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CHINESE DISRUPTION?

What European organizations can learn from China's rising tech industry in times of digital transformation

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Executive summary

The primary driving forces behind today's globalization are the rapid advances in information and communication technology, which in turn are being propelled forward by globalization itself. These mutually reinforcing trends push the pace of change to an exponential rate that makes it increasingly difficult for global managers to plan with any kind of predictability. This new reality, or "new normal," has been termed VUCA after the four characteristics of *volatility*, *uncertainty*, *complexity*, and *ambiguity*, which continuously deform and reshape the business landscape.

Throughout the West, businesses struggling to keep up with change are embarking on digital transformations, often looking to Silicon Valley's innovative tech entrepreneurs for inspiration. However, studies show that only 30 percent of digital projects are considered successful. In addition, while growth in Silicon Valley are showing signs of peaking, a vibrant tech industry is on the rise in China, whose innovative capabilities garner increased attention in the West.

In this macro- and meso-level project, I explore these global trends from a European perspective and seek to identify learning opportunities by asking the question, *"What can European organizations learn from the tech industry's shift from the United States to China?"* In order to answer this question, I take a systems-oriented high-context approach, beginning with a comprehensive look into how the tech industry is driving globalization and vice versa.

We learn how the global business trend toward transnational organizations is being accelerated by technology such as cloud computing, which help enterprises achieve the three goals of global efficiency, multinational flexibility, and worldwide learning that form the basis of a transnational strategy. Traditionally, these three goals conflicted with each other, but today they can be achieved simultaneously in a mutually reinforcing manner. The result is a cross-industrial convergence of industries, which has led to enterprises embracing open innovation and open source software, which in turn has made it necessary for businesses to reinvent their business models around concepts such as subscription-based services and *"access over ownership."* This evolution has resulted in multiple layers of complexity, which have given rise to agile practices as a way to deal with such complexity using a systems-oriented rather than an analytical approach. However, as linear analytical thinking is deeply rooted in Western culture, many organizations have trouble making the mindset makeovers necessary to succeed.

In contrast, China seems to be thriving in the face of both political and economic, as well as technological, complexity, having demonstrated impressive growth rates since Deng Xiaoping began the Opening of China in 1979, and the country has since fostered its own agile tech entrepreneurs. I take an institution-based view of China's politics, economy, and institutions in order to show how China with its philosophy of *"crossing the river by feeling for the stones"* has dealt with extreme complexity and rapidly changing conditions throughout its reform era.

As China progressed through its period of technological catch-up, a vibrant ecosystem of fiercely competitive, "gladiatorial" tech entrepreneurs has emerged in China, and tech giants such as Alibaba, Tencent, Xiaomi, and Huawei are now global players challenging Western giants such as Facebook, Apple, and Amazon. Therefore, I proceed to take a resource-based view of Chinese tech entrepreneurs in order to show how they manage to compete on the edge between structure and chaos by developing the dynamic capabilities necessary to relentlessly produce a continuous stream of temporary competitive advantages in a constantly changing environment.

Such capabilities require a systems-oriented and high-context mindset, and I turn to classical cultural orientations frameworks to show how Eastern ways of thinking are naturally aligned to deal with complex – often termed *wicked* – problems, as opposed to Western ways of thinking, which are more geared toward dealing with merely complicated – or *tame* – problems. This indicates that Chinese companies have an intrinsic advantage compared to Western firms whose analytical mindset shows a preference for tame problems. However, in a world of open innovation, solutions to tame problems can often be *"proudly found elsewhere,"* leaving the West at a disadvantage if they try to apply analytical thinking to solving their wicked problems.

The major managerial implication for European organizations, then, is to develop and cultivate an organizational culture that appreciates a systems-oriented high-context mindset in order to deal with the wicked problems that predominate today's business world increasingly shaped by the VUCA factors. Such an endeavor would also help the organization to increase its chances of successfully doing business in China, although it would be valuable even in a local context.

These global shifts also give rise to reconsidering established theory, e.g., as new global value chains may distort Stan Shih's classic "Smile of value creation." In conclusion, the trends explored point to an interesting future for both research and practice in the field of international business.

1 Introduction

These days the world is experiencing technological change at a breathtaking and ever-accelerating pace, and the direction and potential ramifications are topics of constant debate. Chairman of the World Economic Forum, Klaus Schwab, has coined this trend the *Fourth Industrial Revolution*, and it comprises the combined advances in *physical*, *digital*, and *biological* technologies, which in a complex web of interdependencies push the pace of change to an *exponential* rate (Schwab, 2017).

For many years, the world has been looking to the American tech industry where giants such as Apple, Google, Microsoft, Amazon, and Facebook have been setting the global standards for technology. All five of these are located on the American West Coast, reflecting the trend of American tech firms clustering around the regions of Silicon Valley in Northern California (e.g., Apple, Google, and Facebook) and Seattle in the Pacific Northwest (e.g., Amazon and Microsoft). How Silicon Valley outperformed the Route 128 region on the American East Coast throughout the 1980s and early 1990s has been the topic of interesting studies, the most well-known of which may be that of Saxenian (1996) who concluded that *"the contrasting experiences of Silicon Valley and Route 128 suggest that industrial systems built on* ***regional networks*** *are more flexible and technologically dynamic than those in which experimentation and learning are confined to individual firms"* (Saxenian, 1996, p. 161).

However, in recent years, the rate of innovative growth in Silicon Valley may be showing signs of peaking. Housing costs and other costs of living are among the highest in the world, and wages have reached a level that makes it increasingly difficult for startups to compete for talent while seeking to build a profitable business. Add to this the fact that digital technologies have reached a level of maturity where a physical presence in the Valley no longer is necessary in order to build an innovative business. Some say the region has disrupted itself, and several tech entrepreneurs are now seeking resources in other parts of the United States and in the rest of the world (Economist, 2018-I).

Apparently, the *regional networks* on the American West Coast are now being challenged by *global networks* emerging from the ongoing process of globalization, the acceleration of which ironically is being propelled forward by the digital information and communication technologies

that have been coming out of those West Coast regional networks in the early 21st century, a macro-environmental phenomenon known as *technoglobalism* (Deresky, 2017, p. 50).

Simultaneously with this decentralization of the Western tech industry, rapid changes have taken place elsewhere on the planet, largely unnoticed by many in the West. For while the Western world has been looking to Silicon Valley to spot *what's next* after over a decade of social media, smartphones, and slow economic growth, China has experienced soaring growth rates for several decades and has in the process fostered its own tech giants, the most well-known of which include Baidu, Alibaba, Tencent, Xiaomi, and Huawei. Illustrating the scale of China's rising tech industry, Alibaba's $25 billion IPO (Tse, 2016, p. 10) in September 2014 was the world's largest to date (Lee, 2018, pp. 66-67).

The rise of China's tech industry is now beginning to garner attention of Western media and enterprises. For example, in November 2018, the Danish Academy of Technical Sciences (ATV) published a report about *"Denmark's blind spot: Disruptive China,"* recommending Denmark to *"update its globalization strategy and develop its own ambitious strategy for disruptive digital technologies"* (ATV, 2018).

In this project, I seek to uncover such blind spots by analyzing the evolution of both the American and Chinese tech industries with the aim of identifying potential learning opportunities for (primarily) European companies and organizations who are struggling with *digital transformations* in hopes to keep up with today's complex and rapid changes. The widely cited CHAOS Report 2015 (Standish, 2015) shows that only about 30 percent of software projects are considered successful, so there is room for improvement (Sørensen, 2017, p. 31), and Western organizations should carefully consider opportunities for learning from Eastern ways of thinking if the West is to stay competitive in the face of China's continued rise in the coming years.

1.1 Problem identification

From a Western and European perspective, the developments in China are becoming a vibrant issue that can be approached from several different angles. For a European company, the most obvious question is probably how the Chinese market will evolve and how companies can gain a share of the seemingly ever-expanding Chinese growth. How will this affect Chinese consumer

behavior? And how can European companies effectively position themselves and their products in this foreign and extremely different market, which in addition is constantly changing?

But such classic *market-seeking* questions are perhaps not the most pressing, for concerns are emerging about growing competition from Chinese tech firms who are now making great strides in many of the fields that are currently getting all the hype in the West: artificial intelligence and machine learning, Internet of Things (IoT) and drone technology, as well as derived innovations such as voice and face recognition, machine translation, personalization etc. The Chinese are reportedly very capable of adapting and executing, whereas the West, and possibly Europe in particular, seemingly spend more time debating. Nevertheless, many in the West apparently find it difficult to come to terms with the fact that a non-Western culture is proving itself more capable of innovation than most thought possible. For decades China was known as the world's factory hall that manufactured the innovative products proudly designed in the West while China's own tech industry largely consisted of *copycats*. Such conditions may have contributed to the *"Not Invented Here,"* or NIH, syndrome prevalent in the West (Chesbrough, 2011), but in recent years Western commentators have begun asking a new question: "*Is it time for the West to copy China?*" (Rowan, 2016).

That would call for a thorough analysis. "To copy" may at first seem to be loaded with negative connotations. However, it can also mean that one is willing "to learn from others," which has a more positive ring to it, maybe even being in the same vein as the last 10-15 years' accelerated transition from *closed* to *open innovation* and *worldwide learning*, which are now regarded as essential preconditions for the *digital transformations* currently on the agenda across the Western business world. But when Western organizations are burdened by a heavy negative administrative heritage (Bartlett & Beamish, 2018, p. 218) and several digital projects are failing (Standish, 2015), it may be worth taking a closer look at the underlying cultural differences between the West and China, and how a new generation of Chinese leaders have transformed China's business culture in the 21st century (Ralston et al., 1999). Combined with the technological advances, the Chinese tech entrepreneurs have garnered special attention with an experimental approach that blends Western business style and East Asian culture and philosophy, reminiscent of the *agile mindset* that everyone in the West talks about, but only few manage to effectively implement (Verheyen, 2019). Can a closer look at Chinese culture reveal the existence of intrinsic advantages for China's

tech entrepreneurs that the West should identify and learn from? Increasing numbers of people have expressed such beliefs, e.g., Hugo Barra, who left an executive position at Google's Android division in 2014 to join Beijing-based smartphone giant Xiaomi and said in 2016: *"The world has a lesson or two to learn from China's internet way of thinking"* (Rowan, 2016). Today, the West does indeed seem to be taking lessons from China, as exemplified by Facebook's CEO Mark Zuckerberg who *"seems keen to turn Facebook into a Western version of WeChat, the Chinese messaging app whose array of mobile services, from payments to filing court paperwork, has made it ubiquitous in China"* (Economist, 2019-I).

Such news may be difficult to grasp for many, because the general understanding in the West often seems to be that China must become "more Western" if it is to be as successful and prosperous as the West. China has already been learning much from the West for several decades, taking inspiration from Western management practices and education systems, and will likely continue to do so as its economy and global political power continues to grow. But rather than replacing traditional Chinese ways of thinking and doing things, China is *bridging* and *integrating* methods and practices from both East and West, resulting in novel – and apparently very effective – approaches to doing business that are unique to modern-day China. This may come as a surprise to Western managers and analysts who felt certain that the world's cultures were converging toward one global culture largely shaped by Western values. But one should be careful about making such conclusions, as illustrated by popular statement: *"To say that [China] is becoming westernized because McDonald's does well in Shanghai, is like saying that the US is becoming easternized because there are a lot of Chinese restaurants"* (Lane & Maznevski, 2014, p. 37). As this project sets out to explore, however, there may in fact be reasons to believe that *the West is being easternized*. Such a trend should be carefully studied and perhaps even nurtured if Western organizations are to stay competitive in the future.

Quite a few critics point to unfair practices from the Chinese government as the primary explanation of China's technological progress, including mercantilism, currency exchange rate manipulation, and subsidies to Chinese companies (Tse, 2016, p. 9). Combined with the impressive growth rates and declining poverty rates since 1979 (OECD, 2017, p. 15), which saw the beginning of economic reforms initiated by Deng Xiaoping (Kroeber, 2016, p. 5), economic and political circumstances have no doubt played an important role in the rise of China's tech industry and

entire economy, but by focusing too much on the political aspect, we risk missing valuable learnings from the Chinese private entrepreneurs who have experienced great prosperity. Identifying such opportunities for learning is the focus of this project.

1.2 Intended audience

The developments in China are clearly garnering increased attention from the West, as can been seen from numerous books being written on the topic, such as Tse (2016) and Boutrup (2018), as well as reports such as ATV's *"Denmark's blind spot: Disruptive China"* (ATV, 2018) and the extensive coverage in the media, not least because of the increasing tensions between the West and China. The US-China trade war is a topic of heated debate, as is the suspicion toward Shenzhen-based telecommunications giant Huawei for building out critical 5G infrastructure in Western countries, as people fear this would open up for Chinese surveillance (Economist, 2019-II).

The general interest makes the intended audience of this report a somewhat open question, but here I will identify the following broad categories:

1) **The Danish Academy of Technical Sciences (ATV)** – and similar organizations – who point to "Denmark's blind spot" regarding China's tech industry and calls for action to reduce this information asymmetry. My project can be viewed as a reaction to this request.
2) **European tech companies** who need to take China into account in one way or another, e.g., when assessing Chinese competitors or potential business partners.
3) **Other European companies** who would like to understand why and how digital and agile transformations can benefit from a deliberate shift in mindset from Western to Eastern ways of thinking.
4) **Software developers**, such as myself, and other people in the STEM[1] fields, as well as **businesspeople** and **international managers** of all kinds. As *"software is eating the world"* (Andreessen, 2011), and continued growth and innovation rely on the interdisciplinary advances in several different fields of research and practice (Bartlett & Beamish, 2018, p. 438), it is increasingly important to understand how they interact and affect each other. Deresky (2017, p. 33) points out: *"Of all the developments propelling global business today,*

[1] STEM = **S**cience, **T**echnology, **E**ngineering, **M**athematics.

the one that is transforming the international manager's agenda more than any other is the rapid advance in IT. The explosive growth of IT is both a cause and an effect of globalization." This is also the main reason why I have chosen to pursue a diploma in international business to complement my computer science degree.

The third category – other European companies – may seem the least important of the four, but I believe such companies may in fact be the ones that can derive the most benefit from my findings. As we shall see, the Western tech industry may have exhibited Eastern ways of thinking for several decades now, led by the success and growth of Silicon Valley, whose culture has been unique from a traditional Western point of view, as opposed to the more traditional corporate world in the West (Saxenian, 1996). As increasing numbers of such traditional organizations embark on agile and digital transformations, and in the process try to imitate and incorporate the innovative spirit of Silicon Valley and similar tech environments, it can be helpful to see how these innovative cultures can be related to Eastern rather than Western ways of thinking, which in turn may help explain why the agile mindset makeovers can be difficult and counterintuitive for many traditional Western organizations to adopt. Seeing how modern China combines their new economic resources with traditional Eastern ways of thinking to successfully drive innovation may serve as a motivation for Western organizations to implement the necessary changes that are prerequisites for successful agile transformations, even when it feels counterintuitive from a Western point of view.

1.3 Research question

As the problem identification and intended audience suggest, this is a broad and complex topic, and there is a general lack of knowledge about the Chinese tech industry and how it works differently from Western industries, as indicated by ATV's concern for "Denmark's blind spot." Therefore, I analyze the Chinese tech industry from a Western perspective with a focus on learning, aiming to derive recommendations for European organizations. In the past decades, the Western tech industry has been heavily dominated by the United States. In this project, though, I find it interesting to take a European perspective, as Europe could find itself in an interesting middle position going forward. Based on these considerations I present my main research question:

What can European organizations learn from the tech industry's shift from the United States to China?

This is a somewhat open question, resembling the *complexity* of the topic and the potential *blind spots* from a European perspective. For this reason, this project is explorative in nature with a focus on *learning opportunities*, including *what European organizations can learn* and *how they can optimize organizational learning*, inspired by the Chinese tech industry as well as research in related fields such as *dynamic capabilities* (Teece, 2007) and a *competing-on-the-edge* strategy (Brown & Eisenhardt, 1998). With this I hope to identify potential blind spots in order to reduce the *information asymmetry* (Falcão, 2010, p. 147) that has arisen between China and the West (Boutrup, 2018, p. 252).

It is generally agreed that, as the tech industry continues to accelerate the process of globalization, the business world is entering a "new normal" shaped by what has become commonly known as VUCA – *volatility*, *uncertainty*, *complexity*, *ambiguity* – and a primary challenge of international business today is how to manage this complexity effectively (Lane & Maznevski, 2014, p. 12). How the East and West approach this challenge of *managing complexity* is a running theme throughout this project. With this in mind, I formulate the following sub-questions:

1) **How is the tech industry driving globalization and vice versa?**
   Purpose: In order to better understand China's tech industry from a Western perspective, it is helpful to have a solid understanding of the West's own tech industry and how it has changed business conditions that have guided Western organizations for decades. This first sub-question seeks to analyze how the global trend toward *transnational organizations* is being accelerated by the tech industry's innovations, as well as how this process is rapidly increasing global complexity in an exponential manner. Influential Western (all American) companies in this regard include Apple, Google, Microsoft, Amazon, and Facebook, all of whom are in the top 10 of Interbrand's ranking of Best Global Brands 2018 (Interbrand, 2018).
2) **What characterizes the rise of China in the global economic and political arena?**
   Purpose: Where the previous sub-question focused on the global context, sub-question 2 zooms in on China to see how this extremely complex nation has evolved from Maoist

isolation with no private enterprises to a powerful market-driven economy brimming with private high-velocity entrepreneurs and tech giants such as Baidu, Alibaba, Tencent, Xiaomi, and Huawei. Sub-question 2 seeks to analyze the Chinese context by taking an *institution-based view* of China's formal and informal institutions.

