's international students; as one SUTD alumnus (himself a Singaporean) described: "The MIT name really sells a lot. Especially, I mean, because I know. I speak to students coming in [from] different countries. So when I spoke to them. They – I would ask them, so what's this thing that you like about SUTD? Then you tell me then maybe I can share with you some my experiences. And they say, 'Oh, it's the tie with MIT.' That MIT name, right, never failed [us] you know. So, I think it's big selling, marketing point of view. If you take that out, lah, the school will be just SUTD, just SUTD like, oh, what is different of SUTD with NUS, NTU engineering programs? Now we can say, oh because of the MIT collaboration, you know, blah, blah. But like when you're born and this big name goes, what is going to be the selling point? Yeah."

> accreditation for both the degree, architecture and engineering. So, I will say the key thresholds I think we have crossed. Now is to really you know, go out, you know, and get the high school kids excited about SUTD. So, we are doing quite well on outreach, now.

Interestingly, while graduates' monthly earnings are routinely touted by the SUTD administration as evidence of the institution's success, the entrepreneurial pursuits of the university's graduates, while certainly discussed, are far less significant components of SUTD's external institutional narrative today. At the information sessions at the 2017 open house, faculty and staff discussed numerous curricular and co-curricular opportunities for students to participate in entrepreneurial pursuits *while* at SUTD, particularly lauding the creation of the dual undergraduate-graduate SUTD Technology Entrepreneurship Programme (STEP) to be launched later that year; however, little heed was paid to the few SUTD students who have pursued entrepreneurial opportunities post-graduation. Similarly, in speaking to current students on SUTD's campus, I often found that even those with the largest stated interests in entrepreneurship – for example, those students planning the SUTD $10k entrepreneurship competition or involved in the Startups Club – expressed little-to-no interest in actually pursuing entrepreneurial endeavors after university, opting instead to pursue more secure careers in banking or consulting (fields considered much more legitimate by the general Singaporean population, per many discussions with SUTD students). As one pioneer (who did, in fact, pursue a career in entrepreneurship post-graduation) mused of this trend in students' perspectives: "Back then [at the beginning], when SUTD couldn't compete on salary, it couldn't compete on grades, it couldn't compete on international recognition of research work, that was when its innovation [was] purest. That was all that it had—we had. And now it's different."

As SUTD became more established as an institution, leaders at the university also sought to align the school's research and programmatic pursuits with priorities and initiatives of the Singapore Government, providing the institution with further contextual legitimacy in the Singaporean higher education space. In 2014, for example, the Singapore Government announced its so-called "SkillsFuture" initiative, through which Singaporean citizens receive monetary credits to pursue educational courses in an effort to encourage lifelong learning – and professional skill development – within the country's population (M. Tan, 2014). For those tasked with developing SkillsFuture offerings at SUTD, this program provided an opportunity to align with Singapore's national goals, which administrators view as both beneficial to SUTD as an institution and imperative given SUTD's status as a publicly funded institution. As one SUTD administrator described:

> The SkillsFuture credits, right? So we will be watching that closely to understand what our key major concerns or what – to understand how we might need to shift our – what SUTD needs to do to align, right, because alignment means a few things. One is partly because we're publicly funded, right? So obviously we have to align to some extent, or to a large extent in fact. The other thing, of course, is that usually that also means resources, right? So it also means so that's one way that a lot of resources will be put in too, right? And then thirdly is also it identifies with the industries…we have to sort of think about whether we're preparing our students and our graduates for those industries. So it's important because it's a national thing. So I think that's one major one.

Similarly, leaders of SUTD's academic pillars have also sought to align their curricula with government initiatives—at an ISTD recruitment session in early 2017, for example, a representative of the Singapore Government presented at length about how preparation in ISTD could enable SUTD graduates to contribute to Singapore's "Smart Nation" initiative (while simultaneously securing a high-paying and desirable job post-graduation). Most recently, the university announced the creation of "SUTD Academy," a lifelong education initiative planned to offer "micro-master's" programs for adult learners in Singapore (Koh, 2018).

In the last several years, SUTD faculty and administrators have also pursued research aligned with Singapore's national interests, establishing a collection of research centers addressing many key priorities of the Singapore Government (a particularly understandable strategy given the role the government plays in funding academic research). While in many ways the IDC remains the research core of SUTD in terms of both faculty involvement and physical space, other research centers and programs have also emerged at SUTD over time, thanks to the initiative of SUTD faculty and administrators. These initiatives include: the Lee Kuan Yew Centre for Innovative Cities, the SUTD Digital Manufacturing and Design Centre, the iTrust Centre for Research in Cyber Security, and, most recently, membership in the government's upcoming TechSkills Accelerator FinTech Collective, a consortium of universities, government, and financial associations meant to promote research and education in financial technology (Zhu, 2017). In each of these cases, the core research goals of the initiatives – in the fields of urbanization, advanced manufacturing, cybersecurity, and financial technologies, respectively – align with stated priorities of the Singapore Government[161]. Given that research initiatives were conceptualized and driven entirely by SUTD's own faculty and administrators, the case of SUTD's evolving research agenda illustrates yet another example of SUTD's stakeholders aligning the institution towards contextually appropriate goals (entirely independently of the faculty framers at MIT). As one pillar head proudly proclaimed: "MIT gets credit for IDC definitely, but for everything else [in terms of research] SUTD faculty gets credit."

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[161] Even more explicitly, SUTD announced in January 2018 that it would be using a $75 million SGD funding allocation from the Ministry of Education to focus on four "key areas" – healthcare, cities, artificial intelligence and data science, and aviation – each of which is also a priority of the Singapore Government (Koh, 2018).

