

design thinking — towards a new perspective

Matthias Hillner^a, Stanley Lim^b

^a Royal College of Art, London; ^b LASALLE College of the Arts, Singapore

In his keynote speech at the Design Management Institute conference in London in 2015, Richard Buchanan, professor of design, management, and information systems at the Case Western Reserve University in the USA, distinguishes between design thinking as “a cognitive decision-making process” and design thinking as “a spirit that permeates a culture or an organization”.

This paper examines design thinking in Singapore through investigating the way in which three of the country’s most critically acclaimed design firms, FITCH, IBM iX and Chemistry, have adopted and adapted design thinking principles in different contexts: retail design, systems design, and social design. The methods used here can be linked to the design thinking methodology as incepted by Stanford University’s Hasso Plattner Institute of Design, also referred to as d.School. The pragmatic characteristics of d.School’s design thinking process makes it easy to adopt. However, the key question which this paper will raise, is whether or not design thinking can unite a greater range of stakeholders in Singapore, given that the country’s Ministry of Communications and Information has elevated design as a key driver through the Design 2025 Master Plan which was issued in 2015. This initiative builds on the other definition of design thinking, the notion of a spirit. This paper discusses how expanding the collaborative attitudes within culture and society can potentially promote design thinking as a ‘spirit’ within a nation. Could design thinking be reframed to become a language-like concept that connects people and societies in their shared ambition to shape future lives? What are Singapore’s prospects with respect to this endeavor?

Keywords: *interdisciplinary, innovation, design management, design teaching, methodology*

Introduction

Interdisciplinary Clusters were first introduced at LASALLE College of the Arts' Faculty of Design in August 2016. The objectives of this initiative were "a) to foster research-led ideation and expand on the design process, b) to negotiate broader views [on design] and extend knowledge into other discipline areas, c) to contextualize and reframe design in a larger context and d) to facilitate collaborative work." (LASALLE College of the Arts, 2016, p. 3) To those ends the Faculty devised projects that engaged students from different disciplines. During the second iteration of the Clusters initiative, second-year students from the BA(Hons) Design Communication, Product Design and Interior Design programmes worked in interdisciplinary groups to tackle selected Royal Society of the Arts (RSA) Student Awards 2017 briefs. The briefs required that students demonstrate their understanding of design thinking by implementing relevant methodologies in their design process. d.School's design thinking methodology was introduced to students through workshops and class exercises and in addition to that, the programme sought to broaden students' understanding of design thinking by working with various companies who have deployed design thinking in their work. The goal to work with various industry partners was two-pronged, for students and the teaching team. For the students, it was an opportunity to better understand how design thinking methodologies facilitate innovative industry practice. As for the academic team, the hope was that a clearer understanding of how design thinking is deployed in the industry, can facilitate more critical and insightful discussions on how best to teach design thinking in the curriculum. The programme worked with FITCH, IBM iX and Chemistry.

This paper discusses the similarities and differences between the deployment of the design thinking methodologies in these three companies, and it does so by comparison to the methodology proposed by d.School. Thus it provides insights that are hoped to encourage further developments in the context of design thinking.

The Rise and Challenges of Design Thinking in Singapore

Design thinking has been championed and promoted as an approach to innovation that businesses can build upon. In Singapore, this charge has been led by the DesignSingapore Council. Established in 2003 as part of the

Ministry of Communications and Information, its mandate is to develop the nation's design sector and industry. The Council regards Singapore's growth in the design sector as a key contributor to the nation's economic and social success: "design will be [our companies'] strategic tool for winning in the marketplace, bringing Singapore to the forefront of the global economy." (DesignSingapore Council, 2016, p. 13) Under its 15 recommendations listed in the Design 2025 Masterplan, the introduction of design thinking to businesses and government have been identified as a key strategy: "Increas[ing] the knowledge and practice of design thinking [and] developing a people-centred design and innovation strategy will elevate organisations towards providing differentiated products and delightful user experiences." (DesignSingapore Council, 2016, p. 31) It further states that, "it is recommended that design thinking and related design courses continue to be offered to public servants to cultivate people-centred design in policy development and problem-solving." (DesignSingapore Council, 2016, p. 32)