3) **What characterizes China's successful tech entrepreneurs?**
   Purpose: Having both a global context as well as a China-specific context in place, this sub-question takes a *resource-based view* in order to analyze how the thriving Chinese tech entrepreneurs effectively manage to deal with the complexity of China and the world at large.
4) **Can the rapid progress of China's tech industry be attributed to specific cultural traits?**
   Purpose: This is a central part of the project. Based on the mapping of the Western and Chinese tech industries, I analyze the cultural differences with the objective of identifying Chinese characteristics that can help explain the rapid progress of the country's tech industry. Such an analysis could expose potential *blind spots* and inspire Western organizations to evaluate and possibly adjust their own approaches to management, culture, and strategy.
5) **Can the above analyses give rise to managerial implications for European organizations?**
   Purpose: With the potential blind spots and Western challenges identified in the previous sub-question, this follow-up question seeks to address those challenges with concrete recommendations.
6) **Can the above analyses give rise to adjustments to existing theory of innovation and knowledge-intensive industries?**
   Purpose: Finally, with the constant change that is transforming global business, I examine if my findings from the previous sub-questions give reason to revisit existing theory of innovation and knowledge-intensive industries to see if they will remain relevant.

It bears repeating that a running theme throughout the project is *complexity management*. Lane & Maznevski (2014, p. 14) argue that effective complexity management requires a combination of Eastern and Western ways of thinking. Western culture traditionally puts great emphasis on rational thought, rules-based analysis, and a control-focused management model based on detailed planning and follow-up measurement. However, this way of thinking is not sufficient in a

constantly changing complex environment. In contrast, Eastern ways of thinking see change as something natural that should not be controlled but rather "seen" and "understood," and the environment should be aligned in ways that let change flow effortlessly through a complex web of interrelationships that exist between all things and events. Lane & Maznevski (2014, p. 14) suggest that global managers could benefit from understanding both styles and call this "Hercules meets Buddha." The rapid rise of China's tech industry may indicate that Lane & Maznevski could be right. In a way, this project looks into the effectiveness of the "Hercules meets Buddha" way of thinking using China as a giant case study!

1.4 Delimitation

The above research question represents a broad and open problem, but I have tried to incorporate the delimitation into the formulation of the question. Thus, I focus on the developments in the *American* as well as the *Chinese* tech industries with the assumption that the *European* tech industry thus far has oriented itself toward the United States. Therefore, I will not discuss Europe's tech industry separately in this context. However, as a Danish student at Copenhagen Business School, I take a *European* rather than an American perspective when deriving managerial implications. My analysis is limited to the tech industry, though these days, one should bear in mind that delimiting this industry is becoming less meaningful if we take the view that *"every company is a technology company"* (Stone, 2017). This is also why I believe many traditional companies could benefit from such an analysis.

I consider political and economic aspects in my analyses, though I put more emphasis on the cultural and capability-related aspects. Political and economic analyses of China and the West, including US-China relations, are already topics of extensive coverage in both academia and the media. Furthermore, I believe that the cultural and capability-related aspects are more readily applicable to strategic development of competitive advantage for many European organizations, regardless of whether they actually operate in China or otherwise deal with Chinese competitors or business partners. A study of these aspects can help explain why and how organizations are moving toward agile ways of thinking in a constantly changing business environment.

The project is a macro- and meso-level study that takes a holistic systems-oriented approach in order to identify and learn from global trends. This means I will cover a relatively broad range of

topics, as well as several American and Chinese companies, in order to establish context and relationships between concepts. It also means that no individual topic or organization will be studied in more depth than necessary for these trends to emerge, though I provide detailed references for every topic. More details on methodology are provided in Chapter 2.

1.5 Report structure

The report is structured around the sub-questions such that from Chapters 3 through 8 there is one chapter per sub-question, as illustrated in the following table.

Main research question: **What can European organizations learn from the tech industry's shift from the United States to China?**		
Chapter	**Sub-question**	**Theory**
1: *Introduction*		
2: *Methodology*		Reality assumptions (Arbnor & Bjerke, 2009)
3: *Complexity on the rise: Globalization and the tech industry*	SQ 1: *How is the tech industry driving globalization and vice versa?*	Transnational organizations (Bartlett & Beamish, 2018), open innovation (Chesbrough, 2011), agile project management (Schwaber & Sutherland, 2004)
4: *The complexity of China: Crossing the river by feeling for the stones*	SQ 2: *What characterizes the rise of China in the global economic and political arena?*	Institution-based view (Peng & Meyer, 2016), PIE model (Mygind, 2007)
5: *Leveraging complexity: China's agile tech innovators*	SQ 3: *What characterizes China's successful tech entrepreneurs?*	Resource-based view (Peng & Meyer, 2016), VRIO (Barney, 1991), competing on the edge (Brown & Eisenhardt, 1998), dynamic capabilities (Teece, 2007)
6: *The role of culture in complexity management*	SQ 4: C*an the rapid progress of China's tech industry be attributed to specific cultural traits?*	Cultural orientations framework (Lane & Maznevski, 2014; Deresky, 2017)

7: *Managerial implications*	SQ 5: *Can the above analyses give rise to managerial implications for European organizations?*	MBI model (Lane & Maznevski, 2014)
8: *Research implications*	SQ 6: *Can the above analyses give rise to adjustments to existing theory of innovation and knowledge-intensive industries?*	Smile of value creation (Mudambi, 2008)
9: *Conclusion and future work*		

After the introduction, the methodological approach is discussed in Chapter 2, which includes a relatively detailed discussion of the analytical view as well as the systems view, since these assumptions about reality can be related to Western and Eastern ways of thinking, and thus are a major theme throughout the project.

The sub-questions, described previously in Section 1.3, set the themes for Chapters 3 through 8 and provide some structure and linear progression to an otherwise complex topic. Each chapter provides analyses and discussions related to the sub-questions, but the chapters themselves do not provide explicit final answers to the sub-questions. The main research question is answered in the conclusion in Chapter 9, which also contains a brief discussion of possible future work.

The rightmost column provides an overview of the theoretical models and frameworks from international business literature that are used in the analyses. In some ways the entire report can be considered a comprehensive literature review, and the relevant theory will be introduced as the report progresses.

2 Methodology

As mentioned in the introduction, it would seem obvious to look at China's impressive growth rates and then state a classic market-seeking international business problem such as *"How can company X best enter the Chinese market in order to sell product Y?"* However, seeing how even successful Silicon Valley giants such as eBay (Lee, 2018, pp. 35-37) and Google (Lee, 2018, pp. 37-38) have failed to gain a foothold in China, others should tread with caution. Therefore, in this project, I take a step back in order to first obtain a broader macro-level understanding of China and Chinese ways of thinking, as well as a meso-level understanding of China's tech industry in particular. In addition, from my background in the software industry, I have noticed certain similarities between software engineering, innovation, agile practices, and Chinese ways of thinking, as well as how they think about complexity based on the reality assumption known as the *systems view*. This stands in contrast to more traditional industries and conventional project management, as well as Western ways of thinking in general, which are more rooted in the reality assumption known as the *analytical view*.

Having a map of these similarities and differences between East and West would be a helpful tool when dealing with more traditional international business problems in the future, as well as understanding how the rise of China may come to influence the West. As such, this project could also play a role in the *mapping* part of the MBI (Map-Bridge-Integrate) model for high performance (Lane & Maznevski, 2014, p. 71), which would be useful in many cross-cultural situations between not just Chinese and Western organizations, but also between tech and business in general. In MBI, *map* is about *understanding differences* while the subsequent parts, *bridge* and *integrate*, are about *communicating across differences* and *managing differences*, respectively. These considerations form the basis of my methodological approach described in this chapter.

2.1 Reality assumptions in the face of complexity

As the advances in information and communication technology are propelling globalization forward, and vice versa, the global business world is moving toward a high degree of synergy and interdisciplinarity, pushing the pace of change and globalization to an ever-accelerating rate and rapidly increasing complexity. In this section, we look at how this can be related to some classic

worldviews or *ultimate presumptions* about reality: the *analytical view*, the *systems view*, and the *actors view*, all of which are important to know about in the context of this project. They are often used in academia when discussing and designing methodological approaches to research (Arbnor & Bjerke, 2009), but they are also useful in a broader sense when discussing different ways of thinking related to knowledge-creation processes, particularly when people from a diverse set of cultures, disciplines, or industries must work together, which is increasingly important in today's global business environment. Together with complexity, these worldviews are a central theme throughout the project. Before seeing how each worldview relates to complexity, however, it is helpful to first take a quick look at the inherent complexity of software itself, which has found its way into virtually every knowledge-intensive sector imaginable.

2.1.1 The complex nature of software

In 1986, Fred Brooks published a now-famous essay, *"No Silver Bullet – Essence and Accident in Software Engineering"* (Brooks, 1995, pp. 180-203), where he explains how the characteristics of software is fundamentally different from those of hardware. Brooks distinguishes between *accidental complexity*, which is complexity created by the process of developing software and which can be reduced by using increasingly modern tools and techniques to simplify this process; and *essential complexity*, which is complexity inherent in the very nature of software. Brooks goes on to identify the four inherent properties of this irreducible essence of software systems: *complexity, conformity, changeability,* and *invisibility*. It is worth reading Brooks' in-depth discussions of these four properties to understand and appreciate how the inherent complex and nonlinear nature of software is fundamentally different from hardware and the physical engineering disciplines in general. One of the major points is that of invisibility: *"The reality of software is not inherently embedded in space. Hence it has no ready geometric representation in the way that land has maps, silicon chips have diagrams, computers have connectivity schematics. […] Software is inherently unvisualizable, thus depriving the mind of some of its most powerful conceptual tools. This lack not only impedes the process of design within one mind, it severely hinders communication among minds"* (Brooks, 1995, pp. 185-186).

This unique nature of software, compared to other engineering disciplines, may come as a surprise to many people. Add to this the extra complexity added by having people from different cultures, often separated by both time and distance, communicating and working together to produce

coherent software systems. In the following, it is helpful to keep these layers of complexity in mind when discussing the different worldviews and ultimate presumptions of knowledge creators.

2.1.2 The analytical view

The analytical view is the oldest of the three mentioned, and this view is based on the assumption that the reality under observation exists independently of the observer and that this reality can be divided into its constituent parts, thereby enabling us to examine each part individually and ultimately reassemble the parts to reach a more complete understanding of the whole.

It can be practical to view the world through the analytical lens because it enables one to focus on the topic that one finds most relevant or interesting and reasonably assume *"ceteris paribus,"* also known as *"other things being equal."* The analytical view also underpins the problem-solving approach of dividing a problem into logical constituent parts, which one can then delegate to respective specialists. When each specialist has completed his or her respective work, all the parts can be pulled back together into its coherent whole.

The analytical view is often associated with the classical technical and engineering disciplines where one works with the tangible physical reality. Traditionally, information technology has been categorized into this group. However, though hardware by its physical nature fits fairly well in this category, software on the other hand, as illustrated by Brooks, is of a more intangible nature, which in many ways are more associated with the human mind than the physical world.

Arbnor & Bjerke (2009, p. 123) note how the decline of Route 128, dominated by few large, isolated, and secretive companies, may be explained by the hypothesis that the analytical view dominated in this environment, not just with regards to product development, but also regarding management, strategy, and business development. In contrast, Silicon Valley managed to continue growth and innovation into the 1990s. Arbnor & Bjerke believe this success to be related to Silicon Valley being more dynamic, adaptive, and *systems-oriented*.

Looking at the software industry and its connections to virtually every other industry, we may see a tendency to associate software development with the analytical view because of its comparison with the physical engineering disciplines where one seeks to identify cause-effect relationships, which then provides useful information for identifying project milestones for planning ahead.

2.1.3 The systems view

Contrary to the analytical view, the systems view believes that the whole is more than the sum of its parts, often in unpredictable ways. Consequently, one must be careful when analyzing the parts without a keen eye on the context of the whole in which it is embedded. Organizations are a typical example of such a *system*, according to Arbnor & Bjerke, as individual people and departments of an organization do not operate independently of the context in which they exist.

Throughout the past twenty years such dynamic relationships have become increasingly noticeable, not least because of many new opportunities for digital communication and cooperation independent of time and place. Among typical systems aspects, Arbnor & Bjerke list processes over structures, customer relations, temporary project organizations, organized chaos, the network perspective, innovation, and virtual systems. The network perspective may be particularly interesting, as this can be related to the concept of *open innovation* (described in Section 3.5) and the belief that what takes place *within* the organization is not nearly as important as what happens *outside* the organization as well as the *interactions* between the organization and its external environment.

Going back to the example of Silicon Valley vs. Route 128, Silicon Valley's dynamic, open, and VC-backed startup environment lean toward the systems view, whereas Route 128 failed to adapt from the more static analytical view. The systems-oriented principles of constant change seem to fit well with the transition from hardware to software, a process that is currently being accelerated by cloud computing, open innovation, and globalization, as will be analyzed in depth in Chapter 3. These shifts also help explain why the agile practices are increasingly popular. Where the traditional "waterfall" project management practices assumed relatively high degrees of predictability and stability, the agile practices reject these presumptions, presuming instead that both organization and technology as well as the external environment are constantly changing and highly unpredictable (Schwaber, 2004). As a consequence of this presumption, the agile organization views itself as an inherent part of an *open system* that encompasses consumer, vendor, and competitor behavior, as well as technological changes and availability of skills and talent etc. to which the agile organization must constantly adapt. More on this in Section 3.9.

2.1.4 The actors view

The analytical and systems views both have in common that they view reality as existing independently from the human conception of it. Contrary to this is the *actors view*, which holds the ultimate presumption that reality is a social construction that exists only in the context of people's perceptions and actions as participating actors in this reality. This is often considered to be an irrelevant concept in technical and engineering fields, and the actors view is usually related to qualitative research in the humanities and social sciences, particularly in fields such as the arts and anthropology. However, software development and the agile practices can in fact also be associated with the actors view, as they seek to involve users and stakeholders along with their regular feedback as essential input to ongoing product development. In addition, we can view software as existing only because of the people who create and use it, just as only people can create and experience music and literature.

2.1.5 Discussion of reality assumptions

It is interesting to observe how digital technology can be viewed from any of the three viewpoints discussed here. There seems to be a convergence toward synergy, open innovation, cloud computing, and agile practices, all of which share several characteristics with the systems view, as will be discussed in depth in Chapter 3. However, it should also be clear that both the analytical view and the actors view have valid points when discussing topics related to both individual software projects as well as the evolution of the tech industry as a whole.

Not being able to put software in a well-defined box, we may resort to declaring that *"software development is an art. It isn't predictable enough to be engineering. It isn't rigorous enough to be science. We're artists – and that's* ***not*** *a good thing. We find it hard to work in teams, we find it hard to deliver on deadlines, and we find it hard to focus on practical results"* (Rodger, 2018, p. 3). Add to this the fact that *"unlike art, software has to work. It has business problems to solve, users to serve, and content to deliver"* (Rodger, 2018, p. 3). Considering this, it should be easier to understand why many software projects and digital transformations fail to deliver as expected (Standish, 2015). Recognizing and appreciating these multiple layers of complexity caused by both globalization and the very nature of software itself may be a first step in improving the success rates of digital projects. It may in fact be a reason to put the A in STEM education, yielding

STEAM,[2] in order to develop the cognitive flexibility to switch between and integrate various views of reality when working in modern knowledge-intensive industries.

Attaining such cognitive flexibility may be easier said than done, at least in traditional Western organizations, because the analytical view is common in business research and consulting today and has a deeply rooted tradition in Western thinking (Arbnor & Bjerke, 2009, p. 52), a topic to which we will return in Chapter 6.

2.2 Methodological approach

The general rivalry between East and West, as well as concerns in the West for the rise of China, make for a very popular topic. In this light, it might seem obvious to base my analyses, especially those of cultural and institutional differences between East and West, on a number of unstructured interviews with experienced people from the different tech industries. However, I would be wary of this *actors-oriented* approach (Arbnor & Bjerke, 2009), primarily because my project is macro- and meso-oriented in nature as I seek to identify global trends. In addition, people may tend to be opinionated on the reasons for China's rise, with Westerners often being critical. It would require a large number of carefully selected interviewees in order to reduce bias and to factor out the risks of ethnocentrism and the *self-reference criterion (SRC),* i.e., the risk of unconsciously evaluating other cultures based on knowledge assimilated over a lifetime in one's own culture (Ghauri & Cateora, 2014, p. 13). Such risks are further heightened by my objective of identifying possible *blind spots*, as well as Western and Eastern *ways of thinking*, which likely often occur at the subconscious level. Furthermore, as rapid technological advances are propelling globalization forward, and vice versa, and global business has entered a "new normal" of VUCA, *"managers are working harder and harder to try and understand the complex forces in order to plan and execute with any kind of predictability"* and, more importantly, *"most managers have not yet developed the habits or institutions to lead in it."* (Lane & Maznevski, 2014, p. 12). Consequently, one should be cautious of drawing general conclusions in this field based on observations and opinions of a few individuals, even from those Westerners who can claim success with doing business in China.

[2] STEAM = **S**cience, **T**echnology, **E**ngineering, **A**rts, **M**athematics.

The synergistic nature of globalization and the tech industry, as well as their complex web of interdependencies, also rule out the *analytical approach* to creating knowledge, as this view considers reality to be well-ordered in such a way that the whole is the sum of its parts, and those parts can be studied individually while assuming "other things being equal." In a globally dispersed and constantly changing tech environment, it is difficult to justify such an assumption.

That leaves us with the *systems-oriented* approach, in which we consider the whole to be more than the sum of its parts, and where the parts cannot be studied individually without considering their interactions with each other as well as the whole, the *system*. In this project, I find it natural to take the systems-oriented approach, as I will be taking a macro- and meso-oriented perspective of the tech industry and how this affects globalization and vice versa, as pointed out by Deresky (2017, p. 33): "*The explosive growth of IT is both a cause and an effect of globalization."*

Interestingly, the systems view is also related to innovative and knowledge-intensive industries shaped by rapid pace of change, with the tech industry as a prominent example, and particularly tech-intensive regions as Silicon Valley (Saxenian, 1996) and, more recently, Chinese cities such as Beijing and Shenzhen (Yuan, 2018). Such innovative regions are said to be characterized by open innovation, organized chaos, and network effects, which can be related to the systems view (Arbnor & Bjerke, 2009, p. 111), as can the field of software engineering and the agile practices, as mentioned earlier. Furthermore, the systems view can be related to Eastern ways of thinking, as opposed to Western ways of thinking, which are typically related to the analytical view, as will be shown throughout this project, particularly in Chapter 6.