Finally, leaders of SUTD have also worked to build partnerships with other universities in Singapore and around the world, lending the school additional legitimacy from its connections with more established institutions. As noted at the beginning of this chapter, SUTD's partnership with Zhejiang University is planned to continue, and dozens of SUTD students will still travel each summer to Hangzhou to participate in the university's ALP exchange program on the ZJU campus. In addition to this opportunity, SUTD administrators have developed other exchange programs with universities around the world, selecting partnerships that will provide the greatest legitimacy given the national needs of Singapore. As one SUTD administrator described: "Internationalization is not just partnering—it's easy to partner with people. But how does it fit not only to SUTD but the more important thing is how can it help to grow [the] Singapore economy, create more jobs. I think that is important, and that's the reason why sometimes we have to think very carefully." As of 2017, 75% of all SUTD undergraduates participated in a short- or long-term exchange through one of these partnerships, preparation that this administrator hoped would prepare the students for the global needs of the economy, further building SUTD's legitimacy through the intended future success of its graduates.

In addition to these international partnerships, SUTD's leaders also forged domestic collaborations with Singapore's other top universities, providing SUTD graduates with opportunities to leverage the brands of both SUTD and other institutions in Singapore. In 2014, SUTD launched a Dual Degree Programme (DDP) with SMU, allowing students to pursue joint undergraduate degrees between the two institutions over the course of five years. In December 2017, SUTD launched another dual academic program with Duke-NUS Medical School, through which ten students per year would be admitted to pursue an undergraduate degree at SUTD followed by a Doctor of Medicine degree at Duke-NUS, in

an effort "to produce 'clinicians who are adept at both practicing medicine and harnessing technological advancements across disciplines'," as *The Straits Times* reported (Koh, 2017). Through all of these efforts – many of which are included in SUTD's five-year growth plan[162] "for which it has set aside a multi-million dollar budget" (Koh, 2017) – SUTD leaders sought to build legitimacy for the institution, leveraging partnerships with well-respected local universities to grow and solidify the reputation of the university in the post-MIT partnership years.

While SUTD was able to develop institutional legitimacy within the Singaporean higher education system in the realms of research and education, the institution has yet to reach what would seem to be the greatest legitimizing factor of all: achievement of its stated enrollment targets. As described in the early chapters of this manuscript, SUTD was originally conceived as a means by which to increase Singapore's cohort enrollment in higher education by enrolling approximately 2,400 students per year; after the MIT partnership was established, however, this framing shifted, with the target enrollment of the university set to a smaller (and more elite) 1,000 students per batch. As of this writing, SUTD has

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[162] As Open Gov Asia reported of this plan (Bhunia, 2017): "The Singapore University of Technology and Design (SUTD) has set aside a multi-million dollar budget to spearhead its next phase of growth, with the support of the Ministry of Education, Singapore (MOE) to develop a suite of integrated, multi-disciplinary programmes in key economic sectors over the next five years. These programmes will further enhance SUTD's education and research offerings, allow SUTD to better prepare its graduates for the future economy, and support national growth priorities. […] These initiatives go beyond the existing robust technology and design curriculum, and overseas programmes that SUTD offers. They will include research collaborations to develop state-of-the-art technologies and capabilities to support industry transformation, in-depth faculty-staff learning and training exchanges, co-development of specialised, skills-based courses, access to advanced facilities and equipment for teaching, learning, and research, and enhanced internship and mentorship programmes focusing on job placements, innovation and entrepreneurship."

matriculated six batches of students, and has yet to reach a class size of 500 enrollees in any particular batch, vastly underperforming the enrollment targets set in the institution's early years. As noted in Chapter 6, however, these early targets were always ambitious in light of Singapore's demographic realities; as one trustee explained:

> [A significant challenge was] a big gap between plans and realization. Plans would say 'Oh, we're going to get [a] thousand students.' That's not realistic. We don't have so many students [in Singapore]. […] So now we're talking about 400 students a year—right now it is 400 a year in intake. Plan was for 1,000. So of course the first year we said 'Oh, you cannot stand…it's [a] new university, right now it is 250, soon will grow up to 400.' But it's not going to…you're not going to hit [the] 1,000 [student] mark. You don't have enough babies.

As I left Singapore in late 2017, discussions on the campus were ongoing as to how the school's enrollment was to be increased, with rumors swirling among the faculty, staff, and student communities as to the future course of the institution. Would SUTD aim to admit more international students to bolster the domestic enrollees? Would the school modify its academic calendar to admit a "second batch" in September, in an attempt to mirror the schedule of the country's other universities? Would SUTD (perhaps most improbably of all), try to combine with SMU to form a blended technology and business university[163]? In conducting this research, I received few concrete answers to how these questions would be addressed moving forward; however, SUTD's efforts to grow and expand its academic and research offerings and partnerships – through the collaboration with Duke-NUS Medical School, for example – perhaps provides some insight as to how the institution will seek to establish itself moving forward, with the goal of ultimately reaching – or even exceeding – its enrollment goals.

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[163] Although this was a rumor on campus for a time, it had been effectively squashed by the time I left Singapore, thanks to some well-timed public statements by members of SUTD's and SMU's academic leaderships.

On September 9, 2017, Professor Tom Magnanti presided over what would be his last SUTD graduation ceremony as the school's president, watching as over 300 undergraduate, master's, and doctoral students (the first of SUTD's PhD graduates) crossed the stage in SUTD's cavernous black and purple auditorium. Clad in the red and silver robes of his doctoral alma mater, Tom took to the podium to deliver his final commencement address, a reflection on the world's changes since his own undergraduate commencement exactly 50 years before. Said Tom in his final words to SUTD's graduates (from Singapore University of Technology and Design, 2017b):

> Most of you will be around – students – 50 years from now, and even though I can't begin to imagine the changes you will see, there will be many. Your world will look much different than it is today, and we hope it will be exciting and wonderful. You will have many opportunities and challenges – both personal and professional – along the way. You will have to learn new things and learn how to adapt to new surroundings. Your SUTD education has prepared you for these changes, providing you with the skills and knowledge to make immediate impacts on your lives and on the world. It also has provided a set of fundamentals in science and technology; design; the arts, humanities, and social sciences; and your pillars. They have provided you with an ability to be introspective and learn, so that you can easily move with the times. Use what you have learned to navigate through the changes you will face. Create a wonderful career for yourself, and make a better world by design. We and the world will be better off because of what you will do and contribute—here's to an exciting journey ahead.