The DesignSingapore Council formalized a committee, the Design Thinking & Innovation Academy (DTIA), to manage this key strategy of introducing design thinking. DTIA have organised workshops with various partners to offer training in design thinking as well as special design thinking themed events, such as the recent Innovation by Design Conference 2017, with the objective to "present opportunities for participants to meet and network with leaders in the fields of design, technology and innovation, design thinking, customer experience, human behaviour and organisation transformation." (DesignSingapore Council, 2017) Straits Times, the nation's highest-selling paper, reported in March 2016 that "nearly 9,000 business professionals, educators and students have benefited from design thinking seminars and workshops, according to the DesignSingapore Council." ("Promoting competitiveness through design", 2016, March 15) In 2010, tax incentives were even introduced to provide deductions for businesses adopting design thinking. (Chua, 2010)

Laura Mata Garcia (2012, p. 160) warns that, "The planning and execution of an appropriate design strategy is crucial in order to maximize the potentialities of an organization's design assets. However, many cognitive biases about design and its role in the organization still remain for many managers and decision makers." With such a large interest in design thinking, it can be argued that there will be a reasonably high uptake of the methodology by businesses. However, Carlgren, Elmquist and Rauth (2013,

p. 1) stated that, “indications suggest that firms find implementation [of design thinking] challenging.” In an earlier paper, Carlgren et al. state that “DT [design thinking] is described as a user-centered approach to innovation inspired by designers’ mindset and ways of working. It is argued that this idea (or idealistic way of working) can be applied to any type of organization, and for any type of application when there is a need for increased innovativeness.” (Carlgren, Elmquist and Rauth, 2013, p. 2) This is a problematic starting point and assumption for businesses looking to implement design thinking because it suggests a one-size-fits-all approach, ignoring the fact that each business is unique, with its own specific constraints and particularities. It is likely that businesses who are sold on the benefits of design thinking are also hoping to reap immediate financial benefits which can lead to an overzealous implementation of the design thinking without careful consideration. This coupled with the assumption that design thinking is a methodical framework that can be applied instantly, can account for why Carlgren et al. believe that firms find implementation of design thinking challenging (Carlgren, Elmquist and Rauth, 2016). This is especially true if the methodical framework is fundamentally different from the existing working processes and culture in these businesses. Kimbell argues that the successful implementation of design thinking is contingent on a culture that fosters it: “The adoption of design thinking into management education, for example, in the form of tools and methods separated from the culture of design, may not have the desired results.” (Kimbell, 2012, p. 143)

This paper discusses a number of businesses who have succeeded not only in implementing design thinking methodologies, but also in adapting those to suit the nature of their businesses.

Approaches to design thinking

D.School

Stanford University’s Hasso Plattner Institute of Design, commonly known as d.School, is one of the leading institutions offering courses in design thinking. Plattner (2011) posits that the teaching of collaboration is a focus in the curriculum. The methodology is broken down into five modes or stages (d.School, n.d.):

- *Empathize* – This stage concerns itself with the understanding of design challenges as faced by people. This human-centred focus leads to insights into physical or emotional needs, in the context of the design problem or challenge through activities such as observations and interviews.
- *Define* – This draws upon the insights gained in crafting an “actionable problem statement” (d.School, n.d.), also known as a point of view. Findings from observations and engagement with people are synthesized into a focused statement that will provide direction for the next stage.
- *Ideate* – This mode focuses on idea generation to address the challenges defined in the problem statement. The goal is not to arrive at one solution but many, providing a range of ideas for consideration.
- *Prototype* – It begins with the construction of low-resolution artefacts for quick assessment of functionality and feasibility in addressing the challenges of the design problem. Prototypes can be improved iteratively to achieve a more refined solution.
- *Test* – Here is an opportunity for the prototypes to be assessed in a real-life context of the design problem. Users will be encouraged to trial the prototypes and to create new experiences that can serve as learning points for further iteration of the solutions. If the solutions are not ideal, participants will revisit the Ideate or Prototype mode to either reconsider the challenges and generate new ideas, or improve on the prototypes.