Note how the systems view thus takes on *two important roles* in this project:

1) My methodological approach to knowledge creation in this project is based on the *systems view*, rather than the analytical view or the actors view.
2) The systems view is also treated as a major topic in its own right, as the project explores how systems-thinking dominates in tech-intensive regions, as well as how this relates to complexity, globalization, software engineering, and not least Eastern ways of thinking.

2.3 Empirical data

From my background as a software developer in several cross-disciplinary projects in both the public and private sectors, and in both large multinational enterprises and small startups, I have

first-hand experience with many of the topics in this project. I have also gained valuable knowledge from attending several conferences, seminars, workshops, and community meetups in the United States, China, and Europe. However, rather than building on such first-hand knowledge and conversations in order to collect *primary data* in the form of, e.g., unstructured conversational interviews, I base this macro- and meso-oriented project on *secondary data* in the form of a comprehensive *qualitative* literature review, drawing from a wide variety of sources in order to identify global trends that can help explain the tech industry's shift from the West to the East. These sources include media coverage of past and current events and trends in international business, China, and the tech industries, as well as published authors on these topics. With this approach, I gain indirect access to information from leading trendsetters such as Google and Microsoft in the West and Xiaomi and Tencent in the East. In addition, the reader will be able to easily verify the references on which I base my reasoning and conclusions.

The project is also a multiple-case study (Andersen, 2013, p. 110) of Western and Chinese companies such as Microsoft, Tencent, and Haier. I relate these cases to general theory about, e.g., open innovation (Chesbrough, 2011), competing on the edge (Brown & Eisenhardt, 1998), and dynamic capabilities (Teece, 2007), thereby seeking to *verify* the applicability of these theories (Arbnor & Bjerke, 2009, p. 91). Furthermore, by observing how innovative organizations exhibit Eastern characteristics, I take an *inductive* approach (Andersen, 2013, p. 31) to reach a general recommendation that Western organizations should consider learning from Eastern ways of thinking if they are to improve their innovative capabilities.

As mentioned earlier, with this project being macro- and meso-oriented, I seek to develop and present a contextual framework into which insights from future observations, conversations, and studies about the Chinese and Western tech industries and ways of thinking can be integrated. Besides helping to understand differences between East and West, this project could also be used as a tool for managers at the organizational (micro) level who are leading digital transformations in traditional Western organizations, or for consultants who through *deduction* (Andersen, 2013, p. 31) may seek to explain what contextual and cultural barriers in an organization make it difficult to achieve the shift to agile practices (Verheyen, 2019). Such studies might combine the systems and actors views in order to uncover cultural patterns in a particular organization for which the collection of firm-specific primary data would be essential.

3 Complexity on the rise: Globalization and the tech industry

Before zooming in on China in subsequent chapters, this chapter will provide the necessary context and frame of reference for the later China-specific analyses. Besides providing the background for understanding why China – as if out of nowhere – suddenly seems positioned to become a global superpower in artificial intelligence, an important objective of this chapter is to link the global tech industry with the international business literature in order to illustrate the interdependencies between technological innovation and globalization. The result of this is a worldwide explosion in complexity that impacts all other industries, so profound in scale and scope that it escapes the traditional Western ambition of being in control of its environment.

This is happening in tandem with a global evolution toward the *transnational mentality* where technology and the entire fourth industrial revolution plays a significant role as both cause and effect, resulting in the exponential rate of change that is characteristic of the phenomenon. In the following sections, I illustrate this with the evolution of *cloud computing*, which is one of the primary drivers behind the accelerating changes that we are currently witnessing.

3.1 The trend toward transnational organizations

Bartlett & Beamish (2018, p. 26) operate with four different stages that represent a gradual evolution of a multinational enterprise (MNE) regarding its motivations for and means of internationalization. These four categories are *international*, *multinational*, *global*, and *transnational*.

- **International.** The international mentality is the simplest of the four where managers typically think of overseas operations as distant outposts that simply extend the domestic operations of the parent organization. For this reason, it is also known as the home-replication strategy and was the dominant mentality of highly successful American companies in the postwar decades of the 1950s and 1960s (Bartlett & Beamish, 2018, p. 220).
- **Multinational.** The multinational mentality can be seen as a natural next step in the internationalization process where management recognizes the fact that different countries have different tastes and cultural preferences. The parent organization typically delegates responsibility to experienced country managers, often nationals of the host

country, who modify products, strategies, and practices relatively independently from the parent organization. This mentality is often associated with traditional European MNEs because of the variety in language and culture across Europe. Such *local responsiveness* is valuable, but it is also costly to adapt and manufacture separate products to different markets in this manner.

- **Global.** Enter the global mentality where companies seek to standardize products, strategies, and processes so they can centralize and optimize production, leverage economies of scale, and reduce costs by making *"the same thing, the same way, everywhere,"* a mentality championed by Theodore Levitt from the mid-1980s in his classic article *"The Globalization of Markets"* (Levitt, 1983). The emerging Japanese MNEs of the 1970s and 1980s proved especially efficient at this strategy, gaining competitive advantage through tight control over product development and lean high-volume manufacturing practices (Bartlett & Beamish, 2018, p. 221). Silicon Valley experienced a major recession in the 1980s and observers concluded that the region was "losing its edge" and that *"the semiconductor industry was going the way of the nation's auto and steel producers at the hands of Japanese competition"* (Saxenian, 1996, p. 89).
- **Transnational.** Around the turn of the millennium consumers began to expect the locally adapted products from the multinational mentality but without sacrificing the low prices that followed from the global mentality. The result has been a race toward the *transnational mentality*, which is particularly challenging as it seeks to *combine* the goal of local responsiveness and *flexibility* from the multinational mentality with the conflicting goal of *efficiency* achieved through the global mentality.

As technology advances and globalization continues its rapid diffusion throughout the world, increasing numbers of MNEs are reaching the transnational mentality, which intensifies global competition and accelerates innovation. This puts great pressure on organizational capabilities to innovate and adapt to rapid changes in a tech-infused business environment. The tech industry proposes a continuous stream of innovative tools and solutions to help organizations achieve these two conflicting goals, but in order to keep up and take advantage of this rapid stream of continuous innovation, organizations need to achieve a third goal: *worldwide learning*.

To summarize, Bartlett & Beamish (2018, p. 152) identify three goals that the transnational organization must achieve in order to develop a worldwide competitive advantage: *global efficiency*, *multinational flexibility*, and *worldwide learning*; and they point to three fundamental tools for doing so: *national differences*, *scale economies*, and *scope economies*. Several technologies of the fourth industrial revolution help to achieve these particular goals simultaneously, and in the following I illustrate how *cloud computing* specifically helps modern organizations to achieve these three goals.

3.2 Global efficiency

Amazon pioneered the field of cloud computing in 2006 when they launched Amazon Web Services (AWS), a service that made it possible for organizations to move their IT infrastructure *"to the cloud"* with a *pay-as-you-go* subscription. This was particularly useful for early-stage startups who were able to bootstrap their business with no up-front expenditures on own physical hardware, the intricate details of which were effectively *outsourced* to Amazon who handled procurement, setup, security, and maintenance of the physical servers in their enormous datacenters throughout the world. Furthermore, the elasticity of the cloud gave customers the valuable ability to scale up capacity on short notice or for just a few days of high traffic without having to purchase, set up, and later sell own physical servers (the annual Black Friday and the Chinese Singles' Day – both in November – are typical examples of this use case). Instead, Amazon's customers could focus on developing their core competencies and unique service offerings cf. Quinn & Hilmer (1994). At the same time, scale economies enabled Amazon to reduce costs, distributing them across their customer base, thus achieving both *focus* and *scale* as well as cost savings simultaneously.

The benefits of cloud computing were obvious, and Microsoft and Google soon followed: Microsoft Azure was launched in 2010, followed shortly after by Google Cloud Platform in 2011, resulting in an explosive growth in cloud-based services throughout the 2010s.

The transnational goal of *global efficiency* is clearly within easier reach through effective use of cloud computing. In fact, it is often highlighted as one of the primary benefits of moving to the cloud, as can readily be observed in, e.g., advertising for Microsoft Azure: *"Achieve **global reach** and the **local presence** you need. Go beyond the limits of your on-premises datacenter using the*

***scalable**, trusted, and reliable Microsoft Cloud. **Transform** your business and **reduce costs** with an energy-efficient infrastructure."*[3] Notice how this quote, besides *global reach*, also explicitly mentions *local presence*. This points to the second goal of the transnational organization: *multinational flexibility*.

3.3 Multinational flexibility

Multinational flexibility and local responsiveness are the second goal of the transnational organization. Traditionally, this goal conflicted with the first goal of global efficiency, which was typically achieved by means of standardizing products and centralizing manufacturing, thereby *reducing* flexibility and possibilities for local adaptation of products. However, today, as increasing numbers of products and services are digital and software-based, companies regain possibilities for customizing and adapting products and services to not just local needs at the national level, but also to the specific needs of a single individual. Streaming services such as Spotify and Netflix are probably the most illustrative examples of this trend – there is no going back to the 1980s-style of MTV's global (American) programming (Peng & Meyer, 2016, p. 482).

An important selling point for cloud platforms such as Microsoft Azure is the number of global regions throughout the world from where datacenters can not only efficiently serve users with minimum network latency – Microsoft highlights their more than 50 regions worldwide, *"offering the scale needed to bring applications **closer to users** around the world"* – but also offers local requirements for data residency and compliance options where Azure Germany is especially noteworthy for being specifically designed to comply with strict EU requirements, or Azure China, which Microsoft offers through a partnership with Chinese internet provider 21Vianet. An illustrative overview of Azure's regions across the globe is shown in Appendix 1.

Another major benefit in terms of flexibility is the virtual nature of cloud-based IT infrastructure. Hardware has become *soft*, giving businesses new opportunities for adaptation and re-use – effectively *economies of scope*. This has paved the way for a new software discipline, *Infrastructure as Code (IaC)*,[4] where IT infrastructure is declaratively modeled and version-controlled through the use of simple plain-text files, which can then easily, reliably, and

[3] Azure global infrastructure: https://azure.microsoft.com/en-us/global-infrastructure/
[4] Infrastructure as Code: https://docs.microsoft.com/en-us/azure/devops/learn/what-is-infrastructure-as-code

predictably be deployed, updated, replicated, and tore down in the cloud several times a day, if needed, just as we know it from modern software.

Such flexibility has turbocharged Agile and Lean disciplines such as Scrum, Kanban, and DevOps, supported by integrated project management software such as Atlassian's JIRA[5] and Microsoft's Azure DevOps.[6] The combination of agile project management software and cloud computing platforms eliminate the traditional dichotomy of global efficiency vs. multinational flexibility; rather, a synergistic trend emerges with the two goals mutually reinforcing each other, pushing progress toward the kind of exponential rate of change that is characteristic of the fourth industrial revolution. However, "moving to the cloud" and "implementing agile practices" are not enough if organizations are to compete on transnational conditions. As the pace of change continues to accelerate, new methods are needed for the constant re-skilling of people: *worldwide learning*.

3.4 Worldwide learning

As described above, cloud platforms and related technologies provide rich opportunities for simultaneously achieving both global efficiency and multinational flexibility for modern organizations. The cloud providers' marketing campaigns give the optimistic impression that everything becomes easier and more efficient in a snap. However, the constantly accelerating pace of change within the fields of cloud computing, combined with the increasingly interdisciplinary nature of the skills needed to effectively sense and seize the opportunities created, make it increasingly difficult for people and organizations to keep up and learn new skills while letting go of obsolete skills. Add to this the complexity of maintaining and integrating legacy IT systems supporting organizational structures of yesteryear. Such obstacles to learning and moving forward toward the transnational mentality must not be underestimated, as also explicitly identified by Bartlett & Beamish: *"Although people are innately curious and naturally motivated to learn from one another, most modern corporations are constructed in a way that constrains and sometimes kills this natural human instinct"* (Bartlett & Beamish, 2018, p. 295). This calls for abandoning past mentalities' view on education as something primarily targeted young people

[5] Atlassian JIRA: https://www.atlassian.com/software/jira
[6] Azure DevOps: https://azure.microsoft.com/en-us/services/devops

before entering the workforce, and it is a kind of administrative heritage that has proved difficult to overcome.

The tech industry is very much aware of the fact that effective learning is paramount for their customers to reap the benefits of their products and solutions. As a result, these years the large platform companies such as Microsoft and Google are revamping their approach to documentation and learning offerings. For example, in 2016, Microsoft launched Microsoft Docs,[7] the central go-to source for online up-to-date technical documentation across all Microsoft's products and service offerings in a Wikipedia-like format where users are invited to contribute to the content. This was recently expanded to include Microsoft Learn,[8] which introduces a *gamified* approach to learning about Microsoft's products and service offerings using bite-sized lessons of typically 30-60 minutes each, available to anyone free of charge.

Pluralsight is an example of a company, *"helping thousands of organizations **transform at scale**,"*[9] that has specialized in worldwide learning by offering subscription-based access to expert-authored on-demand video courses about all kinds of technical and creative topics with new courses published and updated on a weekly basis. Many other examples of online learning platforms abound, including Coursera,[10] co-founded by artificial intelligence scientist Andrew Ng, which offers advanced online courses created by leading universities covering specialized topics such as data science, deep learning, and self-driving cars.

These learning mechanisms are taking place on a global scale, making new and curated knowledge readily available to anyone connected to the internet, shaping global consensus and industry best practices. This also makes it easier for knowledge to transfer across national and organizational boundaries because everyone has access to the same educational resources, giving people worldwide a common frame of reference and shared context, thus increasing the four determinants that affect the degree of knowledge transfer: the sender's disseminative capacity, the receiver's absorptive capacity, the knowledge characteristics, and the organizational context (Minbaeva, 2007, see Appendix 2).

[7] Microsoft Docs: https://docs.microsoft.com
[8] Microsoft Learn: https://docs.microsoft.com/en-us/learn/
[9] Pluralsight: https://www.pluralsight.com/about
[10] Coursera: https://www.coursera.org/

There is an important cycle to observe here, because *"as technical know-how has diffused around the world, it is becoming harder to force people of all countries and cultures into a cookie-cutter mold that was often built in America for Americans"* (Lee, 2018, p. 34), which accelerated the pressure of multinational flexibility. It is worth noting that, throughout the years, such trends created windows of opportunity where early Chinese entrepreneurs saw openings for their "copycat" products, taking advantage of Silicon Valley's failure to adapt their products to the local preferences unique to China.

The synergistic result of worldwide learning by increasing numbers of transnational organizations as well as individuals throughout the world is a cross-industrial convergence of industries: *"As more and more breakthroughs and major innovations are based on interdisciplinary and inter-industry advances, the formerly clear boundaries between industrial sectors and technologies become blurred"* (Bartless & Beamish, 2018, p. 348), which brings us to the topic of *open innovation* and the resulting need for reinventing business models.

3.5 Open innovation

We have just seen how modern technology such as cloud computing helps organizations progress toward the transnational mentality by simultaneously achieving the three goals of global efficiency, multinational flexibility, and worldwide learning, and how this is breaking down the boundaries between industries, which are being ever more intertwined in a complex web of interdependencies. This greatly increases complexity and the need for interdisciplinary skills required to stay competitive in a world where innovation happens by combining a wide array of very different disciplines.

Related to this evolution toward the transnational mentality is the trend of companies moving from *closed* to *open innovation* where companies recognize their own organizational limits and open up to the outside world, commercializing third-party innovations and often contributing back their own in-house innovations to the outside world (Chesbrough, 2011, see Appendix 3). Procter & Gamble is the classic example of a 21st century pioneer of open innovation, changing corporate culture from a *"Not Invented Here"* mindset to *"Proudly Found Elsewhere,"* and often cited for stating that *"we needed to change how we defined, and perceived, our R&D organization – from 7500 people inside [the company] to 7500 plus 1.5 million outside"* (Huston & Sakkab, 2006). The

transition from closed to open innovation expresses a shift from a mentality of *scarcity* to one of *abundance* (Dewar et al., 2018).

The software industry has had a significant impact on the notion of open innovation with its *open source* movement, which gathered steam throughout the 1990s and 2000s with the Linux operating system as its most famous success story, though it can be traced further back to the Silicon Valley of the 1980s and early 1990s where companies such as Silicon Graphics, Sun Microsystems, and Hewlett-Packard successfully transitioned the Valley's focus from semiconductors to UNIX-based workstations (Saxenian, 1996). During the early 2000s, the open source movement seemed almost rebellious in nature, determined to create an alternative to the world of proprietary software represented by "evil empires" such as Microsoft. In 2001, Steve Ballmer, CEO of Microsoft between 2000 and 2014, notoriously stated that *"Linux is a cancer that attaches itself in an intellectual property sense to everything it touches"* (Tung, 2016). This stands in stark contrast to Microsoft's current official stance under Satya Nadella, the company's CEO since 2014: *"Microsoft loves Linux"* (Warren, 2016). In recent years, Microsoft has made frequent surprising headlines that illustrate its cultural change toward open source and open innovation. In 2016, Microsoft achieved the feat of being the largest corporate contributor on the world's largest open source network GitHub (Weinberger, 2016), which, incidentally, they went ahead to acquire in 2018 (Economist, 2018-II), causing quite a stir in the open source community. With Microsoft's lead designer on their programming language C#, Mads Torgersen, stating that "*we no longer treat GitHub as a publishing venue – it is simply where we work"* (Torgersen, 2018), it is clear that open source is not just about the end product, but also the process, which anyone can follow on a day-to-day basis, thereby truly embracing the concept of open innovation.