Three months after this graduation ceremony, SUTD announced that Tom's tenure on the campus was finally to draw to a close—as of December 31, 2017, Tom would be leaving SUTD (although retaining the title of "President Emeritus"), leaving the operation of the campus to Provost Guo Wei Xun, who would be promoted to interim president as the Board of Trustees continued the search for Tom's official replacement[164] (Koh, 2017). After

[164] On March 23, 2018, Prof Chong was ultimately announced as SUTD's second President, transitioning from his interim role as of April 1 of that year.

over eight years shuttling the 10,000 miles between Singapore and Boston on a monthly basis, Tom's formal commitments to be in Singapore were finally to end, allowing him to return to his previous life as an Institute Professor at MIT.

In telling the story of the creation of the Singapore University of Technology and Design, one truly cannot overstate the extent of the influence of Tom's vision on the institution that would eventually become SUTD. In dreaming up the concept of SUTD, Tom sought to craft creative and multidisciplinary educational models that could never be built within the structures of an established institution, even one that perceives itself to be as innovative and boundary-breaking as MIT. Almost a decade after its original conception, Tom's vision for SUTD has largely been realized, and today the university's organization and overarching institutional narrative bear an impressive resemblance to Tom and the other framers' original plans conceived in the early days at MIT. Together, a team of MIT faculty worked tirelessly in SUTD's first years to develop and realize this vision, and their legacies on SUTD's campus will likely persist for years to come.

As described in the pages of this manuscript, however, SUTD's own students, faculty, staff, and trustees – as well as individuals at Singapore's Ministry of Education – also shaped the university as an institution, from before the dawn of the MIT collaboration (when government stakeholders set priorities for what would become the fourth university) to the present day. In every stage of the institution's development, these local stakeholders shaped SUTD to fit the Singaporean context, adapting educational models, building new initiatives, and shaping the external narrative of the institution to be relevant – and valid – within the Singaporean higher education system. Through both conscious and unconscious efforts, these individuals molded the Singapore University of Technology and Design into

the university it is today, an institution committed to building a better world – and a better Singapore – "by design."

Conclusions and Epilogue

"The world is strewn with other universities going into other cultures trying to set up a carbon copy of itself and failing miserably, okay? Here we did not. In MIT and SUTD, we're not trying to do carbon copy of ourselves. SUTD will never be MIT—it will never be MIT. It will be its own institution. And I suspect that there will be, you know, there are certainly elements of MIT that will make SUTD strong and unique in Singapore. But Singapore itself has a strong influence on what goes on in that university. […] And there's no doubt in my mind that SUTD would be nowhere where it is without us, without MIT, but ultimately, it will be its own institution. And when we leave, I expect it will continue to evolve and probably evolve away from whatever we left it with and be itself." – MIT Faculty Member

As I hope that I have demonstrated in the pages of this manuscript, I do not believe that the story of SUTD is one of educational neocolonialism, nor one of a Western entity imposing its educational values on unwilling collaborators in an outside cultural space (i.e. Altbach, 1998; Shils, 1972). Rather, I view the story of the MIT-SUTD Collaboration as one of mutually respecting partners—one of positively minded, bright-eyed MIT faculty members viewing their work as a helping hand, through which they enabled Singapore to create a truly unique and special university. As I spoke to the MIT faculty about their time in Singapore, over and over again I heard stories of respect, friendship, and mutual admiration of their Singaporean colleagues—of the joy that they had taken in building something new and special, despite the inevitable frustrations of managing and executing such a project. In the end, the approach of those at MIT working to develop SUTD truly adhered to the charge of "collaboration," as faculty at the Institute viewed their roles as those of mentors and advisors, but placed ultimate responsibility for the direction and success of SUTD on Singaporean stakeholders themselves.

This emphasis on collaboration – rather than unilateral creation of a new institution under the MIT name – is rather unique in the realm of cross-border higher education. The other great players in this field – Nottingham University in the United Kingdom, New York University in the United States, and INSEAD in France, to name a few – approach their

international endeavors in a governance-based fashion, opening satellites as either mirror images or subsidiaries of their home institutions across the globe. In these instances, the leaders of these colleges and universities are understandably focused on ensuring quality (as their masthead will adorn the diplomas of the satellites' graduates), and are therefore much more prescriptive as they work to develop the new institution overseas. By intentionally eschewing the responsibility of the branch campus model, MIT administrators allowed the Institute the flexibility to collaborate – rather than dictate – as SUTD took shape.

Given this difference between the MIT-SUTD relationship and those of other large-scale cross-border partnerships, there stems a logical question as to whether or not the findings of this dissertation are applicable to more "traditional" models of large-scale cross-border higher education. My response to this question would be a resounding yes, particularly in light of the *drivers* of the processes identified in this dissertation. The issues that faculty and staff at SUTD faced as they tried to deliver an MIT-designed education to Singaporean students were those that would be faced in any cross-border institution—incorrect assumptions about students' preparation and skills before matriculation, student struggles as they worked to succeed in new learning environments, and the like. Similarly, the influence that Singaporean staff members had on the functioning of the university – for example, implementing strict mechanisms for financial and resource accounting – would also have taken place at a more traditional branch campus opened in the Singaporean context, particularly if supported by governmental funds. Thus, while the MIT-SUTD approach of collaboration perhaps facilitated a more explicit and accepted evolution of practices than would have occurred at an IBC, similar mechanisms would likely still have been observed, to more or less of a degree depending on the institutional context. Of course, as with any qualitative research, the findings of this dissertation cannot be assumed to be broadly

generalizable without further study; however, I believe that the telling of the story presented here represents an important first step in understanding how global partnerships in education truly function and evolve.