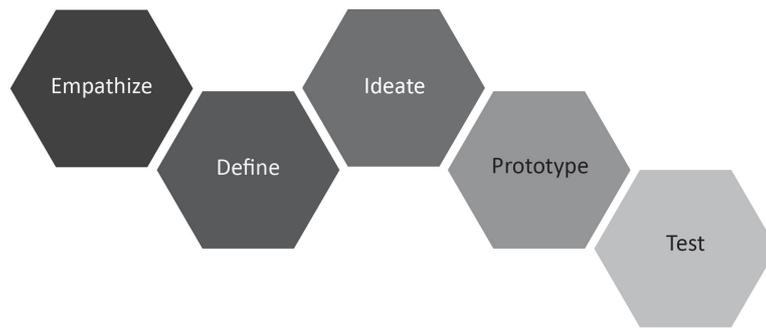


Figure 1 a typical visual representation of the progression and relationship between the five modes of d.School's design thinking methodology.

The d.School design thinking methodology was identified as a good starting point for the curriculum by the BA(Hons) Design Communication programme at LASALLE as its online resources are abundant, with suggested exercises and tools available. The proposed exercises and stages also offer sufficient flexibility for curriculum managers to adapt to the projects on hand. The documents are distributed under the Creative Commons Attribution-ShareAlike license, allowing programme managers to tweak and build upon them.

IBM iX Singapore

IBM iX (Interactive Experience) understand themselves as more than an agency but a next-generation service entity. The solutions offered range from Strategy, Creative, Analytics to Platforms, Cloud Business Solutions as well as Management and Operations. (IBM iX Singapore, n.d.) As a multinational corporation with over 30 branches all over the world, Business Insider reported that IBM iX employ over 10,000 professionals in interdisciplinary teams. (O'Reilly, 2016) In the same article, Paul Papas, global leader for IBM iX added that they have "taken the Stanford School of Design method and tailor[ed] it into something it calls IBM design thinking." (O'Reilly, 2016) The IBM design thinking methodology is grouped into two models known as the *Loop* and the *Keys*. Represented as a möbius strip, the

Loop is a workflow and is a “continuous cycle of observing, reflecting, and making.” (IBM, n.d.) The three stages are this model are:

- *Observe* – IBM believes that breakthrough ideas are born from a thorough understanding of real-world problems. This stage requires participants to observe users to uncover needs, understand context and to obtain feedback.
- *Reflect* – With data gained from the observation mode, participants are required to reflect and synthesize ‘aha’ moments. There is a focus to work with other participants to build upon gathered data and to plan ahead to commit to potential ideas.
- *Make* – This next stage gives form to potential ideas by prototyping ideas and communicating their values. Participants are encouraged to explore outrageous and adventurous ideas.

The next model of the methodology, *Keys*, focuses on project and team management. The following three keys are closely aligned with the three stages of the *Loop*:

- *Hills* – They are a written statement of intent to communicate the focus of a project. The statement should clarify the goals that address the *Who* (users), *What* (user needs) and *Wow* (measure of success). The *Hills* galvanizes and aligns the project team.
- *Playbacks* – They are moments of team management where stakeholders or team members are brought together for feedback. This is akin to a time-out in basketball games where the players and coaches regroup and remind each other of what has been achieved and to realign expectations. The *Hills* are often referred to as they provide direction for the team.
- *Sponsor Users* – They are carefully selected members of the audience, who are often expert users in the area of interest, to trail prototypes and provide feedback. *Sponsor Users* are earmarked based on a careful assessment of the objectives detailed in the *Hills*. Following the feedback, *Sponsor Users* work collaboratively with the project team to improve on the outcomes.