Today, open source has become an important competitive factor in the software industry, especially for platform companies that provide services to other software organizations, and it is an active part of their identity and branding, not least for the big cloud providers who seek to offer a one-stop shop for their customers' IT infrastructure needs. That means opening up for all kinds of technology, including both their own as well as competitors' products. Mike Olson, co-founder of Cloudera, noted that *"no dominant platform-level software infrastructure has emerged in the last ten years in closed-source, proprietary form"* (Asay, 2018). Being a platform company at its core, in October 2018 Microsoft made yet another major move in the direction of open source

when they announced that they were joining the Open Invention Network (OIN), *"a patent community that protects Linux and other open source software programs,"* bringing some 60,000 of the company's software patents to the network, which anybody can then use without having to pay any kind of licensing fee (Chan, 2018).

Besides responding to customers' increasing demand for open source platforms, there is also an employer branding aspect to accelerating the embrace of open source and open innovation. Microsoft and other companies have successfully been hiring high-profile people from open source communities in increasing numbers (Bhartiya, 2017), a process that is self-perpetuating once the network effect kicks in and that helps organizations drive an emerging cultural change from the bottom-up rather than top-down (Bartlett & Beamish, 2018, p. 231). The effectiveness of Microsoft's new strategy of "opening up to the world" was solidified on April 25, 2019 when it was the third company in history to reach a valuation of one trillion dollars despite missing out on the smartphone revolution (Naughton, 2019).

With the move toward open source and open innovation, big questions arise, the most prominent of which is probably: *"How do companies make a profit?"*

3.6 Reinventing business models

It is hardly surprising that the likes of Microsoft's Steve Ballmer and the corporate tech industry were skeptical of Linux and the open source movement back in the 1990s and early 2000s where the corporate world had a more traditional approach to strategy: *"Traditional business strategy has guided firms to develop defensible positions against the forces of competition and power in the value chain, implying the importance of constructing barriers to competition, rather than promoting openness,"* say Chesbrough & Appleyard (2007) as they explicitly mention Microsoft as the master of Porter's Five Forces, which sees competition as a zero-sum game, perhaps best illustrated by the "browser wars" of the 1990s between Netscape and Microsoft's Internet Explorer. But in a modern tech industry under heavy influence of open innovation, interdisciplinarity, and constant change, this is not an effective model for competition (Teece, 2007). However, the alternative raises the question of *value capture* – how to be profitable with open innovation – leading to the concept of *open strategy* where one seeks to combine principles of traditional strategy with the benefits of open innovation. Today's most prevalent strategies

include consulting services and subscription-based services, the latter becoming an increasingly popular business model as the widespread adoption of popular consumer-oriented streaming services such as Netflix and Spotify have helped consumers buy into the idea of paying for *"access over ownership,"* also known as the *"economy of access"* (Denning, 2014), a general trend that also covers services such as Airbnb, Lyft, and Uber, to mention just a few.

These trends have found their way into B2B as well, through the growing adoption of cloud computing and software-as-a-service (SaaS), enabling companies to employ an *asset-light strategy* by outsourcing IT infrastructure and similar services to cloud and SaaS providers, thereby freeing themselves to focus on their core competencies and, perhaps even more importantly, *dynamic capabilities*, a topic to which we will return in Section 5.3.

The recent advances in both the scope and scale of cloud platforms – with flexible access to virtually unlimited data storage and computing power combined with the global diffusion of digital solutions and services that collect enormous amounts of data from ubiquitous smartphones and IoT devices – have paved the way for the commoditization of services such as face, speech, and handwriting recognition as well as natural language processing and other machine learning-based services, effectively waking up a legendary man-made creation from its latest winter sleep: *artificial intelligence*.

3.7 The AI renaissance: "This time is different"

Artificial intelligence (AI) is a topic that has made several public appearances throughout the history of computer science, interrupted by several "AI winters" when the occasional burst of hype was not followed by the world-altering practical uses that consumers and investors were promised. The history of AI can be traced back as far as the 1950s, about the same time as computer science itself was being established as a distinct academic discipline. The field of AI has generally been divided in two camps: the "rules-based" approach and the "neural networks" approach.

The rules-based approach attempts to teach computers by feeding it with logical rules (like "if X, then Y"). This worked well for simple games and similar narrow domains but fell apart when applied to complex problems. Researchers tried to apply the rules-based approach to real-world problems by interviewing domain experts and coding their wisdom into "expert systems," an

approach that gained popularity in the 1980s. The rules-based approach to AI peaked in 1997 when IBM's Deep Blue defeated world chess champion Garry Kasparov. As impressive as Deep Blue was, *"in the end, the only job it was threatening to take was that of the world chess champion"* (Lee, 2018, p. 5), and public interest in AI all but disappeared during the following fifteen years.

The neural-networks approach to AI is radically different. Instead of meticulously describing rules, this approach seeks to mimic the human brain and its networks of biological neurons, then feeding a large number of examples of a given phenomenon to this system, and let the networks identify patterns within the data on their own. The field of neural networks showed promising signs in the 1950s and 1960s but was limited by the short supply of its two main ingredients: *computing power* and *data* (Lee, 2018, p. 9), leading to near-total abandonment during the 1970s and the subsequent decades where the rules-based approach enjoyed more success. In the mid-2000s, English Canadian cognitive psychologist and computer scientist Geoffrey Hinton made a breakthrough discovery of using the method known as backpropagation to efficiently train multi-layer neural networks. Combined with the advances in computing power and data storage capabilities, all the elements for effective neural networks – now termed "deep learning" – fell into place. This gathered little attention initially, but the turning point came in 2012 when Hinton's team entered their deep-learning system AlexNet in the annual online image recognition contest, the ImageNet Challenge, and set a new record of correctly labeling images 85 percent of the time, a significant improvement over the previous record of 72 percent. In 2015, improved deep-learning techniques reached an accuracy of 96 percent, surpassing the human average of 95 percent for the first time (Economist, 2016).

These recent advances in deep learning renewed AI hype throughout the West in the 2010s since deep-learning techniques can readily be applied to a wide variety of problems so long as data is available for training. Computers are now doing a better job than humans at identifying faces, recognizing speech, and issuing loans (Lee, 2018, p. 5). Two decades after IBM's Deep Blue beat the world chess champion, a new milestone was reached: In May 2017, AlphaGo, a deep-learning program developed by London-based AI company DeepMind (acquired by Google in 2014), defeated Ke Jie, the world's No. 1 ranked Go player. Compared to Western games like chess that are based on tactics and analytical thinking, the board game of Go, characterized by its extreme

complexity with a total number of possible combinations exceeding the number of atoms in the known universe, is based on patient positioning and slow encirclement, which made it more of an art form and a state of mind than a game of analytical tactics (Lee, 2018, p. 2).

Barely noticed in the West, the streaming of AlphaGo's matches against the world's top Go players in East Asia drew more than 280 million Chinese viewers, and AlphaGo's victories sparked a nation-wide interest in the field of artificial intelligence and deep learning with Chinese students enrolling in advanced AI programs and streaming lectures from international researchers on their smartphones, made possible by the mechanisms of open innovation and worldwide learning discussed in Sections 3.4 and 3.5. Furthermore, money poured in from venture capitalists, Chinese tech giants, and the Chinese government to fund AI startups. AlphaGo's 2017 victory has been called China's "Sputnik moment," referring to the Soviet Union's launch of the first human-made satellite into orbit in October 1957, which triggered an instant effect on the American psyche, led to the creation of NASA in 1958, and effectively started the space race, culminating with the American Moon landing in 1969 (Lee, 2018, p. 3). Likewise, we are now witnessing the beginning of an "AI race" between China and the United States.

Considering the fact that the West has a fifty-year head start in AI research, how China should stand a chance in this regard should be a very interesting question and one to which we will return in Section 6.6 after having looked more closely into cultural differences between Eastern and Western ways of thinking. For now, however, note how the early rules-based approach to AI essentially was an *analytical* approach to solving what is in fact an extremely *complex* problem.

3.8 Trust in the age of data

As data-driven digital services and deep-learning algorithms are moving forward, the high degree to which the tech industry affects globalization and vice versa becomes clear, though the results of this process seem increasingly difficult to predict. In recent years, we have seen signs of a "winner-takes-all" trend where network effects ensure that a company such as Facebook seems impossible for competitors to challenge since Facebook is the social network where users' networks are already present, so how can they go elsewhere? Likewise, Google has the amounts of search data needed to provide superior data-based search results to users whose continued use generates more data, resulting in a self-perpetuating widening gap to its nearest competitors. This state of

affairs has reached a point where it is affecting global politics on a grand scale, with tech giants allegedly distorting competition, abusing user data, spreading fake news, hoarding profits, evading taxes, and increasing social inequality. The Cambridge Analytica data harvesting scandal at Facebook (Solon & Laughland, 2018) is one of the most infamous examples of this, as are the antitrust cases against Google and Apple, among others, led by European competition commissioner Margrethe Vestager (Adams, 2017). These developments are reflected in the deteriorating confidence in business' motivations and ethics among younger generations who feel unprepared for the changes that Industry 4.0 is bringing (Deloitte, 2018).

These signs of increasing distrust are a major concern for cloud providers whose business models rely on their customers trusting them to not only securely manage their IT infrastructure and data stores, but also to ensure that the benefits of cloud computing, AI, and the entire fourth industrial revolution are evenly distributed while respecting the privacy of users. This may help accelerate *"the evolving attitudes of companies toward their sense of corporate social responsibility and their commitment to a strategy of sustainability"* (Bartlett & Beamish, 2018, p. 495) and the increasing notion that *"doing too well can lead stakeholders to perceive that a firm is not doing enough good"* (Carroll & Shabana, 2010). It is clear that CSR is becoming an important source of competitive advantage, and we see tech giants go to great lengths for building trust, such as Microsoft publishing *"A Cloud for Global Good: A roadmap to a trusted, responsible, and inclusive cloud,"* a 230-page document outlining potential societal ramifications of cloud computing, automation, and AI, as well as proposals for political measures.[11] In the same vein, "commitment to privacy" is becoming a new trend and a source of competitive advantage among both Google and Facebook with headlines such as *"the future is private"* (Constine, 2019).

Putting this and previous sections together, few people deny that the world has entered a "new normal" shaped by VUCA – volatility, uncertainty, complexity, and ambiguity. As the tech industry continues propelling the process of globalization forward – and vice versa – at an ever-accelerating pace, complexity goes through the roof. As also mentioned in Section 2.2, this has managers around the world *"working harder and harder to try and understand the complex forces in order to*

[11] A Cloud for Global Good: https://news.microsoft.com/cloudforgood/

plan and execute with any kind of predictability" (Lane & Maznevski, 2014, p. 12). One proposal for dealing with this increasing complexity is that of *agile project management*.

3.9 Dealing with complexity: Agile project management

The increased visibility of the VUCA factors of volatility, uncertainty, complexity, and ambiguity have made it increasingly obvious that the traditional linear project management methods with comprehensive planning and fixed milestones are ineffective. The unpredictable nature of constantly changing contextual factors make comprehensive and detailed plans obsolete in a matter of a few months or even weeks.

It is this realization that has led to the increasing adoption of *agile* project management practices, an umbrella term that covers a growing number of methodologies, processes, philosophies, and frameworks, such as eXtreme Programming (XP), Lean Startup, Kanban, and the Scrum framework, which has made it confusing as to what "Agile" actually means, making it a rather complex topic. This is ironic since the fundamental objective of agile project management is to deal with the unpredictable and ambiguous nature of *complex problems*. "Being agile" is all about *adapting* to a rapidly changing contextual environment such as today's fast-paced business environment.

First developed in the 1990s by Ken Schwaber and Jeff Sutherland, the Scrum framework is one of the earliest and most well-known of the agile practices, having also found its way into general project management literature and business school curricula (Sørensen, 2017, p. 357). Numerous books have been written about Scrum, but the official *Scrum Guide* is less than 20 pages, and from this we can quickly learn that *"Scrum is founded on empirical process control theory, or empiricism. Empiricism asserts that knowledge comes from experience and making decisions based on what is known"* (Schwaber & Sutherland, 2017, p. 4). When we deal with complex problems such as developing a software product in a complex business environment targeting an unpredictable consumer market, by using the Scrum framework we employ *empirical process control* to guide work toward the most valuable outcome possible. This is opposed to *defined process control*, which we can use when a well-defined process repeatedly will produce predictable results of acceptable quality. We generally prefer defined processes whenever possible *"because with them we can crank up unattended production to such a quantity that the output can be priced as a commodity"* (Schwaber, 2004, p. 3). This works for many manufactured physical products, but

rarely for software projects or similar knowledge-intensive work, the complex and non-linear nature of which was succinctly summarized with Brooks' Law as early as 1975: *"Adding manpower to a late software project makes it later"* (Brooks, 1995, p. 25).

Complex problems and *complicated problems* are terms often used interchangeably, but it can be helpful to distinguish between the two. Schwaber (2004, p. 2) defines complex problems as *"those that behave unpredictably. Not only are these problems unpredictable, but even the ways in which they will prove unpredictable are impossible to predict."* Grint (2005) calls such complex problems *wicked problems*. Complicated problems, on the other hand, can be very difficult problems, but they are not unpredictable. Mathematics abound with examples of complicated problems that can be very difficult but that given enough time, patience, and diligent work can be solved predictably, every time. Grint (2005) calls such complicated problems *tame problems*, a helpful term that avoids confusing them with wicked problems.

It is important to understand that the Scrum framework does not *prescribe a process*, hence the term "process *framework*." Empirical process control, as defined by Scrum, is about ensuring that whatever process we *choose to use* is producing output of acceptable quality given the current context. In order to do this, we must regularly *inspect* the output of the process and then *adjust* that process accordingly, and for this to work the process must be *transparent*. These are the three pillars upholding empirical process control: *transparency*, *inspection*, and *adaptation*, which are facilitated by the four scrum *events* organized around the concept of a scrum *sprint*. A sprint has a fixed duration of typically 2-4 weeks, in which the *self-organizing* scrum team produces another increment of the product in question. The four scrum events that occur during the course of every sprint are:

1) **Daily scrum meeting.** Every day the entire scrum team meets to synchronize their work with this short 15-minute meeting designed to ensure *transparency* so the team can *inspect* and *adapt* on a daily basis.
2) **Sprint review meeting.** By the end of every sprint, the team has produced another increment of the product in question and presents this at the sprint review meeting where stakeholders (and possibly end users) *inspect* the product and provide feedback so the team can *adapt* accordingly in the next sprint. Is the product evolving in the right

direction? Has organizational, technological, regulatory, or market conditions changed in ways that should be taken into account in the coming sprints?

3) **Sprint retrospective meeting.** After the sprint review meeting, the scrum team *inspects* itself and their process, *adapting* the process as needed.
4) **Sprint planning meeting.** Before starting a new sprint, the team forecasts how much and what it will be able to produce during that sprint. Historical data from previous sprints facilitate *transparency* and provide valuable empirical insight into the overall progress, helping the team *inspect* the process and *adapt* accordingly, carefully steering the project in the right direction as the contextual environment evolves.

These four scrum events, occurring with regular intervals and demarcating the end and beginning of the fixed-duration sprints, infuse some predictability into an otherwise unpredictable environment, reduce information asymmetry between scrum team and stakeholders, and bring a sense of stability and rhythm – a heartbeat – to the project in question. If done well, Scrum (and other agile practices) should result in synergies that over time continuously improve the scrum team's overall effectiveness while providing value on a regular basis. It is the job of the project's *Scrum Master* to ensure that everyone involved understands Scrum and its practices so the project's potential can be unleashed.

However, this has proven to be much easier said than done, as can be seen from heated discussions (e.g., on LinkedIn) about what Scrum (or Agile) is and is not. Apparently, there are a lot of myths and misconceptions surrounding Scrum and other agile practices. It is worth noting that being agile is not about running faster, but about responding effectively to change in a sustainable manner. It is not about improving short-term efficiency; most scrum teams will in fact slow down when first starting out because it takes time to establish the feedback loops and collect the empirical data that facilitate transparency, inspection, and adaptation. And the scrum meetings are not about imposing a strict rules-based process for the scrum team to follow; the intention is in fact the exact opposite of this: to improve flexibility. To make such things clear, in 2001, a group of experienced software developers gathered to formulate the now-famous Agile Manifesto:[12]

[12] Manifesto for Agile Software Development: https://agilemanifesto.org/

We are uncovering better ways of developing software by doing it and helping others do it.

Through this work we have come to value:

Individuals and interactions over *processes and tools*

Working software over *comprehensive documentation*

Customer collaboration over *contract negotiation*

Responding to change over *following a plan*

That is, while there is value in the items on the right, we value the items on the left more.

Still, misunderstandings prevail and have led to several frustrations and failed "Agile" projects. Even the original creator of Scrum, Ken Schwaber, bluntly stated that *"some Scrum Masters just don't get it, no matter how much they've read about Scrum"* (Schwaber, 2004, p. 25).

Explaining the Scrum philosophy and other agile principles to people who have been taught traditional deterministic approaches to project management with detailed plans, Gantt charts, and work schedules has proved to be a difficult task throughout the Western world. To understand why, it may help to take a closer look at people's underlying worldviews, assumptions of reality, and ways of thinking. Then we find indicators pointing out that *"abstract linear thinking is so pervasive in Western culture that people often don't notice its use"* (Brett, 2014, p. 33), as we also discussed in relation to this project's methodological approach in Chapter 2. Before introducing agile philosophies and practices to traditional Western managers, then, the real challenge to tackle may be to facilitate a mindset shift toward a more holistic *systems-oriented* way of thinking.

"As software is eating the world," and the entire tech industry is affecting every other industry, thereby moving the world toward an increasingly systems-oriented way of working and thinking that seems counterintuitive to traditional Western ways of thinking, a very interesting question emerges: *How do Eastern ways of thinking relate to a systems-oriented worldview and the ability to deal with complexity?* Does China have an intrinsic competitive advantage in the "new normal" of VUCA? Such questions are the topic of the following chapters.