Like any ethnography, this manuscript also captures a particular snapshot of the MIT-SUTD Collaboration—a particular moment in time, occurring during the course of a seven-year partnership, which spanned two continents and involved hundreds – if not thousands – of participants and affiliates. The data for this dissertation were primarily collected and analyzed over a 20-month period (January 2016 to August 2017), documenting the final year of the initial seven-year agreement between MIT and the Singapore Ministry of Education. By the time data collection for this project had begun, SUTD was in near-full operation, and the "start-up" phase of the MIT-SUTD partnership had long since passed. In an effort to understand the beginning phases of the collaboration, I did my best to interview all the major actors who participated in the initial negotiations and framing of what SUTD would eventually become, although in some cases this was not possible (and in many cases, recollections were often frustratingly – if understandably – hazy). When possible, the content of these testimonials was triangulated using collected documents, and was also supplemented by my own experiences and documentation during my first period working at SUTD, from June to August 2012. While I am confident that the discussions and developments I have outlined here largely represent the early days of SUTD, it is worth reiterating that these occurrences were outside my period of "official" fieldwork, and these anecdotes rely largely on narrative interviewing and archival work. Furthermore, it is worthwhile to note that – as with any qualitative research – this narrative stems from my

own particular experience collecting and interpreting data on the collaboration, and is meant to be viewed as such, rather than as a universal "truth" of the story of SUTD.

While the culture and educational offerings of SUTD have certainly stabilized in many ways, the university is currently in its period of greatest transition since the move from Dover to the Changi campus. As described in the previous chapter, MIT ended its first educational contract with SUTD in June 2017, despite hopes at both institutions that some type of agreement could be reached to extend the relationship past its initial expiration date. As of January 2018, only one of the original Pillar Heads remains in their initial roles, and much of the founding senior academic leadership – including the inaugural president, Tom Magnanti – have departed from SUTD. While recent research has shown that most new SUTD hires have strong buy-in to the institution's espoused values (J. M. S. Lee, 2015), it remains unclear as to whether the founding vision of SUTD as an entrepreneurial, boundary-breaking university will persist within the environmental pressure of Singapore's established higher education system. While it is not the goal of this dissertation to predict what the future will hold for SUTD, my on-campus experiences would have me believe that the current educational environment of SUTD – not quite traditionally Singaporean, but certainly not a carbon copy of MIT – is likely to persist, as long as international perspectives continue to be represented within the faculty and academic leadership. As I discuss in this manuscript, SUTD's recruiting practices for students, faculty, and staff has been one of the largest influences on the campus' evolution, and should the approaches to recruiting these stakeholders remain unchanged, I believe that these practices will also lead the campus to persist along its current course moving forward.

As described in the opening pages of this work, the primary motivation for this research was to understand how large-scale cross border partnerships develop, function, and evolve over time, with an emphasis on the role of local actors in shaping these collaborations. In particular, I sought to address the following research questions: *During the creation of a new cross-border higher education institution, how are the culture and identity of the sending institution: (a) communicated to and adopted at the new cross-border institution, and (b) adapted to fit the local cultural and educational context?* In this section, I seek to provide a brief synthesis of the findings corresponding to these particular lines of inquiry, in hopes of providing this dissertation's readers with clear and concise theoretical "takeaways" of this work.

First, the story described in these pages shows that although MIT faculty, staff, and students developed numerous mechanisms to communicate the culture and identity of the Institute to their counterparts in Singapore (as described in Chapter 3), the means of their contributions to SUTD can be summarized by six distinct *communication mechanisms*, as follows:

1. Setting of SUTD's curricular and academic vision;
2. Providing academic and research mentorship to SUTD faculty, particularly in areas with dedicated MIT faculty collaborators;
3. Prioritization of research;
4. Serving as a source of institutional identity and legitimacy, particularly in the SUTD's early years;
5. Recruiting and selecting SUTD faculty and students along shared MIT values; and
6. Exposing SUTD faculty and students to MIT's culture through inter-university exchange and training programs.

For each of these mechanisms of communication from MIT, SUTD actors in turn modified and adapted the institutional practices "sent" from MIT to fit the institutional and cultural realities of the Singaporean higher education context. These *adaptation mechanisms* are (with numbers corresponding to the communication mechanisms listed above):

1. Modifying the curricular and academic vision based on local priorities and expertise;
2. Incrementally adjusting academic practice in response to the needs of local students;
3. Aligning research endeavors with national priorities;
4. Incorporating local values and priorities as additional sources of institutional legitimacy;
5. Creating institutional narratives incorporating shared values and socializing new members within this value set; and
6. Selecting and adopting contextually appropriate practices.

As described in the early chapters of this manuscript, these processes of communication and adaptation themselves occurred within institutional, cultural, and individual-level frames that broadly shaped the MIT-SUTD partnership and the ways in which the above processes would ultimately take place. For example, the Singapore Government's institutional priorities regarding what programs should be offered by the fourth university largely dictated the curricular and academic vision set forth by the framers at MIT, which in turn affected how local actors modified SUTD's academic programs to fit their particular priorities and expertise. Similarly, the cultural priorities of the families of prospective university students in Singapore – particularly with regards to the importance of prestige and the economic returns of a university education – shaped how SUTD developed its institutional narrative, ultimately shifting away from its reliance on MIT and towards the financial successes of its graduates. Finally, given that the characteristics of the individual

faculty and students interested in joining SUTD were also unique in the broader Singaporean context, the values of innovation and boundary-breaking of those attracted to the institution inherently aligned with many of the values MIT framers sought to bring to the new university and were then perpetuated as new individuals were socialized into the organization. Figure 16 (below) illustrates how each of the communication and adaptation mechanisms described above fit into these three frames, as well as examples illustrating specific outcomes of each type of process.