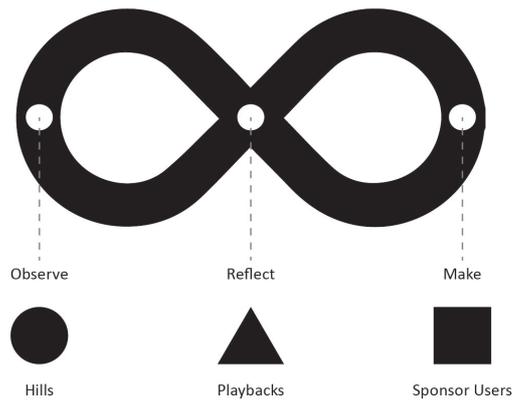


Figure 2 the six stages of IBM design thinking

The inclusion of team and projection management stages, i.e. *Hills*, *Playbacks* and *Sponsor Users*, works in conjunction with the *Loop*. The *Observe*, *Reflect* and *Make* stages are conducted in a cyclical and iterative fashion, with *Hills*, *Playbacks* and *Sponsor Users* operating at regular intervals.

FITCH Singapore

FITCH is one of the world's leading retail and branding agency and the unit based in Singapore have been providing consumer-centric services to clients for more than 10 years. There are around 15 employees specializing in retail experience design. The company recognises that the retail shopping experience has changed in recent times with e-commerce. What used to be a straightforward customer journey now goes on detours and turns: "What was once so SIMPLE – 'I'm just popping out to the shops' is now infinitely splintered. Shopping is anywhere and everywhere." (FITCH, 2015) Through research FITCH developed a proprietary design thinking methodology called the 4D Process™:

- *Discover* – This is the research stage when team members model the aforementioned splintered consumer experience. This is done using another FITCH tool called the Mindstate Mapping™, which will be

covered further down. The objective of this stage is to establish the current consumer experience of a given brand, product or experience.

- *Define* – Following insights gained from the Mindstate Mapping™ tool, team members begin to ‘identify weaknesses, missing links and new opportunities for development.’ (FITCH, n.d.) The goal of this stage is to agree on a ‘Big Idea’ that guides the new retail experience.
- *Design* – Team members begin proposing and designing ideas for the new retail experience with the ‘Big Idea’ as a guiding principle.
- *Deliver* – This is the implementation stage where design solutions are finalized and implemented to reach the target consumer.

The *Discover* stage of the methodology is guided by a proprietary tool that allows team members from FITCH to do a complete assessment of the current retail experience of a given brand, product or experience. The assessment takes the team members into various phases of making a purchase to consider the various decisions. This tool, known as Mindstate Mapping™ takes into account four different stages:

- *Dreaming* – Shoppers in this mindstate are looking for “ideas and inspiration [without] fully defined needs and wants.” (FITCH, 2015) This mindstate challenges the designer to consider the various activities and attitudes shoppers have when they are looking for ideas or inspiration with respect to a particular brand or product. By studying typical activities and attitudes, new opportunities may arise for designers to leverage on and direct shoppers to focus their attention on their brand, product and/or service. The Dreaming state can take place in non-retail environments, where a product, activity or behaviour can trigger a temptation to purchase something.
- *Exploring* – *Once shoppers are inspired to make a purchase, they enter the Exploring stage where they have a category-specific purchase in mind but they have yet to decide on any particular brand, product and/or service. At this point, they can be easily*

influenced. Typical activities for this point include browsing (both online and offline) and asking for opinions regarding potential purchases.

- *Locating – At this state, a specific brand, product and/or service has been decided on. A consumer is actively searching for a product or model they have in mind. This can be in a physical environment such as a shopping mall or supermarket but online searching is becoming more prevalent.*

The three stages of the Mindstate Mapping™ are shared across all FITCH agencies across the world. The FITCH Singapore team however, believes there is another mind state to consider, after a consumer purchases a product or service. They termed this state, *Achieving*.

- *Achieving – The FITCH Singapore team believes that the post-purchase experience is not to be ignored because successful after-sale engagement can ensure that the consumer returns. Designers need to consider how a brand, product or service can provide excellent after-sales advice, building and connecting consumers to a community of consumers, and help them get the most out of their purchase. The long-term goal is to ensure that consumers become loyal to the brand, product or service, which can lead to future sales or word-of-mouth exposure.*



Figure 3 the four stages of FITCH Singapore's design thinking (top) and the Mindstate Mapping™ (bottom)

The 4D Process™ is fairly systematic in its approach, with an emphasis on the *Discover* stage of the process through the DELA Mindstate Mapping™.