3.10 Summary

With contextual complexity being a main theme of this project, it would not be complete without a thorough analysis of the contextual factors affecting globalization and the tech industry, as well as the complexity of the bidirectional cause-and-effect relationships between them.

This chapter reviewed the global trend in international business toward *transnational organizations* and how the solutions and services of the tech industry in general, and cloud computing in particular, help organizations move toward the transnational goals of *global efficiency*, *multinational flexibility*, and *worldwide learning*.

This trend increases complexity and blurs the formerly clear boundaries between industrial sectors and technologies. As a consequence, it is no longer feasible for any single company to develop and retain the knowledge and resources required to continuously innovate and stay competitive, which is why organizations are moving toward *open innovation*. This in turn puts pressure on companies to *reinvent their business models*, with subscription models promoting access over ownership being one of the most popular ways of capturing value in this new business environment.

Taken together, these advances in technology and business models have commoditized advanced artificial intelligence and deep-learning technology such as face, voice, and handwriting recognition, as well as natural language processing, machine translation, and personalization, ushering in a new era of *data-driven* companies where data is the "new oil," opening up a slew of new questions about ethics, privacy, and *trust*.

Clearly, complexity has been on the rise for several decades, which is why companies throughout the world are adopting *agile practices* in order to effectively deal with this "new normal" shaped by the VUCA factors of *volatility*, *uncertainty*, *complexity*, and *ambiguity*. However, with the traditional *analytical view* deeply rooted in Western thinking, adopting the agile principles has proved difficult, since this calls for a more holistic *systems-oriented view*.

In the following chapters, we turn to China, perhaps the most complex country on earth, to see if they, compared to the West, should have some intrinsic competitive advantage regarding complexity management.

4 The complexity of China: Crossing the river by feeling for the stones

China is a country unlike any other. With a population of 1.4 billion, China is the world's most populous country with more inhabitants than the United States (327 million) and the European Union (512 million) combined. Politically and economically, it is interesting to observe how China rose from poverty and famine during its Maoist isolation to its impressive growth rates sustained over the course of three decades between 1980 and 2010 (OECD, 2017, see Appendix 4), which is now being followed by the rise of a vibrant tech industry, possibly leading to what some commentators predict may become the world's leading AI superpower (Lee, 2018).

In many ways, China seems to defy common wisdom and attempts at generalization. For example, *"collectivistic societies such as Japan often have a hard time fostering entrepreneurship"* (Peng & Meyer, 2016, p. 10), yet China, which is also a collectivistic society, is brimming with government-supported entrepreneurship under the banner "Mass Innovation and Mass Entrepreneurship" (Lee, 2018, p. 54).

In this chapter, we look into China's complex path to prosperity and some of the uniquely Chinese characteristics and thinking behind it in an effort to shed some light on the "big question" of international business: *"What determines the success and failure of firms around the globe?"* (Peng & Meyer, 2016, p. 9), though here, of course, we narrow this question to *tech* firms in *China*. We will first take an *institution-based view* to see how the political and economic institutions shape the opportunities for Chinese businesses and entrepreneurs. In the next chapter, we move to the *resource-based view* where we take a closer look at how the Chinese tech entrepreneurs develop their innovative capabilities.

4.1 The institution-based view

In the institution-based view, we consider the formal and informal "rules of the game" (Peng & Meyer, 2016, p. 10). The *formal* rules are shaped by political, economic, and legal institutions, whereas the *informal* rules are those shaped by culture, religion, and language. My analysis of China in this section is loosely based on the PIE model (Mygind, 2007), which considers politics, institutions, and economy as components of a dynamic system that interacts with each other as well as with the surrounding world. As such the PIE model is a systems-oriented model, as opposed to the more static PESTEL checklist, which I will not be using. This will not be a

comprehensive PIE analysis of China, since the purpose here is not to provide a European enterprise with a decision tool for whether or not to enter the Chinese market or similar decisions. Rather, as we seek to *learn* from China's rising tech entrepreneurs, we should try and understand the political and economic *context* in which they operate, though these formal institutions are likely outside influential reach of most European organizations. The *informal* institutions, i.e., primarily the cultural characteristics of China, will be discussed in detail in Chapter 6, as these *could* serve as inspiration for assessing culture in European organizations.

4.2 Politics

China's political system is fundamentally different from typical Western models, and this makes China and Chinese organizations difficult topics for Western analysts who may tend to view developments in China through the same lens as they view developments in the West. To avoid falling into this SRC (self-reference criterion) trap, before looking closer at China's tech entrepreneurs, we need an overview of China's political environment. Kroeber (2016) identifies three main features of China's unique and resilient political system, and understanding these is a *"prerequisite for making sense of the country's economic past, present, and future"* (Kroeber, 2016, p. 1):

1) China's system is *bureaucratic-authoritarian*. This means that it is not a democracy, but contrary to popular belief, it also means that China is not a dictatorship like countries ruled by a single individual or small group of people whose authority supersedes all bureaucratic institutions. Rather, authority resides in the Communist Party, which selects its leaders who are subject to term limits, retirement ages, and are required to obtain consensus from the rest of the leadership group on policy decisions. Rarely seen in modern authoritarian regimes, China has achieved three successive transfers of power from one living leader to another unrelated one. Deng Xiaoping was the paramount leader from 1978 to 1992 where he transferred control to Jiang Zemin who retired in 2002 and ceded control to Hu Jintao who was followed in 2012 by current leader Xi Jinping. This circulation of leaders has made the Chinese state more stable and resilient than other authoritarian states and is said to ensure that the system does not get captured by old leaders resistant to change (Kroeber, 2016, p. 3). It should be noted here, however, that Xi Jinping seems to be tightening

control and consolidating power to such a degree that some call it China's *Third Revolution* (with Mao's being the first and Deng Xiaoping's the second) (Economy, 2018).

2) China is a *one-party state* with the Communist Party as the sole legal party. This party does not consist of a few secretive leaders; it is a vast organization of some 86 million members, more than 5 percent of China's population, that reaches far into government, courts, media, companies, universities, and religious organizations, from where ground-level information feeds into a policy-formation process in Beijing, adjusting policies as conditions change (Kroeber, 2016, p. 4).
3) China is formally centralized, but *in practice highly decentralized*. The Communist Party controls the bureaucracy at all levels of government and centrally appoints senior leadership of all provinces and many cities. However, local governments enjoy a high level of discretion and autonomy. A measure of decentralization is the share of government expenditure that takes place at the subnational level. In 1972-2000, this figure averaged 25 percent for democracies and 18 percent for nondemocracies. In 2014, China's figure was 85 percent, making China's level of fiscal decentralization *"unusually high by any standard, and extraordinary for an authoritarian country"* (Kroeber, 2016, p. 4). China's decentralization can be traced back to the Maoist era and is partly due to the country's immense geographic diversity and poor transportation links, but it was also a deliberate insurance against attack by the Soviet Union or the United States: If one or more major industrial areas should be wiped out, production of daily necessities and military equipment could continue in the remaining regions. Deng Xiaoping exploited this existing decentralization in the economic reforms beginning in 1979, which stressed local experimentation. The most prominent example of this may be the creation of "special economic zones" (SEZ) where special rules on taxation and investment created business-friendly environments far more liberal than the rest of the country (Kroeber, 2016, p. 5). The best known SEZ is probably the city of Shenzhen (in the southern province of Guangdong neighboring Hong Kong), which grew from 30,000 inhabitants in 1980 to 12 million today and has fostered tech giants such as Huawei, Tencent, and world leader in drone technology DJI.

From a Western perspective, we see a paradox here that defies common wisdom: authoritarian politics and a dynamic, decentralized economy do usually not mix well for long, as illustrated by the Soviet Union, whose economy stagnated leading to political collapse, or South Korea who was forced to open up their political systems in 1988 after years of economic growth. But where Western analysts see a contradiction, Chinese leaders see complementary synergy: The tight political control provides the stability within which economic activity can be decentralized, and the higher living standards resulting from rapid economic growth enhances the party's legitimacy. For Deng Xiaoping, economic growth had highest priority with political reform a distant second, which was the opposite of the Soviet Union who began with political reforms hoping to unblock resistance to economic reforms (Kroeber, 2016, p. 8). This approach combined with the flexibility and agility coming from decentralized experimentation with effective feedback loops are important factors in explaining China's impressive growth rates sustained over three decades. Whether continued economic growth eventually will lead to political reforms is a topic of debate, but for now it seems that the party has successfully strengthened its legitimacy, and for most people the risk of sacrificing economic growth for another, untried system would apparently seem to be too high (Kroeber, 2016, p. 9).

4.3 Economy

By 1979, after China's period of Maoist isolation, the country was far behind in technological terms, so in order to achieve economic growth it needed to initiate a process of "technological catch-up," a typical requirement for a poor country to get rich because the technology is necessary to boost the productivity and economic output of its workforce in order to become competitive. This is a very complex endeavor and must be done in several phases. First, they must acquire technology from rich countries, but in order to fund this, one key ingredient is to develop the country's export-oriented manufacturing capabilities by leveraging one of the few natural endowments it does have, namely plenty of cheap labor, thereby earning the foreign exchange needed to buy the capital equipment that enables production higher up in the value chain (Kroeber, 2016, p. 11). At the same time, the state must control the financial markets so it can strategically direct capital to favored sectors, which is achieved through a set of practices known as financial repression comprising regulated low interest rates, undervalued exchange rates, and

capital controls to compel profits to be reinvested in the domestic economy rather than moving abroad (Kroeber, 2016, p. 12).

Similar strategies were used by Japan, South Korea, and Taiwan in the 1950-1980 period, and variations can in fact be traced back to the 19th century when Germany and the United States were the most successful "catch-up" economies (Kroeber, 2016, p. 13). However, China's strategy differed from that of the other East Asian countries by relying heavily on inward FDI, and the special economic zones were designed to attract foreign companies to set up factories in China. Some Chinese critics complained that this was renting out cheap Chinese labor to foreign capitalists, but after the Maoist isolation, it was also a way of rapidly importing foreign technology and intangible know-how such as management and engineering techniques. In contrast, Japan, South Korea, and Taiwan did not permit substantial FDI, but one should keep in mind that all three of these countries were part of the United States alliance network in East Asia and thus benefited from technical assistance, educational exchange programs, and access to America's booming markets, privileges that were not as readily available to China (Kroeber, 2016, p. 14).

Another unique aspect of China's growth strategy is the sheer size of the Chinese population, which presents both constraints and possibilities, as summed up by Premier Wen Jiabao: *"When you multiply any problem by China's population, it is a very big problem. But when you divide it by China's population, it becomes very small"* (Kroeber, 2016, p. 12). When people from the West visit China and observe the visible amounts of inefficiency and waste, many conclude that the economy will soon hit a crisis. But they forget that in a country of China's size, such waste can be irrelevant when the overall objective of meeting basic needs is effectively achieved. China had the size to emphasize *quantity over quality* in order to turbocharge a high-speed growth model (Kroeber, 2016, p. 22). Today, however, as the population ages and growth rates are slowing, China faces the challenge of rebalancing its economy from investment to consumption (OECD, 2017, p. 14), likely requiring a shift away from *mobilization of resources* to more *efficiency of resource use* (Kroeber, 2016, p. 210).

China's sustained economic growth path since 1980 may seem like a "grand plan" masterfully executed based on meticulous planning with a long-term orientation, but that is far from the truth. China's leaders themselves famously describe the country's economic "strategy" as *"crossing the river by feeling for the stones,"* an uncertain process of experimentation guided by

broad aims and principles, but without any predetermined path (Kroeber, 2016, p. 16), though one official reportedly admitted in private that it was more like *"walking a tightrope over a bottomless pit – and the rope behind you is on fire"* (Kroeber, 2016, p. ix), which would also help explain why Deng Xiaoping so diligently promoted *"practice over dogma"* with an explanation that defined a generation: *"What does it matter if a cat is black or white, so long as it catches mice?"* (Clissold, 2014, p. 220)

4.4 Institutions

As China has changed rapidly throughout the reform era, so has both its formal and informal institutions. This presents yet another paradox, because the key role of institutions is to *reduce uncertainty* so that businesses can plan for the long term, predict returns on investment, and trust partners to carry out obligations set out in a contract (Peng & Meyer, 2016, pp. 33-34). Having no such stable environment, entrepreneurs had to build businesses that were able to change as China changed (Tse, 2016, p. 16). Furthermore, since there were no private businesses in China during the Maoist era, most of China's early entrepreneurs started from scratch, often having no experience running a private business. Today, after 40 years of economic reforms, at least three-quarters of China's economic output is accounted for by the private sector (Tse, 2016, p. 14). In this rapid transformation of China from a socialist, state-controlled economy to a vibrant, market-driven one, China's private entrepreneurs have had to learn as they went along, *"crossing the river by feeling for the stones,"* just like China's leaders (Tse, 2016, p. 17).

In the 21st century, many of China's young entrepreneurs are still at most one generation away from poverty, and a *scarcity mentality* continues to be deeply ingrained in Chinese culture. In addition, with many being only children as a result of China's one-child policy effective 1979-2015, the new generation of entrepreneurs carry on their backs high expectations from two parents and four grandparents. Consequently, the ultimate goal for many of China's entrepreneurs is not to "change the world" with lofty mission statements, as is the norm among affluent entrepreneurs in Silicon Valley; in China, the primary objective is to make money, and *"they're willing to create any product, adopt any model, or go into any business that will accomplish that objective"* (Lee, 2018, p. 27). Another difference to keep in mind is that in 1998, the year when Google was founded, only 0.2 percent of China's population was connected to the internet compared with 30 percent in the United States, so China's early tech entrepreneurs had no role models within their home

country. Instead, they looked abroad and tried to copy the success stories of Silicon Valley (Lee, 2018, pp. 33-45). Wang Xing (born 1979) is one of the most well-known of these early Chinese *"copycats,"* having copied both Facebook and Twitter before hitting it big with Groupon clone Meituan-Dianping, founded in 2010 in Beijing, and in 2018 the fourth most valuable startup in the world, valued at $30 billion (Lee, 2018, p. 49). Together, this cultural acceptance of copying, a scarcity mentality, and a willingness to enter any promising industry, have created a fiercely competitive environment of lean "gladiatorial" Chinese tech entrepreneurs (Lee, 2018, p. 28) who may have started their careers as copycats, but in the 2010s have been driving innovation in their own unique ways and in some cases even turned the tables, e.g., with Facebook now copying WeChat (Economist, 2019-I).

The 2010s showed early signs of promise for China when Lei Jun founded Beijing-based Xiaomi in 2010, selling low-cost smartphones and only took a few months to reach a revenue of $1 billion; in 2014, Xiaomi sold a total of 61 million phones, beating its initial target for the year of 40 million (Tse, 2016, pp. 67-68) and became number one in China by units sold, ahead of Samsung, Apple, and Lenovo (Peng & Meyer, 2016, p. 506). With sleek design and using the same high-quality suppliers as Apple and Samsung, Xiaomi was able to cut costs by selling its phones online and quickly iterating new product versions based on direct user feedback, thus building community around its products and taking advantage of the Chinese entrepreneurial spirit. CEIBS professor Jane Wang observed*: "Xiaomi stands out as something different. What does this say about its users? It says: I'm experimental, I'm willing to give new ideas a try and I'm really leading the trend"* (Peng & Meyer, 2016, p. 508). We can see signs of individualism here, but at the same time, Xiaomi manages to emphasize community, with founder Lei Jun's words: *"Xiaomi is not selling a product, but an opportunity to participate"* (Tse, 2016, p. 69), thus blending individualism with in-group collectivism (Peng & Meyer, 2016, p. 79).

By 2010, only about one-third of China's population had internet access, and ordinary computers were still too expensive for many people, so the cheap smartphones in the early 2010s enabled millions of people to leapfrog over computers and use their new phones to go online for the first time (Lee, 2018, p. 57). When Shenzhen-based gaming giant Tencent added mobile payments to their social-media app WeChat in 2013, and in 2014 launched a digital version of the Chinese New Year gift-giving tradition of sending money in "red envelopes," millions of people instantly linked

their bank account to their WeChat Wallet, thus leapfrogging directly from cash to mobile payments, skipping credit cards (Economist, 2019-III). In the following years, Chinese startups applied mobile payment technology to *"every nook and cranny of Chinese urban life, including food delivery, electricity bills, live-streaming celebrities, on-demand manicures, shared bikes, train tickets, movie tickets, and traffic tickets"* (Lee, 2018, p. 61), shaping what in the 2010s is being called China's unique alternate internet universe, seamlessly integrating the online and offline worlds, often called O2O (online-to-offline). This in turn is creating massive treasure troves of valuable data about people's behavior both online and offline; data that is now set to fuel Chinese AI enterprises in the coming years.

As the Chinese tech entrepreneurs were driving new growth and innovation, China's government saw opportunities for pushing these trends even further. In 2010, Beijing began the process of creating a Silicon Valley-inspired innovation ecosystem in the city's technology hub Zhongguancun by clearing out a street of old inhabitants and providing rent subsidies to VC firms, startups, incubators, and service providers (Lee, 2018, p. 53). In 2014, this was scaled across the country under the official banner of "Mass Innovation and Mass Entrepreneurship," providing quality space and money for tech startups, which resulted in 6,600 new startup incubators around the country. This has been criticized as being highly inefficient, but again, with China's massive size, this can also be extremely effective, especially because the collectivist nature of China means that when an industry or activity receives government endorsement, the entire population seems to move at the same time (Lee, 2018, pp. 63-65). As Chinese tech startups and giants have been collecting huge amounts of data throughout the 2010s, the government has taken the next step by publishing "The Development Plan for a New Generation of Artificial Intelligence" in July 2017, in line with the AI fever sparked by the AlphaGo matches, and followed up with similar subsidies and an official ambition to make China the global leader in AI by 2030 (Lee, 2018, p. 98).