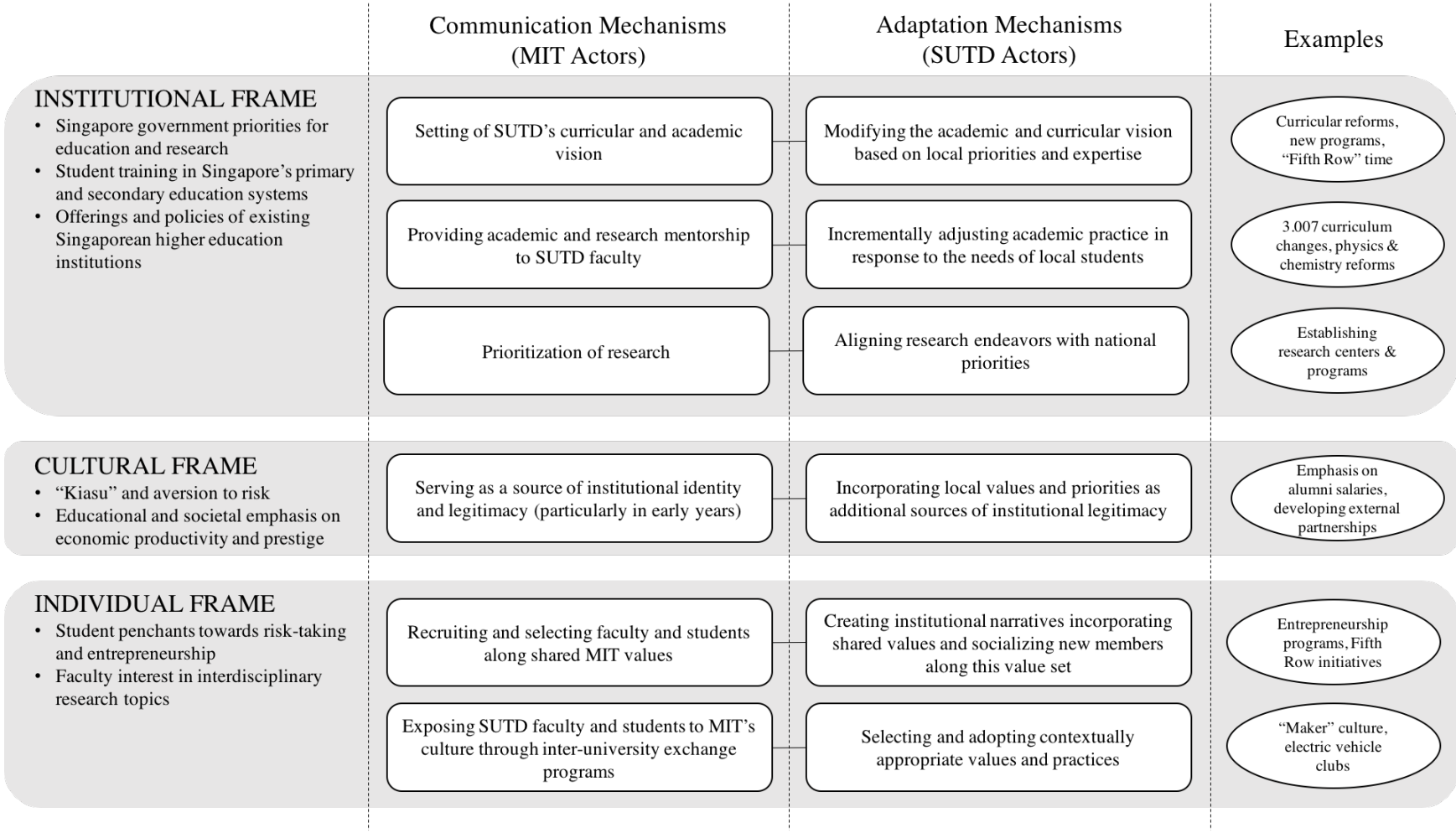

Figure 16. Cultural and identity communication and adaptation mechanisms evident within the MIT-SUTD Collaboration, within three contextual frames.

Additionally, as was described at length in Chapter 9, it is important to note that MIT stakeholders did not prioritize several important aspects of building a new university in developing their plans for SUTD, perhaps most significantly the design and operation of the university's permanent campus in Changi. While the communication and adaptation processes described above hold for those areas in which MIT planners developed strategies for SUTD, in low priority areas – such as the school's administrative bureaucracy – the university evolved essentially as a Singaporean institution, incorporating influences from the nation's existing universities and from the country's private sector (as described in Chapter 4). Thus, these aspects of the founding of SUTD do not fit into the broader framework of communication and adaptation illustrated in Figure 16 above, and should be considered as a separate process of home-grown institutional development.

While phenomenological understanding was the primary motivation for this dissertation work, I hope that future planners and administrators of cross-border higher education projects will also find practical lessons in the story presented here. While I believe that the history presented in these pages could inform future CBHE projects in myriad ways, I would urge higher education leaders contemplating these initiatives to consider a few lessons in particular:

1. **Different cultures understand the purpose of education differently, and these visions should be aligned across the two institutions participating in a CBHE partnership.**

As has been a constant refrain in this manuscript, Singaporean views of education are extremely pragmatic—in general, Singaporean society views the purpose of education as contributing to economic growth at an individual, family, or national scale. In the case of

the MIT-SUTD Collaboration, this view was inherently aligned with MIT's institutional values, which prioritize problem solving and betterment of the world through boundary-breaking science and technological advancement, the same types of innovation the Singapore Government seeks to promote through its higher education system. Without an inherent alignment between these values systems, I expect that the MIT-SUTD Collaboration would have been far less successful, instead being fraught with epistemological and philosophical arguments about the purpose of education, rather than constructive consideration of how to create educational programs that would directly benefit Singaporean society. When entering into a large, cross-border partnership, leaders of higher education institutions should reflect on their own institution's views on education as well as those of their potential collaborator to ensure that these values systems are compatible enough to create a functional collaboration with a clear sense of direction.

In addition to the importance of alignment in local and foreign approaches to education, local understandings of the values of higher education will also have significant impacts on a cross-border institution's ability to attract students (as described in Chapters 6 and 10). Before beginning to design academic programs for a cross-border institution, leaders in higher education must first understand demands of the local higher education market. In the SUTD case, for example, the Singaporean tendency towards risk aversion as well as declining trends in both the overall population and students' interest in engineering exacerbated the new university's challenges in attracting new students, factors that foreshadowed the institution's eventual lower-than-expected enrollments. While the strong salary figures for SUTD's first graduates eventually bolstered the university's enrollment and nationwide reputation, annual enrollment figures are still well below the institution's initial projections, largely due to these system-wide factors (as well as mandated limits on

international student enrollment). Thus, in future large-scale cross-border higher education projects, institutional leaders should carefully analyze the existing higher education market in the local country before deciding to undertake such a project, in an effort to ensure that the new institution will be successful in meeting market needs.