Chemistry Singapore

Based in Singapore and established in 2000, Chemistry is a design consultancy that “appl[ies] a systematic approach to problem solving, using design as a strategic tool to help organisations foster innovation and create compelling customer experiences.” (Chemistry, n.d.) The consultancy employs about 10 designers and have developed solutions through human-centred insights for companies in healthcare, hospitality and consumer electronics. Their work with the government agencies in Singapore focuses on social design. The company also conducts design thinking workshops with government agencies, companies and educational institutions.

Bassam Jabry, Partner and Managing Director of Chemistry, believes the company’s design thinking methodology comprises three core principles:

- *Human-Centred and Empathic* – There is a focus on developing an understanding of human needs and this is achieved through qualitative research methods.
- *Cross-Disciplinary and Collaborative* – Chemistry believes that design thinking is at its most effective when it is cross-disciplinary. New possibilities and ideas are birthed from thinking outside established boundaries. (Jabry, 2016)
- *Iterative and Experimental* – This principle informs Chemistry’s approach of arriving at design solutions, one that iterates through prototypes.

Chemistry’s design thinking methodology can be articulated in four stages:

- *Human-Centred Research* – At this stage, qualitative research methods are used to build empathy with various stakeholders to discover issues and insights surrounding the challenges or problems that they face. Ethnographic research is conducted through observations, shadowing and interviews for Chemistry’s team members to establish first-hand knowledge of the human experience. Karin Aue, Partner and Design Director of Communication and Experience Design with Chemistry explains: “This form of research allows us to uncover insights around what motivates our users, their worries, aspirations and the thought

processes behind their actions, or non-actions.” (as cited in Koh, 2013, p. 55)

- *Ideation* – This stage requires team members to possess the “[...] ability to think freely, translating those people insights into new ideas.” (Jabry, 2016) Chemistry believes that having a cross-disciplinary team with diverse life-experiences can be catalyst for developing novel and effective ideas. (Leong, 2014)
- *Iterative Prototyping* – Shortlisted ideas are prototyped in a rapid fashion as they go through iterative rounds of improvement. The goal of this stage is to constantly refine on the design solutions as a proof of concept quickly by “giving them room to grow, and sometimes fail, allow[ing] them to evolve into a robust solution that can be implemented.” (Jabry, 2016)
- *Implementation* – During this stage, the most promising ideas are finalised and put to the test within their respective context. Selected solutions are implemented and take on the form of multiple platforms and media in line with cross-disciplinary makeup of the Chemistry team.

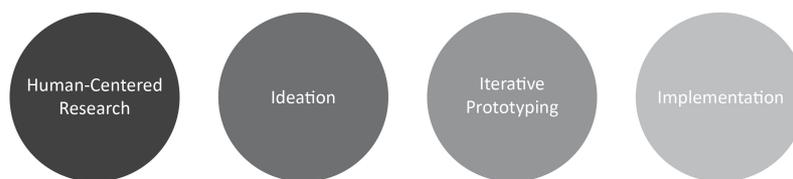


Figure 4 the four stages of Chemistry's design thinking methodology

Similarities and Differences

It can be argued that the d.School methodology presents a fundamental structure that can be built upon. That is not to say that the methodology is not comprehensive. As an academic institution offering design thinking courses, its methodology needs to be adaptable to a large variety of conditions. This flexible nature makes it ideal to compare the various approaches of design thinking against it.

In figure five, the stages of the earlier mentioned approaches of design thinking are mapped against d.School's methodology to highlight their relationship with each other.