4.5 Discussion of the institution-based view

When looking at the evolution of China's economy and tech industry from a traditional Western institution-based view, it seems full of paradoxes. Instead of reducing uncertainty and increasing stability, as is what we typically look for when assessing the institutions of a country, all sectors of China seem to be accelerating all the VUCA factors of volatility, uncertainty, complexity, and

ambiguity. China's government is taking an experimental approach to solving problems while at the same time encouraging its population to do the same at the ground level.

One aspect that makes this possible for China is the sheer size of the country, which makes it possible to test out new ideas on a large scale. In some ways, this seems similar to the benefits of the massive scalability of cloud computing. On the same note, the experimental nature of China's government and the entrepreneurial nature of its citizens remind us of the agile principles and the systems view. The focus on empiricism and effective feedback loops emphasized by the agile practices can also be found in ancient Chinese history, as Song Dynasty reformer Zhu Xi (1130-1200) wrote: *"Actual investigation of things is the surest way to get knowledge"* (Clissold, 2014, p. 220). Looking back at the four fundamental principles of the Agile Manifesto in Section 3.9, Deng Xiaoping's "practice over dogma" could easily fit in as a natural candidate for a fifth agile principle.

This experimental and extremely practice- and learning-oriented nature of Chinese ways of doing things even seems like the *"perfect distillation of the Lean Startup model often praised in Silicon Valley"* (Lee, 2018, p. 27) with its "build-measure-learn" feedback loop (Ries, 2011, p. 75). This may come as a surprise to many in the West, some of whom mostly think of China as a rigid rules-based society with its authoritarian one-party political system and how it censors and controls the internet and other media, e.g., by blocking access to Western social-media sites such as Facebook, Twitter, and YouTube, as well as Google services such as Search and Maps. *"This censorship is real, pervasive, and in many respects harmful"* (Kroeber, 2016, p. 4), and it may resemble some kind of alternative attempt at infusing a sense of institutional stability amid all the uncertainty.

It will be interesting to see how the censorship is going to affect China's push for further innovation in the coming years, and vice versa. In 2013, the government tried to block the code-sharing site GitHub (acquired by Microsoft in 2018), but this only lasted a few days after waves of protests. With GitHub being a central infrastructure piece for worldwide learning and open innovation, as discussed in Section 3.5, cutting off China from this platform would be disastrous to China's innovative capabilities. In March 2019, this led to some controversy as Chinese tech workers launched a popular campaign on GitHub called 996.icu, referring to 12-hour workdays from 9am to 9pm, six days a week, with the final destination likely being "intensive care unit," hence the *icu* abbreviation (Economist, 2019-IV). Time will tell if the use of GitHub as a platform

for activism is an emerging trend, and if so, how China's government will deal with it without jeopardizing innovative growth.

Most would agree that censorship hinders innovation. However, a side effect might be a sharpened sense among Chinese people to read between the lines, deal with ambiguity, and generally improve their contextual intelligence in the already high-context Chinese culture, thus actually improving their abilities to deal with the VUCA-shaped world of today. In Chapter 6, we will take a closer look at such cultural traits of China compared to the West.

A key take-away from the institution-based view is how China's general *"emphasis on practice-based investigation rather than rigid rules makes the Chinese some of the most flexible people on earth"* (Clissold, 2014, p. 220). Such traits in human resources are in high demand when building out a company's assets and capabilities in knowledge-intensive and rapidly changing industries, a topic generally treated from a resource-based view, coming up in the next chapter.

5 Leveraging complexity: China's agile tech innovators

Where the institution-based view looks at the surrounding environment in the belief that it is the formal and informal rules established there that determines the success or failure of a company, the resource-based view puts emphasis on the belief that the success or failure of a company is determined by its internal resources and its ability to put those resources to good use. The institution-based view is well suited when assessing a specific country, such as China, since that would be of interest to many companies looking to operate there. The resource-based view is more often used to analyze a specific company and its internal organization, and thus it is more difficult to use in a generalized manner at the macro and meso levels, which are the focus of this project.

However, it would be interesting to take the previous discussion of an institution-based view of the Chinese tech industry and extend it into the resource-based view. As we saw in the previous chapter, Chinese enterprises were far behind the West for decades in terms of skills and know-how, and in terms of technological and reputational resources. Looking at China from the institution-based view, we also saw how the government and Chinese culture helped "compensate" for this lack of resources while pursuing economic growth and technological catch-up. As China and its tech industry have since matured, the Chinese enterprises have seemingly developed their own sources of competitive advantage. It would be interesting to switch to the resource-based view and see how China's entrepreneurs may now be compensating for weak spots in China's unpredictable institutions.

5.1 The resource-based view

When taking a resource-based view of a company, a typical approach is to identify the company's internal resources in order to find sources of competitive advantage. Here we typically distinguish between *primary resources*, which are the productive assets of a company, and *capabilities*, which are the company's ability to use those resources to achieve organizational objectives. Primary resources are further categorized into:

1) *Tangible resources*, such as financial (e.g., cash and securities) and physical (e.g., plants and equipment).
2) *Intangible resources*, such as technological patents, brands, and reputation.

3) *Human resources*, such as skills of employees, collaboration abilities, and organizational culture (Peng & Meyer, 2016, pp. 90-92).

Capabilities can be more difficult to identify and quantify, but it is generally agreed that for the primary resources to be useful in developing competitive advantage, a strong organizational ability to use those resources is required. One way of assessing capabilities is to categorize them after what outcome the company delivers particularly well. For example, companies such as Apple and Google are generally said to have strong capabilities in innovation, while Amazon and Alibaba demonstrate capabilities in logistics and service (Peng & Meyer, 2016, pp. 93-95).

The VRIO framework (Barney, 1991; Peng & Meyer, 2016, pp. 97-101) is a common tool for determining whether a resource is a source of competitive advantage. When using the VRIO framework we consider four aspects of a resource:

1. **Valuable.** The resource must add value. A resource that does not add value cannot be a source of competitive advantage; it may even lead to a disadvantage. Sometimes, a resource that once added value, stops adding value and becomes a burden. For example, in many organizations, having a large number of powerful servers in-house was a valuable resource because it was necessary to serve their customers. However, as more competitors outsource their IT infrastructure to cloud providers such as Azure or Amazon and start reaping the benefits in terms of scalability and flexibility, as described in Sections 3.2 and 3.3, maintaining your own physical servers in-house is becoming more of a competitive disadvantage.
2. **Rare.** A resource may be valuable, but if everyone else has it, it cannot be a source of competitive advantage; it can at best be a source of competitive *parity*. In the digital world of open innovation and cloud computing, practically everyone has access to cutting-edge software and virtually unlimited amounts of storage and computing power, and therefore such resources are not sources of competitive advantage.
3. **Imperfectly imitable.** Valuable and rare resources can be sources of *temporary* competitive advantage. But if competitors can easily imitate them, they will not be rare for long. Physical resources are typically easy to imitate while intangible and particularly human resources often are harder to imitate. Companies often complain that it is difficult to find people with the appropriate skills in the STEM fields. Such skills are valuable and

rare. But they should arguably not be too hard to imitate these days since the proliferation of worldwide learning and on-demand online courses are instantly available to anyone, as we saw in Section 3.4. Still, many human resources are hard to imitate because of *causal ambiguity* and *social complexity* – how exactly do you replicate a unique organizational culture somewhere else? That is a good example of an imperfectly imitable resource, and it may therefore be a source of competitive advantage.

4. **Organization.** Even if a resource is valuable, rare, and hard to imitate, and therefore a source of competitive advantage, it may not be a *sustainable* competitive advantage if the organization is not able to appropriate the value for itself. A software company may have a unique organizational culture that is rare, hard to imitate, and valuable – maybe users love their apps – yet if the company is unable to make a profit from their efforts, it is not a source of sustainable competitive advantage. Examples of such companies seem to abound in today's tech industry, such as the increasing number of tech unicorns (i.e., privately held startup companies valued at over $1 billion), in both Silicon Valley and China, that are not making any profits (Economist, 2019-V).

It seems clear that it is increasingly difficult to gain a competitive advantage in today's tech industry, and as the pace of change keeps accelerating, it is difficult even to gain a temporary one. Open innovation and worldwide learning may have leveled the playing field in some regards, but it has also pushed the pace of change to an exponential rate where the skills you learn today will likely be obsolete tomorrow, and where the competitive advantage you thought you had has become irrelevant. *"Managing change is difficult because managers cannot plan effectively"* (Brown & Eisenhardt, 1998, p. 6), but that is the VUCA reality of today. Zhang Ruimen, CEO of Qingdao-based appliance maker Haier, points to a consequence of this: *"Companies can no longer think about establishing a defensible position for themselves and their products; instead, they can only think of creating the means to transform themselves over and over again"* (Tse, 2016, pp. 21-22). Jack Ma, CEO of Alibaba, speaks of their jump strategy: *"If you plan, you lose; if you don't plan, you win"* (Tse, 2016, p. 40). And Jeff Bezos, CEO of Amazon, said: *"If you are planning more than twenty minutes ahead in this environment, you are wasting your time"* (Harford, 2018, p. 136). While many enterprises are struggling to keep up with change, others are thriving, and a few set the pace for the rest to follow. There is a strategy for effectively positioning a company

somewhere between structure and chaos in this continuously deforming landscape. This strategy is called *competing on the edge*.

5.2 Competing on the edge

We have seen how the region of Silicon Valley has exhibited systems-oriented characteristics since the 1970s. In the 1990s, Brown & Eisenhardt (1998) studied such industries shaped by continuous change and coined the term "competing on the edge" for the strategy employed by the most successful companies in such environments. Today, China's business environment and particularly its tech entrepreneurs are exhibiting very similar characteristics, but on a much larger scale. Arguably, *"China will be the place where companies develop the competing-on-the-edge skills they need to thrive in the next decade and beyond"* (Tse, 2016, p. 188). As the high-velocity and unpredictable nature of Silicon Valley and China is spreading throughout the rest of the business world, there may be much to learn from this approach to strategy and how the Chinese entrepreneurs are employing it.

The key strategic challenge of competing on the edge is *managing change*, and competing on the edge distinguishes between three levels of managing change (Brown & Eisenhardt, 1998, p. 5):

1. **Reacting to change**, e.g., when competitors launch new products, governments issue new policies, or when customer demands change. Many of China's copycats of the 1990s and 2000s were primarily reacting to changes coming out of the West, and the general objective of China's entrepreneurs was that of catching up (Tse, 1016, p. 21).
2. **Anticipating change.** This is the more proactive variant of the reactive approach and is about sensing opportunities and threats before they happen so the enterprise can line up resources and develop corresponding marketing channels ahead of competitors. Today, we can relate this to the concept of data-driven organizations who set up tight feedback loops to inform decision-making. E.g., Xiaomi anticipated customer demand for low-cost, high-quality smartphones and validated its hypothesis with an online pre-selling model, reaching $1 billion in revenue a few months after the company was founded in 2010 (Tse, 2016, p. 67; Peng & Meyer, 2016, p. 508).
3. **Leading change.** This is the level where the enterprise does not have to react to or anticipate change because it sets the pace for others to follow. Google is the obvious

example in the search engine field where the company effectively dictates the pace. E.g., when Google updates and adjusts its search ranking algorithm, the SEO (search engine optimization) industry starts spinning worldwide as enterprises seek to maintain their search rankings on Google. In China, the new-economy superstars such as Tencent and Alibaba are setting the pace, e.g., in the field of mobile payments.

Traditional approaches to strategy focus on the question *"where do you want to go?"* before tackling the follow-up question *"how are you going to get there?"* Competing on the edge, on the other hand, takes a systems-oriented approach and puts emphasis on the organization's ability to manage change, tackling both questions simultaneously, and letting a *semicoherent strategic direction* emerge from that organization. Such a semicoherent strategic direction is characterized by being *unpredictable*, *uncontrolled*, *inefficient*, *proactive*, *continuous*, and *diverse*. It is created from a relentless flow of continuous advantages made possible by the organization's ability to change continuously. Such an organization masters three core concepts (Brown & Eisenhardt, 1998, pp. 7-15):

- **The edge of chaos.** When competing on the edge, the company is in a natural state between structure and chaos. The organization is sufficiently rigid that change can be organized to happen, but not so rigid that it cannot occur. Too much structure creates a gridlock, but too little structure creates chaos. The successful company knows what to structure and what *not* to structure. The Scrum framework, discussed in Section 3.9, can be seen as a proposal of what to structure, e.g., the four scrum events, and what *not* to structure, e.g., what route the self-organizing team takes during the course of a sprint. A centrally planned economy, such as the Soviet Union, is an example of a system with too much structure, unable to change as the environment changes, leading to eventual collapse. China may be an example of a country that, though obviously difficult, has managed to balance between structure and chaos.
- **The edge of time.** When competing on the edge, the company thinks about multiple time horizons, focusing on today without losing sight of the past or the future. Being stuck in the past is obviously problematic, but by ignoring the past, you always start from scratch, not learning from experience, and you become too slow to change. Companies on the edge of time *stretch out the past* to the present and reach into the future. Scrum teams try to be

on the edge of time by planning ahead one sprint at a time (guided by a long-term product vision), taking as input the currently working product, as well as data and experience from past sprints and the current contextual environment, and then produce the next increment. A similar Chinese focus is hinted at by Song Dynasty reformer Zhu Xi: *"Actual investigation of things is the surest way to get knowledge"* (Clissold, 2014, p. 220).

- **Time pacing.** When competing on the edge, companies let change be triggered by passage of time rather than the occurrence of events. Scrum is time paced, as every sprint ends after a set duration of, e.g., two weeks. Chinese smartphone-maker Xiaomi employs time pacing by having very short launch-test-improve cycles, launching products in quick succession based on customer feedback in online forums (Peng & Meyer, 2016, p. 508). Companies that use time pacing understand the power of rhythm, get their companies into a groove, and choreograph the transitions between product launches or market entries. The increasingly popular practices of DevOps, today facilitated by automated cloud-based integration solutions, help organizations achieve this kind of time paced flow by focusing on the *"union of people, process, and products to enable continuous delivery of value to end users"* (Brown, 2015). This way, product releases become so frequent that "release day is just another day at the office."

The goal of such a competing-on-the-edge strategy is not efficiency in the usual sense; recall that occasional *inefficiency* is one of the six characteristics of a semicoherent strategic direction. Rather, the goal is *flexibility* and overall effectiveness. Similarly, when Deng Xiaoping led China's reform era beginning in 1979, he did so by letting a semicoherent strategic direction emerge from *"crossing the river by feeling for the stones,"* inefficient at times, but also very effective.

Tencent's WeChat app is the result of a semicoherent strategic direction that has been *unpredictable*, *uncontrolled*, *proactive*, *continuous*, and *diverse*. It started as a simple mobile messaging app launched in January 2011, and was fairly unimpressive, but users could send short voice recordings so as to avoid having to input Chinese characters on their phones, which was cumbersome at the time. As its user base grew, WeChat added voice and video calls, and later the app-within-an-app model that offered enough functionality for many Chinese companies who stopped building their own apps and just lived within WeChat's expanding ecosystem. In 2014, WeChat launched the "red envelope" campaign, an instant success that brought WeChat to

people's wallets, thereby paving the way for reaching into the offline world, with people using WeChat to *"pay at restaurants, hail taxis, unlock shared bikes, manage investments, and book doctors' appointments"* (Lee, 2018, p. 59). This brings in so much data about users' online and offline behavior that Tencent now is one of the world's major players in the field of artificial intelligence. Such a sequence of diverse moves could not have been predictably planned when Tencent first launched their simple WeChat messaging app in 2011.

Competing on the edge is not new. The companies in Silicon Valley were fiercely competing on the edge in the 1990s; we can recognize its spirit from Silicon Graphics CEO Ed McCracken: *"There is no steady state in this business. We have to reinvent our company continuously because our product line changes every eighteen months. If you ever slip a cycle, it's hell to catch up. It takes ten times as much effort to leapfrog"* (Saxenian, 1996, p. 143). Incidentally, Silicon Graphics (later SGI) apparently did slip a cycle, as it lost its edge throughout the late 1990s when personal computers became powerful enough to run 3D graphics software. The company filed for bankruptcy in 2009 after several failed attempts at reinventing itself. Competing on the edge is difficult, even when you know the rules, of which number one is that *competitive advantage is temporary* (Brown & Eisenhardt, 1998, p. 243). When competing on the edge, the traditional concept of *core competencies* becomes less relevant, as rapid technological change and a constantly deforming competitive landscape continuously render many skills and competencies obsolete; rather, enterprises must seek to develop *dynamic capabilities*.

5.3 Dynamic capabilities

Because core competencies tend to quickly become obsolete in high-velocity and rapidly changing environments, enterprises also need to develop their *dynamic capabilities*, which are higher-order capabilities that enable the enterprise to effectively adapt and evolve by continuously reinventing and reconfiguring its organizational capabilities. Teece (2007) developed a conceptual framework for working with dynamic capabilities by disaggregating them into the capacity to 1) sense opportunities and threats, 2) seize opportunities, and 3) effectively enhance, combine, protect, and reconfigure intangible and tangible assets, or *transform the organization*. With today's digital transformations taking place on a continuous basis in all sectors, difficult-to-imitate dynamic capabilities are now arguably the primary source of sustained competitive advantage.

I find the Chinese appliance maker Haier to be an interesting case study of how dynamic capabilities can be developed in a large organization. Haier, based in Qingdao between Beijing and Shanghai, is one of the biggest success stories of China's reform era. CEO Zhang Ruimin (born 1949) took over the company in the 1980s and transformed it from a struggling state-owned enterprise turning out poor-quality refrigerators (Tse, 2016, p. 3) to a thriving multinational enterprise, today the world's largest appliance maker with a revenue of $35 billion, and some 75,000 employees globally (Hamel & Zanini, 2018). As such, Haier is differerent from China's new-economy superstars such as Tencent and Alibaba; however, having lived through the entire reform era, it has progressed through all the phases of first catching up to the West, then anticipating changes, and now possibly leading the way for others by implementing a new organizing principle called *microenterprises* (Hamel & Zanini, 2018).