2. The most constructive cross-border collaborations stem from deep and longstanding involvement from the "sending" institution's faculty members.

As I spoke with SUTD faculty about their experiences with MIT, it quickly became clear that a few key faculty – including Arthur Foster, Joyce Williams, and a handful of others – had clear and lasting impacts on the SUTD curriculum and pedagogy, as well as strong and enduring relationships with their Singapore-based counterparts. Compared to many other faculty involved in the collaboration, these individuals went above and beyond what was expected when they original agreed to participate in the project—over the years, they made countless visits to Singapore, and continued to collaborate remotely with their SUTD counterparts even while based back in Cambridge. This commitment eventually grew to a sense of trust and respect for these individuals within the SUTD faculty, and the components of the collaboration under their purviews have been particularly fruitful and constructive as a result. In contrast, faculty in academic areas at SUTD with less committed counterparts at MIT felt more adrift, particularly junior faculty navigating the tenure and promotion process without local senior faculty to serve as mentors. Given these findings, when considering whether or not to engage in a CBHE partnership, higher education leaders should rigorously assess their institution's ability to devote faculty resources to such a project, as strong, time-intensive commitments on the part of faculty are likely to lead to the most constructive results. As the SUTD story demonstrates, the most productive collaborations stem from substantial investments from faculty and staff, and institutions

should therefore be prepared to devote significant faculty and staff resources to undertaking such a project.

3. Planners of CBHE projects should consider strategies to develop the new institution holistically, rather than with a sole focus on academics and research.

Understandably, as MIT faculty created a plan to develop a new engineering and design institution, they developed a framework oriented towards those aspects of a university with which engineering faculty are most concerned: faculty hiring, curriculum, pedagogy, and research. By focusing on these aspects, however, some important considerations in creating the new university were largely ignored, such as the staffing and leadership for the HASS Cluster (as described in Chapter 5), as well as the administrative organization of how SUTD would be run (as described in Chapter 9). Given this dynamic, these aspects of the university evolved on their own, becoming much more traditionally Singaporean than other aspects of the institution, often to the frustration of Western-trained faculty members used to less structured higher education institutions. Of course, there is nothing inherently wrong with Singaporean-style organizations (the country has become remarkably successful using these types of organizational models over the last 53 years); however, it would have been productive for MIT faculty to consider these aspects of the university organization more fully when creating their plan for SUTD. Thus, when engaging in cross-border projects, faculty planners should consider all aspects of the university when developing their plans—even if an institution deliberately chooses not to address administrative logistics in their project, leaders should expect local culture to impact the broader initiative through these seemingly small or less consequential components.

4. Many CBHE projects will eventually end, and plans should be created with such an outcome in mind.

During the over two years of negotiations to extend the MIT-SUTD agreement, I heard from stakeholders at both universities that an extension agreement between the two institutions would be reached in time. Ultimately, however, the partnership was not renewed (as described in Chapter 10), and as of June 2017 SUTD no longer branded itself as "Established in Collaboration with MIT." From the beginning, neither MIT nor SUTD stakeholders planned for the agreement to last in perpetuity; however, the reality of a complete break of academic ties in 2017 wasn't a serious consideration for many stakeholders in the early stages of the partnership. While the conclusion of the collaboration as it came to pass in 2017 won't be disastrous for either institution, earlier considerations of how the collaboration would end certainly could have saved time and energy – and prevented many administrative headaches – on both sides of the Pacific. Thus, higher education leaders considering such collaborations in the future should spend some time considering the possibilities that such projects might end sooner than necessarily anticipated, and developing contingency plans for such an eventuality.

As a final note, although some suspect that the "bubble" of international branch campus (IBC) development might experience an imminent burst, I suspect that higher education institutions will continue to cultivate overseas partnerships, up to and including the scale of the one described here. The lure of these collaborations is particularly strong for those American institutions fighting in the so-called "arms race" to provide luxurious services and myriad opportunities for students in an attempt to attract enrollees in a crowded higher education market (as well as to raise funds in times of shrinking higher education budgets). Furthermore, I suspect that these partnerships will begin to realign away from the established education hubs of Singapore, Qatar, and the Emirates, and towards the

developing world—this trend can already be seen in China, for example, which as of November 2016 surpassed the UAE as host to the largest number of IBCs of any country worldwide (Garrett, Kinser, Lane, & Merola, 2016). Should these trends continue, it will become ever more important to understand the nuanced ways in which cross-border educational partnerships function; as more and more universities begin to develop institutions in more and more countries, it seems inevitable that some combination of cultural misunderstanding and poor management will result in embarrassing closures reminiscent of Michigan State-Dubai and Tisch School of the Arts Asia (Dessoff, 2011; Schlanger, 2013). By understanding the ways in which local actors adapt foreign educational models to fit their specific contexts – as well as encouraging these adaptations as local actors seek to shape educational environments better suited for their students – institutions may be able to sidestep the issues that plagued these (ultimately) doomed branch campuses. Thus, I would hope that practitioners of cross-border higher education take the findings of this research to heart, and that strategies to facilitate localization in CBHE projects are encouraged rather than suppressed in the name of "quality assurance."

Of course, like any doctoral student, I also have aspirations that this work could influence many fields, including but not limited to the study of education. I suspect that the processes at play within the MIT-SUTD Collaboration, while situated in the field of cross-border higher education, may also prove relevant to other institutions operating in cross-national contexts. While higher education institutions have been profoundly impacted by the forces of globalization, they are by no means the only organizations operating in cross-national contexts today—thus, I would hope that the theory presented in this manuscript might also be applied to other multinational organizations such as nongovernmental organizations, international aid organizations, or multinational corporations. While

examining these settings was far outside of the scope of this dissertation project, future work might examine the applicability of the concepts described here to these other important contexts.