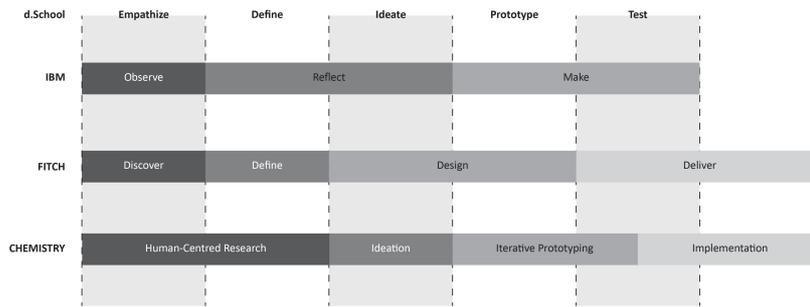


Figure 5 the various approaches to design thinking in comparison to the five steps of the d.School design thinking process

Design Thinking in Singapore

During a presentation at Singapore DesignWeek, Neal Cross, Managing Director and Chief Innovation Officer of DBS Bank explained that “If you do not deploy design thinking, you are working for yourself.” (Neal Cross, 2017) None of the other presentations related to design thinking went beyond the notion of design thinking as a method of collaborative ideas processing.

Richard Buchanan, professor of design, management, and information systems at the Case Western Reserve University in the USA, takes the notion of design thinking further than the co-creative concept. According to Buchanan, design thinking can be defined in four fundamentally different ways:

1. An imaginative act
2. A cognitive decision-making process
3. A spirit that permeates a culture or an organization
4. A discipline or a practice

Buchanan, keynote speech DMI, London, 2015

All of the methods discussed in the previous two sections as well as Cross' concept can be linked directly or indirectly to the design thinking method that was once incepted by Stanford University's Hasso Plattner Institute of Design, which falls into the second category articulated by Buchanan. This logical step-by-step process is very useful. It can be taught, practiced and shared amongst designers and non-designers. The kind of design thinking, which Buchanan promotes, the third option listed above, does not necessarily contradict this paradigm, but it transcends it. Design thinking becomes part of a culture. But how can this be achieved?

Singapore recognises the benefit of innovation for culture and society as well as for the local economy. In their ambition to foster an innovation-driven economy, the Design 2025 Committee have identified '5 strategic thrusts' (see figure 6). Fifteen specific recommendations are distributed in line with these five action points. The agenda is supposed to have been fully rolled out by 2025.

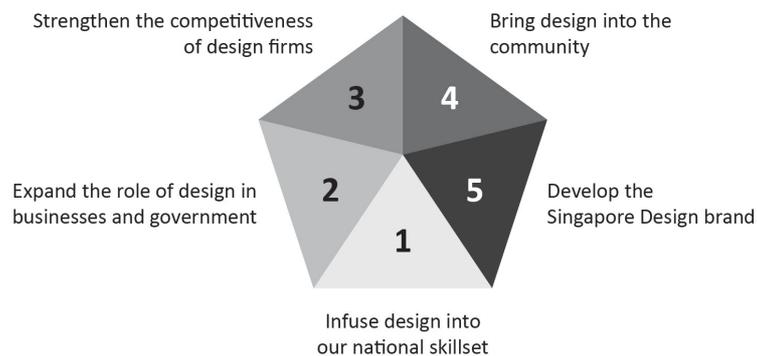


Figure 6 five action points to promote design in Singapore

Singapore's 2025 Masterplan is aimed at spreading design awareness, sensitivity and creativity amongst its future generation of decision makers. Community engagement projects help to raise awareness for the significance of design within the public. Engaging in design at business management and government level helps to promote design(ery) thinking in sectors which are not design-led by default. Teaching design as well as

design thinking at secondary school level fosters awareness for and curiosity about design amongst future generations.

What might potentially happen in Singapore, is that design thinking is elevated from a method or a methodology to an ethos. Instead of being used simply as a tool that is deployed momentarily, it becomes something that pervades the thinking of a majority of Singaporean citizens. No longer just a series of activities to be conducted in prescribed order, design would then become an undercurrent, a shared attitude that guides people’s decision making. Design thinking then becomes common place. That, at least, is the hypothesis.

But what is the critical difference between design thinking as a method, and design thinking as an ethos? The authors of ‘Design Thinking for the Greater Good’ may help to find an answer to this question. They connect design thinking with social design on the one hand, and with the notion of the citizen designer on the other.