The idea behind microenterprises is to reduce organizational bureaucracy by turning the employees into a network of entrepreneurs directly accountable to customers. It does this by dividing the enterprise into an open ecosystem of small units, microenterprises (MEs), typically consisting of 10 to 15 employees. At Haier, there are more than 4,000 such MEs, divided into three main categories: roughly 200 "transforming" MEs, which are market-facing units involved with Haier's legacy appliance business but reinventing themselves as the world changes; some 50 "incubating" MEs, which are entirely new businesses experimenting with new products and emerging markets such as e-gaming and IoT-enabled refrigerators; and finally 3,800 "node" MEs, which sell components and services such as design, manufacturing, and human resources to the market-facing MEs. With an organizational philosophy of "small pieces, loosely coupled," it seeks to mimic the decentralized architecture of the internet. Besides adhering to some common standards for target setting and cross-unit coordination, MEs are free to form and evolve with little central direction. In the following we look at how this organization facilitates the three dynamic capability capacities of *sensing*, *seizing*, and *transforming*:

- **Sensing opportunities and threats.** This is about scanning and monitoring the internal and external environment for changes that can potentially lead to opportunities or threats, e.g., in the form of emergent technological trends, customer needs, both expressed and latent, as well as competitor behavior. It requires learning, interpretative, and creative skills, which may be possessed by individuals inside the enterprise, but should preferably

be formally embedded in the organization to reduce dependency on specific people who may leave the organization. Today, many organizations are becoming increasingly *data-driven* with internal data science teams who use big data and analytics tools to systematically and continuously scan and monitor the environment for patterns and changes in customer behavior, market trends etc.

At Haier, growth rates and product statistics around the world are collected by a dedicated research unit, and there are "node" MEs in the ecosystem whose primary service is to sell market research and big data services to market-facing MEs who are free to use these services or find external alternatives as they see fit.

- **Seizing opportunities.** Even if an organization has excellent capacity for sensing opportunities, it may lack the organizational capacity to seize such opportunities as they emerge. This may be due to administrative heritage, e.g., in the form of rigid committee decision-making structures or a risk-averse management, leading to various forms of anti-innovation bias. Large incumbent enterprises are often slow to explore risky radical innovations, thereby increasing the risk of being disrupted by fast-moving innovative players with novel business models and updated tech skills. Teece (2007) points out the value of staying light on assets in order to avoid inertia and stay nimble: *"In abandoning dead or dying assets, the enterprise frees itself of certain routines, constraints, and opportunities for undesirable protective action inside the enterprise."* Today, such flexibility can be achieved, e.g., by outsourcing IT infrastructure to cloud providers, thus making it cheap and easy to spin up the required infrastructure for new projects.

  At Haier, new ideas are not judged by top management. Rather, MEs usually pitch their ideas to one of Haier's venture capital partners in order to obtain outside funding before Haier contributes internal resources, typically with the option of later buying out the venture partners. ME employees also have the option to put in their own money with prospects of good dividends.
- **Transforming the organization.** Once an opportunity has been sensed and a timely decision has been made to commit the necessary resources to a viable business model, the capacity to actually transform and reconfigure the organizational assets is critical. This involves abilities such as mobilizing resources, learning new skills, transferring knowledge,

as well as integrating and coordinating a variety of specializations. Today, with online on-demand courses, worldwide learning has become more instantly accessible with both highly specialized courses as well as executive briefings to provide for "big-picture" contextual knowledge.

At Haier, MEs are self-organizing and free to buy and sell services from each other, or even buy from external suppliers outside Haier's own ecosystem. MEs can hire and fire as they see fit, and ME employees, often having their own money at stake, can vote for poorly performing leaders to be replaced.

Thus, Haier's organization is constantly transforming as its ecosystem evolves and MEs spontaneously form and self-organize to seize opportunities as they emerge (Teece, 2007; Hamel & Zanini, 2018). Interestingly, this concept of creating a network of *microenterprises* in order to reduce organizational bureaucracy is reminiscent of the increasingly popular approach in software engineering of replacing monolithic system architectures with loosely coupled components known as *microservices* (Rodger, 2018) that can be independently developed and deployed (and disposed of) by separate teams. Both promote decentralization, autonomous self-organization, and flexibility as a way of *"strengthening capabilities to improvise and innovate in the face of immediate challenges and opportunities"* (Tse, 2016, p. 21).

5.4 Discussion of the resource-based view

In this chapter, we looked at Chinese tech entrepreneurs from a resource-based view, which often takes its outset in a VRIO assessment of a company's resources in order to identify sources of sustainable competitive advantage. We found that in an industry shaped by open innovation and cloud computing, few tangible or intangible resources are sources of competitive advantage. Rather, sources of competitive advantage are primarily found within human resources and organizational culture, which due to causal ambiguity and social complexity are often hard to imitate. Yet, with worldwide learning, even competitive advantage based on skills and organizational abilities in strong demand are only temporary. In industries where companies are increasingly competing on the edge, sustained competitive advantage is achieved by developing dynamic capabilities that enable companies to constantly reinvent themselves and build a continuous stream of temporary competitive advantages.

We saw how such strategies and capabilities have been found in tech-intensive regions of the world, such as Silicon Valley, and now increasingly in China, a country that has gone through times of such extreme degrees of uncertainty and complexity that it may have been a perfect training ground for a new generation of entrepreneurs who manage to relentlessly reinvent themselves at a breathtaking pace. Surprisingly, perhaps, is the case of Chinese appliance and home electronics maker Haier, which has found new ways to free its employees from bureaucracy in order to unleash their potential. In all these cases, systems thinking is clearly at work. In the next chapter, it is time to see if cultural differences can explain this tendency.

6 The role of culture in complexity management

In the previous chapters, we have seen how the tech industry has evolved in complexity, and how tech-intensive regions such as Silicon Valley have driven innovation by taking a systems-oriented rather than an analytical view. We have also seen how China in many ways has exhibited behavior that resembles strategies and practices for dealing with complexity and constant change. In this chapter, we look at how some classic studies of cultural dimensions by Trompenaars and the GLOBE project (Lane & Maznevski, 2014; Deresky, 2017) can help us structure these differences and more clearly see the links between Eastern ways of thinking and the complexity of both the tech industry as well as globalization in general.

The dimensions are typically presented as two opposite extremes on an axis along which the world's countries are scattered. For example, in Hofstede's classic dimension of masculinity vs. femininity, Japan is identified as an extremely masculine culture whereas Sweden is extremely feminine while countries such as Brazil and Canada are somewhere in between. In the following, we are not interested in such country-specific granularity and will rather consider the more general differences between East and West, for which I will occasionally consider China and the United States as representatives.

Before looking into the specific dimensions, it can be useful to first note how Brett (2014, pp. 28-35) identifies two broad cultural prototypes: *dignity* culture, which is associated with the West, and *face* culture, which is predominant in East Asia. The Western dignity culture puts emphasis on the individual, as well as Aristotelian logic, linear thinking, and an analytical approach to problem solving. In contrast, the Eastern face culture puts emphasis on the interests of the collective, as well as Confucian philosophy and a holistic systems-oriented mindset, which relies more on experience-based knowledge than does the analytical approach. More recently, a third cultural prototype has been added: the *honor* culture, which is more geographically dispersed to primarily the Middle East, North Africa, Latin America, and parts of Southern Europe. However, I will not consider the honor culture further in this project.

This East-West cultural divide is well-established and generally familiar to many people, so with this in mind we proceed to consider more specific dimensions that illustrate the differences

between Eastern vs. Western ways of thinking, as well as how they relate to the VUCA nature of globalization and the tech industry.

6.1 Mastery vs. harmony

Harmony is a belief that "we" and the "world around us" all are part of the same system, and this system has a natural balance that we must maintain and nurture to ensure continued prosperity and growth. Native Americans are an example of a strongly harmony-oriented people whose traditions of hunting put emphasis on maintaining balance in nature by carefully studying and respecting its ecosystem. If things go wrong, it is because the system was not in balance.

In contrast, mastery is the belief that "we" are separate from the "world around us," and it is the role of humans to control the environment. If things go wrong, it is because we did not control the environment well enough (Lane & Maznevski, 2014, pp. 47-48).

Where Western business cultures have a strong emphasis on mastery with an assertive, take-charge management style, Chinese cultures have a strong emphasis on harmony with a more subtle leadership style in which managers work behind the scenes (Deresky, 2017, p. 111), engaging in small actions to bring various parts of the system into alignment (Lane & Maznevski, 2014, p. 48), much like a skilled Scrum Master works in an agile environment. Likewise, in realizing the inherent complexity of software systems, Brooks (1995, p. 201) found that *"teams can **grow** much more complex entities in four months than they can **build**,"* clearly demonstrating a systems-thinking approach to software engineering.

6.2 Individualism vs. collectivism

It is generally well known that the West is seen as individualist whereas the East is more collectivist. However, this is a more complex dimension than one might think. The United States is often seen as strongly individualist in the workplace, but it also shows strong collectivism within communities such as churches and team sports, which may not often be noticed by business visitors from other countries (Lane & Maznevski, 2014, p. 55). At the other end, collectivist cultures are complex because of the notion of in-groups and out-groups. Privileges of the group only apply to members of the group, as non-members are assumed to have their own groups (Lane & Maznevski, 2014, p. 52), which may help explain why the Chinese are seen as untrustworthy by some Western businesspeople who have not taken the time to engage in the

extensive relationship building related to the notion of *guanxi*, which refers to the *"intricate, pervasive network of personal relations that every Chinese carefully cultivates"* (Deresky, 2017, p. 196). The power of the group is also central to the collectivist African philosophy of *ubuntu*, which is Zulu for *"I am because you are"* (Lane & Maznevski, 2014, p. 52) and the name of the most popular Linux distribution, resembling the strong collectivist sense of community in open source software.

Teamwork occurs in all cultures, but individualist cultures prefer specific roles and responsibilities whereas collectivist cultures have more fluid roles and commitment to the team as a whole (Lane & Maznevski, 2014, pp. 55-57). This is reminiscent of Scrum, which *"recognizes no titles for team members, regardless of the work being performed by the person. […] accountability belongs to the team as a whole"* (Schwaber & Sutherland, 2017). This puts Scrum at the collectivist end, which may in fact render it incompatible with many incentive systems in traditional Western organizations based on individualist values.

There are signs that China is shifting toward more individualism as global competition increases (Deresky, 2017, p. 121) and Chinese managers are combining Eastern and Western management styles (Ralston et al., 1999). How this might affect China's innovative capabilities in the future will be interesting to follow, especially considering the observation that individualism might be the Achilles heel of Silicon Valley: *"The individualistic world views of Silicon Valley entrepreneurs have limited their ability to respond collectively to challenges or to build cross-cutting institutions that would sustain regional interdependencies"* (Saxenian, 1996, p. 163).

6.3 Doing vs. thinking

This dimension describes two variations of desirable focus of activity. Western business culture is generally doing-oriented, especially in cultures dominated by a Protestant work ethic dictating that hard work is pure, and illustrated by a "when in doubt, take action" attitude. In contrast, Eastern culture is generally thinking-oriented with a belief that past performance is an important source of learning and a "when in doubt, get more information" attitude (Lane & Maznevski, 2014, p. 58).

At first glance, this contradicts the earlier notion that the West is planning-oriented while the East is more agile, but recall that agile practices such as Scrum are not about "doing more, faster," but

rather, *doing* incremental development in order to gather real-world information as input for regular *thinking*-oriented activities. Doing-oriented cultures may be more efficient at performing well-defined tasks whereas thinking-oriented cultures will accept some waste if that improves overall effectiveness, as China has been doing throughout its reform era.

In complex and changing environments such as the tech industry the ability to switch between doing and thinking is an essential skill: Thinking without doing obviously brings no value, but doing without careful thinking leads to the problem of "technical debt," an issue that notoriously worsens exponentially (hence the debt analogy) as more doing-oriented hard work is applied to the problem. Robert Martin, one of the authors behind the Agile Manifesto, summarizes the importance of balancing doing and thinking: *"The only way to go fast, is to go well"* (Martin, 2017, p. 11), as does the tenth agile principle of "*simplicity – the art of maximizing the amount of work* ***not*** *done."*[13]

6.4 Monochronic vs. polychronic

The Western world is a monochronic culture, meaning that time is objective, broken up into equal units, and assumed to flow in a linear fashion. Living by the mantra of "time is money," punctuality is of utmost importance, and people prefer to do one thing at a time and stick to a plan, thereby often missing opportunities to develop relationships. In polychronic cultures, time is seen as more elastic and flexible with several timelines flowing in parallel, allowing several things to happen simultaneously as well as allowing plans to change with short notice. Latin America and the Arab world are prominent examples of polychronic cultures, often seeing deadline-driven people as lacking patience. More generally, collectivist cultures, including the East, tend to lean toward a polychronic time orientation (Lane & Maznevski, 2014, pp. 61-63; Deresky, 2017, p. 165). This dimension can also be related to short-term vs. long-term orientation with monochronic cultures typically focusing on short-term goals and next quarter's profits whereas Eastern cultures often set long-term goals. However, some cultures, such as Latin America, differ in this regard, combining polychronic and short-term orientations.

In a globalized business world, a polychronic time orientation may be necessary for the simple reason that organizations operate across several time zones, but it becomes even more important

[13] Twelve principles behind the Agile Manifesto: https://agilemanifesto.org/principles.html

when competing on the edge where two of the three core concepts are related to time, namely the edge of time, where companies think about multiple time horizons, as well as time pacing, with its focus on establishing rhythm, possibly in different tempos for different regions. Likewise, in agile environments, organizations must often balance a long-term flexible vision with short-term planning based on the current context.

6.5 Universalism vs. particularism

In universalistic cultures, rules and systems are applied objectively with no consideration for individual circumstances whereas particularistic cultures are more subjective, adapting systems based on circumstances. The West is generally universalistic with the United States being the most extreme example, while the East generally is particularistic with China in front, though interestingly, a country such as Spain is right behind China in this regard (Deresky, 2017, p. 122).

This dimension has clear ties to the analytical vs. systems view, and it follows that agile practices such as Scrum take a particularistic approach when adapting to the constantly changing contextual environment. Particularism also applies to software engineering where there is *no silver bullet*, because in software, *"no two parts are alike […] If they are, we make the two similar parts into one, a subroutine, open or closed. In this respect software systems differ profoundly from computers, buildings, or automobiles, where repeated elements abound"* (Brooks, 1995, p. 182).

6.6 Discussion of cultural dimensions: Low-context vs. high-context

As with other topics discussed in this report, culture is complex, and many nuances must necessarily be skipped in order to arrive at an East/West cultural divide. As we proceed to further structure this cultural analysis, we should also keep the *ecological fallacy* in mind: You cannot always predict an individual by knowing about his or her culture (or vice versa), as many other factors influence individual behavior (Lane & Maznevski, 2014, p. 65).

The dimensions discussed in this chapter describe many different aspects of culture, but they can generally be related to one major differentiating factor, namely if and how they take *context* into account. This can also be expressed with the more general cultural dimension of *low-context vs. high-context*. Western cultures (particularly United States and Northern Europe) are generally low-context cultures while Eastern cultures are high-context cultures. This difference can lead to many types of misunderstanding, e.g., when people from high-context cultures expect others to read

between the lines and understand subtle gestures and other contextual clues that people from low-context cultures do not process (Deresky, 2017, p. 166).

But more interestingly, in a globalized high-tech world of VUCA where the context is constantly changing, this also suggests that high-context cultures have an intrinsic advantage when operating in such environments, simply because they have a higher awareness of contextual changes and therefore are more naturally aligned with the agile principles. High-context cultures should therefore be able to adapt more effectively than people from low-context cultures. Looking at China, the combination of its massive scale, complexity, and high-context culture can help explain the impressive rise of the country's economy in general and its tech industry in particular.

In the following table, I have compiled the cultural dimensions discussed in this chapter, as well as several other factors discussed throughout this report, such as mission-driven vs. market-driven, and categorized them under either the Western dignity culture or the Eastern face culture.

Western dignity culture	**Eastern face culture**
Low-context	High-context
Analytical view	Systems view
Mastery	Harmony
Individualism	Collectivism
Doing	Thinking
Monochronic	Polychronic
Universalism	Particularism
Mission-driven	Market-driven
Value-based	Practice-based
Quality over quantity	Quantity over quality
Avoid waste	Accept waste
Focus on efficiency	Focus on effectiveness

This table indicates that Eastern high-context cultures assume the world to be dynamic and unpredictable and act accordingly in an agile manner, whereas Western low-context cultures are more skillful at dealing with a static and predictable environment where they can optimize for efficiency.

Note how the innovative tech regions of the West, such as Silicon Valley, exhibit several of the characteristics of Eastern culture, while the Route 128 area exhibited more characteristics from traditional Western culture. As innovative growth shifted from Route 128 on the US East Coast to Silicon Valley on the West Coast in the 1980s, we may now be seeing a similar shift on a larger scale with innovative growth shifting from the West to the East, as technology continues to break down industrial boundaries, pushing globalization and complexity to new heights.

Finally, note how Eastern aspects such as putting emphasis on *quantity over quality*, as well as the *acceptance of waste and inefficiency*, once considered major disadvantages, are rapidly turning into an advantage. This can be attributed to a global shift caused by two major transitions (Lee, 2018, p. 12):

- From *the age of expertise* to **the age of data**. As discussed in Section 3.7, most groundbreaking research in the fields of computer science and artificial intelligence throughout the past half century took place in North America and Europe, and the West will likely stay at the forefront of research well into the future. However, with the decline of the *complicated* rules-based AI and the advent of *complex* deep-learning AI, big data is the decisive factor of successful AI algorithms. A small group of elite AI engineers will easily be outperformed by average AI engineers who have access to more data, and China has access to enormous amounts of data as well as a large pool of excellent though not necessarily elite AI engineers.
- From *the age of discovery* to **the age of implementation**. The discovery of deep-learning AI has been compared to the discovery of electricity. When electricity was first discovered, hungry entrepreneurs began applying it to revolutionize several different industries, and something similar is happening today with AI. With China's massive scale, access to big data, and an AI-friendly government encouraging gladiatorial tech entrepreneurs, China is well positioned for taking a leadership position during the age of AI implementation.