Appendix A: "Cast" of Characters

The list below contains the pseudonyms of the individual characters included in this manuscript (as well as the names of the SUTD founding president and Chairman of the Board of Trustees, who have not been assigned pseudonyms and are marked with asterisks). As described in this dissertation's introduction, the identities of these individuals have been concealed to the greatest possible extent, and in some cases these characters represent composites of several individuals involved in the creation of SUTD.

MIT Faculty, Staff, and Students

Dr. Thomas "Tom" Magnanti*
MIT Institute Professor
SUTD President, 2010 – 2017

Dr. Robert O'Malley
MIT Professor, Department of Mechanical Engineering
Cluster Lead (Sophomore Cluster), MIT-SUTD Collaboration

Dr. Arjun Bhat
MIT Professor, Department of Mechanical Engineering
MIT-SUTD Collaboration Director, 2010 – 2013

Dr. Arthur Foster
MIT Professor, Department of Mechanical Engineering
Cluster Lead (Freshman Cluster), MIT-SUTD Collaboration
MIT-SUTD Collaboration Director, 2013 –

Dr. Luis Sosa
MIT Professor, Department of Urban Studies and Planning
IDC Co-Director, 2011 – 2014

Dr. Jack Powell
MIT Professor, Department of Biology

Dr. Joyce Williams
MIT Professor, Department of Chemistry

Brian Zhang
Master's Student, MIT Technology and Policy Program
Research Assistant, SUTD-MIT International Design Centre

SUTD Trustees, Faculty, and Staff

Philip Ng*
Chairman, New University Steering Committee, 2008 – 2009
Founding Chairman, SUTD Board of Trustees, 2009 – 2016

Dr. Guo Wei Xun
SUTD Provost, 2010 – 2017
SUTD Acting President, 2017 –

Dr. Lee Yam Keng
SUTD Associate Provost for Education, 2010 –

Dr. Andrew Meyer
Pillar Head, Engineering Product Development, 2010 – 2017
Co-Director, SUTD-MIT International Design Centre, 2010 –

Dr. Frank Jacoby
Pillar Head, Engineering Systems and Design, 2016 –

Dr. Peter Eide
Cluster Head, Humanities, Arts, and Social Sciences, 2014/15 – 2016

Ang Chok Tong
Senior Director, Office of Campus Infrastructure & Facilities, 2009 –

Sylvia Low
Senior Director, Marketing and Communications, 2009 –

Marjorie Patel
University Librarian, 2011 –

Dr. Carsten Hopfeller
Assistant Professor, Engineering Product Development

Dr. Elena Lipohar
Assistant Professor, Humanities, Arts, and Social Sciences

Loke Jia Hao
Professor, Architectural Systems and Design

SUTD Students and Alumni

Shafiq Abdul Rahman
SUTD Pioneer, Class of 2015 (EPD)
House Guardian

Rachel Chua
SUTD Pioneer, Class of 2015 (ISTD)

Jacob Lim
SUTD Pioneer, Class of 2015 (ASD)
Campus Builder

Yap Jun Kai
SUTD Pioneer, Class of 2015 (EPD)
Campus Builder

Appendix B: List of Acronyms and Abbreviations

A*STAR – Agency for Science, Technology, and Research
Aircon – Air Conditioning
ALP – Asia Leadership Programme
ASD – Architecture and Sustainable Design
AUD – Australian Dollar
CBHE – Cross-Border Higher Education
CCA – Co-Curricular Activity
CEUS – Committee on the Expansion of the University Sector
CMI – Cambridge-MIT Institute
CREATE – Campus for Research Excellence and Technological Enterprise
DDP – Dual Degree Programme
EC – Education Committee
EDB – Economic Development Board
EHS – Environment, Health, and Safety
EPD – Engineering Product Development
ESD – Engineering Systems and Design
F&B – Food and Beverage
Fab Lab – Fabrication Laboratory
FinTech – Financial Technology
GCE – General Certificate of Education
GIR – General Institute Requirement
GLP – Global Leadership Programme
HASS – Humanities, Arts, and Social Science
HDB – Housing Development Board
HR – Human Resources
IAP – Inter Activities Period
IB – International Baccalaureate
IBC – International Branch Campus
IDC – International Design Centre
IIT – India Institute of Technology
INSEAD – l'Institut Européen d'Administration des Affaires
IRB – Institutional Review Board
ISTD – Information Systems Technology and Design
ITE – Institute of Technical Education
JC – Junior College
LC – Learning Catalytics
KPI – Key Performance Indicator
LO – Learning Objective
MISTI – MIT International Science and Technology Initiatives
MIT – Massachusetts Institute of Technology
MO – Measureable Outcome
MOE – Ministry of Education
MPP – MIT-Portugal Program

MRT – Mass Rapid Transit
NRF – National Research Foundation
NS – National Service
NTU – Nanyang Technological University
NUCom – New University Steering Committee
NUS – National University of Singapore
NYU – New York University
OGL – Orientation Group Leader
OSL – Office of Student Life
PAP – People's Action Party
PM – Prime Minister
Poly – Polytechnic
PR – Permanent Resident
PSLE – Primary School Leaving Examination
RA – Research Assistant/Assistantship
SI – Student Initatives
SIT – Singapore Institute of Technology
SMA – Singapore-MIT Alliance
SMART – Singapore-MIT Alliance for Research and Technology
SMU – Singapore Management University
STEM – Science, Technology, Engineering, and Mathematics
STEP – SUTD Technology Entrepreneurship Programme
SUTD – Singapore University of Technology and Design
TEAL – Technology Enhanced Active Learning
TLL – Teaching and Learning Laboratory
TPP – Technology and Policy Program
TTT – Teach the Teachers
UNSW – University of New South Wales
UPOP – Undergraduate Practice Opportunity Program
UROP – Undergraduate Research Opportunity Program
US – United States
ZJU – Zhejiang University

Appendix C: MIT, SUTD, and Me – My History with the MIT-SUTD Collaboration

I first heard of SUTD in the fall of 2011, when, as a first-year student in the MIT Technology and Policy Program, I attended an information session for the MISTI exchange program described in Chapter 8. Embarrassingly, as I walked into the large MISTI conference room in MIT building E40 that day, I had little idea as to where Singapore was located on a map (at least as far as I can recall) or what MIT might be doing there—rather, I was drawn to the event simply due to the fact that it was for a funded international exchange opportunity (and that the evening's information session would have a free dinner of Bertucci's pizza, of course). At the session itself, I listened with interest as MISTI and MIT-SUTD Collaboration staff described how those selected for the program would be spending their summers helping to create a new university, regretting that my then-RA position was unlikely to allow me to participate in such a program.