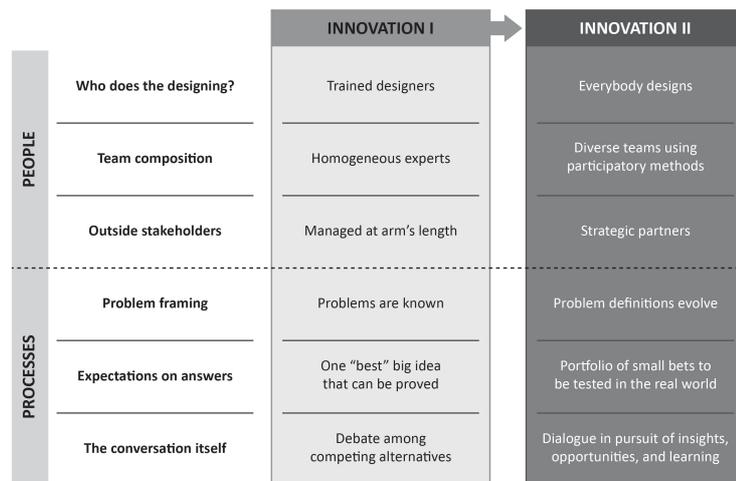


Figure 7 the shift from Innovation I to Innovation II according to Liedtka et al.

According to Liedtka et al. the innovation processes that are exclusive to trained designers constitute “an outmoded tool kit premised on predictability and control” (Liedtka et al., 2017, p.5) The authors highlight

that challenges in the social sector require the active engagement of non-designers, and a co-creative approach. As a consequence, design thinking is now being spread across “charitable foundations, social innovation start-ups, global corporations, national governments, and elementary schools” (Liedtka et al., 2017, p.6). This leads to a democratisation of innovation which Liedtka and her co-authors refer to as *Innovation II* (Liedtka et al., 2017, p.7). Social innovation challenges are complex, and require a speculative design approach. *Innovation II* is not a finite process, but an ongoing engagement with social issues.

Liedtka et al. argue that design thinking in the context of *Innovation II* encourages “distinct shifts in mindsets and behaviours” (Liedtka et al., 2017, p.8). So can design thinking be seen as a language-like concept that connects people and societies in their shared ambition to shape future lives? Considering the fact that language can be defined as an articulation of thought that allows people to exchange ideas and concepts, one would be inclined to say yes. But rather than an articulation of thought, design thinking might be the thought itself. Then again, how do we draw the line between language and thought, if that is possible at all? In relation to design, our thoughts are now being reframed through a new paradigm, and it is this new paradigm that reshapes attitudes and behaviours, and it potentially connects people. The difficulty with multiple concepts of design thinking spread across society, is that design thinking can divide people as much as it may connect them, not dissimilar to language itself. Whether or not design thinking will unite people in Singapore or elsewhere depends on how relevant principles are framed, articulated, and implemented. We may argue that design thinking per se does not constitute a language. It is a concept that needs reasonably coherent articulation and continuous discourse in order to prevail as a connecting framework. It then becomes a way of thinking that enables people to enhance their lives and that of others.

Acknowledgements: *We would like to thank Stefan Hirsch from IBMiX, Karin Aue and Nicholas Loke from Chemistry, as well as Andrew Crombie, Kristian Jones, and Gene Wang from FITCH.*