Through a series of chance conversations and some initiative on my part, that session in time led to a meeting with the then-director of the MIT-SUTD Collaboration (referred to in this manuscript as Arjun Bhat), who in fall 2011 was looking for a graduate student RA to help run that summer's inaugural MISTI program, scheduled to take place from June to August that year. In addition to the MISTI role, this student would also be responsible for supporting the SUTD pioneers (from afar) as they began to establish the Fifth Row at SUTD, as well as lending a helping hand to the MIT-organized inaugural SUTD entrepreneurship program (and any other tasks that might arise—at this point the collaboration was an all-hands-on-deck, start-up affair, after all). In our hour-long meeting, Arjun painted an incredible image of what SUTD could become and the role that I could have in that initiative, essentially asking me – a 22-year-old straight out of the University of Michigan – if I wanted to help start a new university[165].

Although I think that I managed to play it fairly cool in response to this incredible opportunity, I nearly immediately accepted this offer, resigning from my previous RA position and setting to work recruiting and training the 18 MIT undergraduate and graduate students who would accompany me to Singapore as participants in the inaugural MISTI program. Along the way, I recruited an acquaintance from Michigan as a co-facilitator of the "Fifth Row Leadership Programme[166]" we planned to execute in Singapore, and departed the United States in early June 2012 for a country I had never visited, with a vague plan as to how I could help set up a university with the "DNA of MIT" (an institution with which I

[165] If memory serves, I believe that Arjun even suggested that if I played my cards right, my name could end up in the SUTD fight song or in the name of the campus secret society. Sadly, I do not believe that either of these predictions ever came to be (not for a lack of trying on my part).

[166] I remember being – at the time – particularly proud of the fact that I remembered to spell it "programme" with the extra "m-e" (in the British – and subsequently Singaporean – tradition).

had eight months of actual, in-person experience). In those early days, I paid little if any heed to the cultural differences I would face after arriving in Singapore, simply believing those with experience in the country that it was "very Western" and that I would feel extremely comfortable living and working there.

Of course, upon actually arriving in Singapore, I faced challenges that I clearly should have considered before departure, struggling as I attempted to run an exchange program populated by participants essentially my own age in a national environment with which I had so little familiarity. In particular, I felt a visceral discomfort as I stood at the front of a large room of Singaporean students, guiding them on how to be leaders using my American understanding of the term, the only understanding I had in my arsenal at that point in time. As that first summer in Singapore progressed, I did my best to incorporate Singaporean perspectives as much as I could, but lingering questions remained: Were we the right people to be teaching these students what it meant to be a leader? Who was advocating for this vision to be brought to – or perhaps even thrust upon – these students? Was our vision of leadership even relevant to Singapore, and if it was, could it ever take hold in a culture so different from that of the United States? In time, it was these questions that led me to pursue my doctoral work at the Harvard Graduate School of Education, and this dissertation is in many ways my (very long) attempt at addressing my uncertainty in these early days at SUTD.

It is worthwhile to note that my formal involvement with the MIT-SUTD Collaboration did not end upon my graduation from MIT in June 2013—in the summer of 2013, I served as an instructor in the first iteration of the GLP exchange program at MIT, and in 2015 and 2016, I returned to the collaboration once again to coordinate the final iteration of MISTI in the summer of 2016, overlapping with the first few months of my data collection in Singapore. Unfortunately, an unforeseen health crisis (only discovered thanks to the thoroughness of the Singaporean visa application process) kept me from fulfilling my charge of seeing the MISTI program through to its conclusion in August of that year, although I remained connected to this program remotely as best I could. It was only in early September 2016 – when I returned, fully recovered, to Singapore to begin my data collection in earnest – that I first stepped onto SUTD's campus without a formal affiliation with MIT, setting out to build an identity on campus separate from my formal role with the Institute. Thus, while most ethnographers will struggle with their position as both insider and outsider to the cultures or organizations they study, I was faced with this dichotomy beginning on the day I first conceptualized this project, and have struggled to resolutely define the nature of my relationships to both MIT and SUTD ever since.

Through all of these formal experiences as an MIT-SUTD Collaboration employee – as well as informal interactions outside of my formal role, particularly during my period of data collection – I forged close bonds with both MIT and SUTD affiliates. In many ways, I feel greatly indebted to these individuals—on the MIT side, thoughtful faculty and staff members provided me with incredible opportunities to learn, grow, and experience the world firsthand, while at SUTD, individuals opened their organization and their lives to me when they had so little to gain in return. Thus, as I constructed the findings of this research, I often found myself attempting to paint all aspects of the collaboration in the best light possible, in an effort not to disserve those that had taken such a risk inviting me into their communities; at the same time, however, I also felt a responsibility to attempt to document

the struggles and frustrations many have felt during the process of developing SUTD. This dissertation is likely an imperfect reconciliation of these two tendencies, and while some might be frustrated by the results, I have done my best to – whenever possible – tell as many sides of the story as I can, including the rationales of the various actors involved. In particular, I spent a great deal of time trying to understand and communicate the Singaporean perspective as best I could, and I hope that I have presented a fair characterization of a country and a culture that I have come to deeply respect.

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