References

- Carlgren, L., Elmquist, M and Rauth, I. (2013): Perceptions of the value of design thinking in innovation in large firms. Paper presented at Crafting the Future - 10th European Academy of Design Conference, Gothenburg, Sweden. 2013. Retrieved August 15, 2017, from:
http://meetagain.se/papers/three/perceptions_of_the_value.pdf
- Carlgren, L., Elmquist, M and Rauth, I. (2016). The Challenges of Using Design Thinking in Industry - Experiences from Five Large Firms. *Creativity and Innovation Management*, Vol. 25, Issue 3, pp. 344-362. John Wiley & Sons.
- Chemistry. (n.d.). *Chemistry is an award winning Innovation Design Consultancy, based in Singapore*. Retrieved August 15, 2017, from:
<http://www.chemistryteam.com>
- Norman, D. (2010, 20 Jan 2011). Why Design Education Must Change. *Core77*. Retrieved 20 Jan, 2011, from
http://www.core77.com/blog/columns/why_design_education_must_change_17993.asp
- Chua, T. (2010). *Singapore implements new tax incentives for design innovation*. Retrieved July 5, 2017, from:
<http://sbr.com.sg/manufacturing/news/singapore-implements-new-tax-incentives-design-innovation>
- d.School. (n.d.). *An Introduction to design thinking PROCESS GUIDE*. Retrieved July 4, 2017, from: <https://dschool-old.stanford.edu/sandbox/groups/designresources/wiki/36873/attachments/74b3d/ModeGuideBOOTCAMP2010L.pdf>
- DesignSingapore Council. (2016). *Design 2025*. Retrieved July 4, 2017, from:
https://www.designsingapore.org/~media/corp/media%20release/media%20release%20-%20design%202025%20masterplan%20-10%20mar%202016_final_.pdf?la=en
- DesignSingapore Council. (2017). *Innovation by Design Conference 2017*. Retrieved July 6, 2017, from:
<https://www.designsingapore.org/designdirectory/sdwhome/modules/event/2017/innovation-by-design-conference>
- FITCH. (n.d.). *The Joy of Shopping: It's All in the Mind*. Retrieved July 5, 2017, from: <http://www.fitch.com/think/the-joy-of-shopping-its-all-in-the-mind>

- FITCH. (2015). *The Joy of Shopping: It's All in the Mind Report*. Retrieved July 15, 2017, from: https://www.slideshare.net/FITCH_design/joy-of-shopping
- Garcia, L. M. (2012). Understanding design thinking, exploration and exploitation: Implications for design strategy. *IDBM Papers Vol. 2*, pp. 150-161. IDBM Program, Aalto University.
- IBM. *IBM Design Thinking*. (n.d.). IBM. Retrieved July 4, 2017, from: <https://www.ibm.com/design/thinking/>
- IBM iX Singapore. (n.d.). *Transformative Ideas in Action*. Retrieved July 4, 2017, from: <https://www-935.ibm.com/services/sg/business-consulting/interactiveexperience/work/>
- Jabry, B. (2016). *Can design support Singapore's transition from a consumer society towards a more creative community?*. [LinkedIn]. Retrieved November 10, 2017, from: <https://www.linkedin.com/pulse/can-design-support-singapores-transition-from-consumer-bassam-jabry>
- Kimbell, L. (2012). Rethinking design thinking: Part II, in: *Design and Culture, Vol. 4, Issue 2*, pp. 129-148. UK: Taylor and Francis.
- Koh, J. (2013). *Towards a Toolkit for Practicing Experience Designers* (Doctoral Dissertation) National University of Singapore. Retrieved November 10, 2017, from: <http://scholarbank.nus.edu.sg/handle/10635/120584>
- LASALLE College of the Arts (2016). *BA(Hons) Design Communication AY16/17 Module Guide Negotiated Design Project*. Retrieved July 4, 2017, from: <https://goo.gl/sgqjvu>
- Leong, B. (2014). *Putting "Thought" into Customer Centric Design*. Retrieved November 10, 2017, from: <http://m360.sim.edu.sg/article/Pages/Customer-Centric-Design.aspx>
- Liedka, J., Salzman, R., Azer, D. (2017). *Design Thinking for the Greater Good, Innovation for the Social Sector*. New York: Columbia University Press
- O'Reilly, L. (2016). *IBM quietly built the world's largest digital agency — here's how it got there*. Retrieved July 5, 2017, from: <http://www.businessinsider.sg/ibm-quietly-built-the-worlds-largest-digital-agency-heres-how-it-got-there-2016-3/>

- Plattner, H., (2011). Foreword. In Plattner, H., Meinel, C., and Leifer, L. (Eds.). *Design Thinking: Understand - Improve - Apply* (pp. v-vi) Heidelberg, Berlin: Springer-Verlag.
- Promoting competitiveness through design. (2016, March 15). *The Straits Times*. Retrieved July 4, 2017, from: <http://www.straitstimes.com/singapore/promoting-competitiveness-through-design>