7 Managerial implications

In the previous chapters, we saw how complexity is on the rise as a consequence of globalization and the advances in information and communication technology. We can expect this trend to continue accelerating as the world transitions into the age of data and the age of implementation where technologies such as artificial intelligence and deep learning are changing the rules of business in highly unpredictable ways. We also saw how China over the course of 35 years has managed to transform itself from an isolated country struggling with poverty and famine to a high-growth nation and technological powerhouse playing an important role in global business. In addition, we noticed how the field of software engineering is inherently complex rather than merely *complicated*, a fact that may come as a surprise to people who categorize software together with physical engineering disciplines.

While traditional Western organizations are struggling with digital transformations and similar challenges in the face of increasing complexity, China's tech entrepreneurs seem to be thriving. Having mapped the cultural differences between East and West with the above aspects in mind, an explanation for this can be found in several systems-oriented, high-context traits of Eastern culture that arguably give the Chinese a considerable advantage over Western culture when dealing with complex problems.

As also noted in Section 3.9 about the agile practices, Grint (2005) refers to such complex problems as *wicked problems*, which are characterized by a high degree of uncertainty, and dealing with such problems require systems-oriented *leadership*. In contrast, merely complicated problems are referred to as *tame problems*, and they can be dealt with using traditional analytical efficiency-optimizing *management*. Grint (2005) also identifies a third type of problem, *critical problems*, or crises, often characterized by having very tight time constraints, which call for an authoritarian *command* approach.

Since most problems in business today are wicked and require a high degree of context awareness, a major managerial implication for Western organizations would be to develop such high-context awareness. This is not easy to achieve since the low-context trait is deeply rooted in Western culture, as resembled in the cultural dimensions discussed in the previous chapter. Furthermore, there may be a natural tendency for Western people to treat wicked problems as

though they were merely *tame*, because such problems are better suited to the analytical mindset of Western culture. When the analytical approach proves insufficient to solve a wicked problem, the analytical response would often be to apply more Herculean effort to the problem (doing over thinking). As fixed deadlines approach, and the problem turns *critical*, it may be too late to switch to a systems-oriented leadership style; instead, management may opt for the authoritarian *command* approach, still not properly addressing the inherent complexity of the *wicked* problem.

The scenario described above could serve as a motivation to develop the high-context awareness necessary to deal with the wicked problems of today's high-velocity and constantly changing world. Another motivating factor should be the knowledge that high-context Chinese competitors are more effective when dealing with wicked problems than low-context Western organizations. In most cases, it will likely be an incremental and experimental process to gradually increase the high-context "Eastern-style" awareness in a low-context Western organization, but by combining Eastern and Western cultures, an enterprise should be able to gain a competitive advantage over organizations that continue to primarily exhibit Western characteristics.

Here are a few ways that could help develop such high-context awareness:

- When looking to the successful tech-intensive regions of the world such as Silicon Valley or Beijing for inspiration, remember to consider their entire ecosystems and ways of thinking. Trying to replicate their innovative results by mimicking a Route 128 mindset is not likely to bring much success.
- Embrace open innovation and be wary of the "Not Invented Here" syndrome. Most of your problems will be *wicked*. Thanks to open innovation, solutions to *tame* problems can often be "Proudly Found Elsewhere." Combining such solutions, however, can be a wicked problem.
- Be wary of the traditional specialist vs. generalist categorization of employees. In complex systems-oriented self-organizing units, roles are more fluid. A "generalized specialist" seeks knowledge about other fields in order to proactively manage interdependencies between specializations in a complex environment, as well as to stay prepared for re-skilling when his or her current specialization is rendered obsolete. Effective worldwide learning makes this more accessible than it once was, e.g., in the form of online on-demand "big picture," "hands-on," or "deep dive" courses.

- Consider if you are competing on the edge. A company can try to reach and stay on the edge by developing dynamic capabilities of sensing and seizing opportunities as well as transforming and reconfiguring the organization. There may be many reasons for not being on the edge, often due to administrative heritage. However, not being on the edge puts a company at a competitive disadvantage in high-velocity industries. In any case, a company must not pretend to be competing on the edge when it is not.
- Accept waste and be willing to trade short-term efficiency for long-term effectiveness by making room for experiments and the time that continuous re-skilling will consume.
- Perhaps the most obvious one is to embrace and encourage diversity, e.g., by hiring people from high-context cultures, and otherwise seek out people from other cultures who can challenge your own world view and bring the MBI model of “map-bridge-integrate” (Lane & Maznevski, 2014, p. 71) into everyday use.

There are many other ways to develop high-context awareness and a systems-oriented world view. A major objective of this project is to provide a contextual framework that can be used to understand how cultural, technical, and managerial aspects can be related to the continuing evolution of globalization and technology. An important point is to continuously *map*, *bridge*, and *integrate* Western and Eastern ways of thinking to allow high performance to be achieved in complex and unpredictable business environments.

8 Research implications

Rapidly changing industries such as the tech industry often challenge established theories and models in the fields of management and strategy. The Product Lifecycle Theory, which describes the growth, maturation, and eventual decline of a product, does not take into account continuous innovation and experiments with increasingly shortened product lifecycles (Saxenian, 1996, p. 131). Likewise, the PESTEL model for analyzing a country's macroenvironment may be too static to account for the increasingly complex dynamics of a globalized world (Mygind, 2007). And Porter's Five Forces has guided companies to develop defensible positions and construct barriers to competition, but this is not advisable in an environment shaped by open innovation where a primary source of competitive advantage is an organization's ability to move fast and reconfigure itself in an agile manner (Chesbrough & Appleyard, 2007; Teece, 2007). These are well-known and popular models, but they must be used with great care, if at all, in today's complex environment where digital transformations are spreading to other industries.

As conditions keep changing, other models and theories may warrant a closer look as well. Another well-known theory is that of Stan Shih's "Smile of value creation," which is often used to describe a popular strategy for location and control of value-chain activities in knowledge-intensive industries (Mudambi, 2008), illustrated by the "smiling curve" in Figure 1.

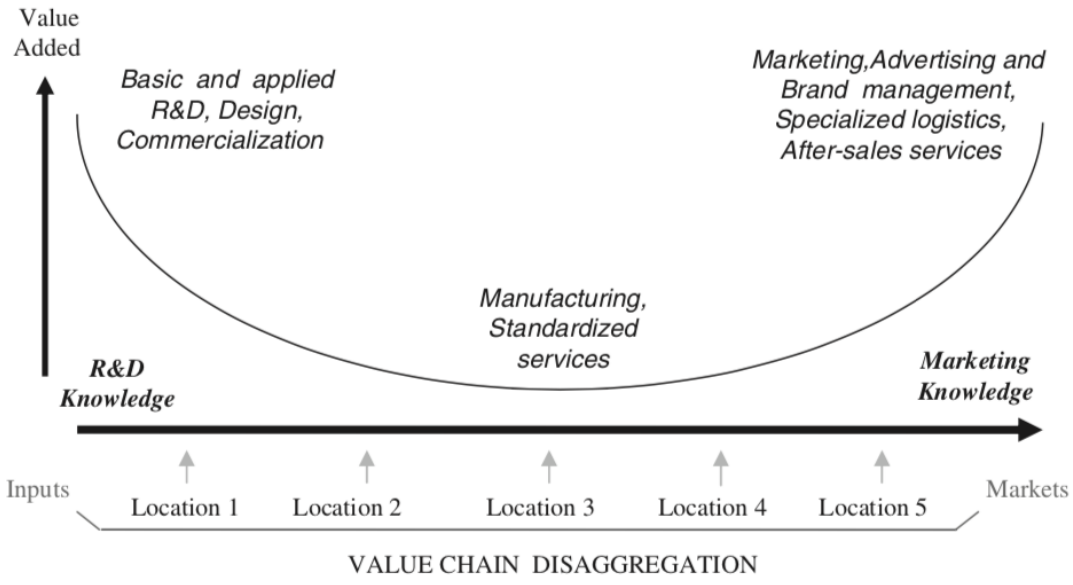

Figure 1: "The Smile of Value Creation." Source: Mudambi, R. (2008). Location, Control and Innovation in Knowledge-Intensive Industries. Journal of Economic Geography, 8(5): 699-725.

The general idea of the “smiling curve” is that upstream activities such as R&D, design, and commercialization, as well as downstream activities such as marketing, advertising, and brand management are highly value-added activities that require a high degree of intangible, creative, and specialized knowledge. In contrast, midstream activities such as manufacturing are highly tangible, repetitious, and standardized, and therefore low on the value-added axis. This creates the smiling curve with high value-added being concentrated on both ends of the value chain. Furthermore, a typical strategy is to keep the high value-added and creative intangible activities in-house in the West while low value-added and repetitious tangible activities are outsourced to the East or other developing regions. Apple is a typical example of the “smiling curve” with design and marketing being kept in-house while manufacturing is outsourced, as also explicitly stated on every Apple device: *“Designed by Apple in California. Assembled in China.”*

Notice how the high value-added creative activities would benefit from Eastern ways of systems-oriented thinking as they consist primarily of complex *wicked* problems, whereas the low value-added repetitious activities consist of merely tame problems, which are more suited to Western ways of analytical thinking. Considering this, it will be interesting to follow how China’s continued rise and other factors will affect the “smiling curve” and similar established theories.

Today, a company such as Xiaomi is using the same manufacturing partners as Apple, and therefore the entire value chain can be kept within China. Furthermore, the results of several R&D and advertising activities are being increasingly standardized as the world is transitioning from the age of expertise and discovery to the age of data and implementation. Highly advanced services such as machine learning-based voice and image recognition as well as natural language processing are now low-cost services available to anyone, thereby moving down on the value-added axis. The same applies to digital marketing and advertising services, many of which have been standardized by platform companies such as Google and Facebook, thereby distorting the smiling curve in unpredictable ways.

Tomorrow’s winners may be those entrepreneurs who manage to combine such advanced but standardized and commoditized AI, cloud, and marketing services with innovative business models and continuously reconfigure their midstream activities in order to turn high-growth business opportunities into reality. It seems unlikely that Stan Shih’s classic “Smile of value creation” will fit the value chains of such future endeavors.

9 Conclusion and future work

Since Deng Xiaoping began the Opening of China in 1979, the country has demonstrated an impressive transformation from an isolated nation struggling with poverty and famine to a global economic and technological superpower. Today, China's vibrant and innovative tech industry is garnering increased attention in the West, as analysts try to explain how a country that was barely connected to the internet 20 years ago has managed to position itself as a leader in cutting-edge fields such as artificial intelligence – a feat that seemingly defies common Western logic.

In parallel with China's rise to power, the Western tech industry, led by Silicon Valley, has triggered an explosive growth in information and communication technology, which is accelerating globalization in a mutually reinforcing manner that pushes the pace of change to an exponential rate. This trend has been coined the Fourth Industrial Revolution, and it is powered by several simultaneous and interwoven trends toward transnational mentality, open innovation, worldwide learning, cloud computing, and disruptive business models, among other things.

In this project, we saw how *volatility*, *unpredictability*, *complexity*, and *ambiguity* – known as VUCA – are common characteristics of both of these phenomena, creating complex – "wicked" – problems rather than merely complicated – "tame" – problems. The Chinese government has gone about solving such complex problems throughout the reform era by taking an experimental approach, *"crossing the river by feeling for the stones,"* reminiscent of the agile practices promoted by the Western tech industry for dealing with complex digital projects. In a similar manner, the Chinese tech entrepreneurs are constantly adapting to, and increasingly shaping, the rapidly changing business and market conditions by developing the dynamic capabilities necessary to continuously reinvent themselves and balance on the edge of structure and chaos.

Meanwhile, in the West, traditional organizations are struggling with digital transformations, with studies reporting that only 30 percent of digital projects are considered successful. In this project, we saw how a likely reason for this can be found in the analytical *low-context* mindset that is deeply rooted in Western culture, as opposed to the systems-oriented *high-context* mindset of Eastern cultures. Earlier studies of successful tech-intensive regions in the West, such as Silicon Valley, have shown that such highly innovative regions are exhibiting similar systems-oriented characteristics, as opposed to analytic-thinking regions such as Route 128, which failed to keep up

as the pace of innovative change accelerated. As the innovation center shifted from the American East Coast to the West Coast in the 1980s and early 1990s, today we see signs of a similar shift, on a much larger scale, from the West to the East.

This knowledge exposes potential *blind spots* of analytical low-context European organizations who have yet to recognize the systems-thinking high-context mindset of both Silicon Valley and China. As analytical organizations are geared toward solving complicated *tame problems*, they face trouble as most problems in today's complex world are *wicked problems*.

Therefore, **what European organizations can learn from the tech industry's shift from the United States to China** is the potential competitive advantage that would follow from developing and nurturing a systems-oriented high-context organizational mindset. In a European context, such a mindset would be a valuable and rare resource that would be difficult to imitate by European competitors, at least so long as the analytical low-context mindset remains the predominant way of thinking in Western culture. The proven success and innovative power of agile tech entrepreneurs in both Silicon Valley and now China should convince the European manager that such a mindset makeover would be a worthwhile endeavor. Furthermore, such a transformation would also prepare European enterprises to more effectively do business in China, as they improve their ability to *understand the differences* between East and West (map), *communicate across those differences* (bridge), and ultimately *manage the differences* (integrate) so as to achieve high performance, cf. the MBI model.

This project has been a macro- and meso-level systems-oriented study based on qualitative secondary data in order to identify global trends and develop a contextual framework that could help with building such a high-context mindset. Possible future work could include micro-level actors-oriented studies of individual organizations and their cultures based on primary data, as they embark on digital transformation journeys.

Finally, classic models such as the Product Lifecycle Theory, PESTEL, and Porter's Five Forces are of limited use in today's rapidly changing world of open and continuous innovation. We also saw how a theory such as the "Smile of value creation," though specifically targeted at knowledge-intensive industries, may need to be adjusted. In conclusion, the global trends explored in this project point to an interesting future for both research and practice in the field of international business.

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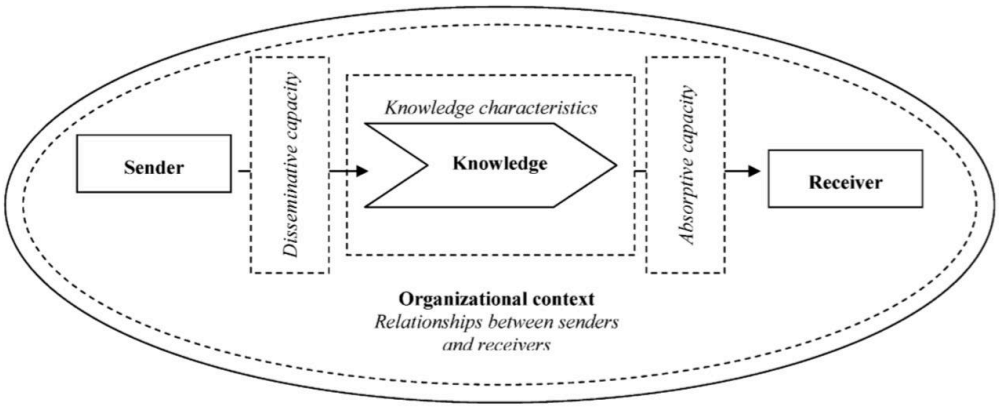
Appendix 1: Azure regions

Source: https://azure.microsoft.com/en-us/global-infrastructure/regions/

Appendix 2: Knowledge transfer in multinational corporations



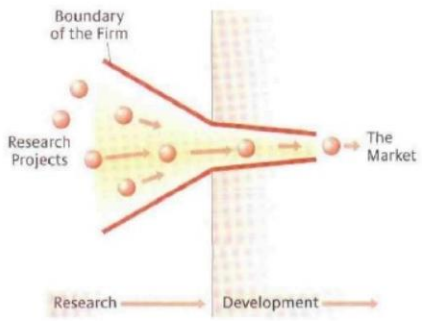
In Bold – elements of knowledge transfer

In Italics – barriers/determinants associated with the four elements of knowledge transfer

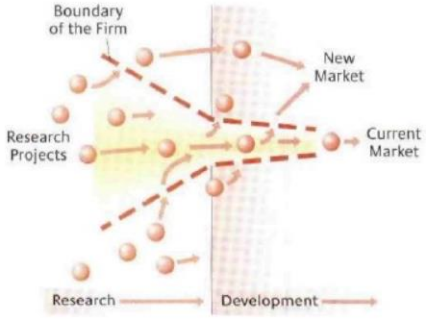
Source: Minbaeva, D. (2007). Knowledge transfer in multinational corporations, *Management International Review*, Volume 47, Issue 4: 567-593.

Appendix 3: Open vs. closed innovation

CLOSED INNOVATION PRINCIPLES	OPEN INNOVATION PRINCIPLES
Successful innovation requires control. Companies must generate their own ideas that they would then develop, manufacture, market, distribute and service themselves.	(a) Rise in number and mobility of knowledge workers => increasingly difficult for companies to control proprietary knowledge (b) Growing availability of venture capital => help startups commercialize ideas spilling out of corporate silos
The smart people in our field work for us.	Not all of the smart people work for us so we must find and tap into the knowledge and expertise of bright individuals outside our company.
To profit from R&D, we must discover, develop and ship it ourselves.	External R&D can create significant value; internal R&D is needed to claim some portion of that value.
If we discover it ourselves, we will get it to market first.	We don't have to originate the research in order to profit from it.
If we are the first to commercialize an innovation, we will win.	Building a better business model is better than getting to market first.
If we create the most and best ideas in the Industry, we will win.	If we make the best use of internal and external ideas, we will win.
We should control our intellectual property (IP) so that our competitors don't profit from our ideas.	We should profit from others' use of our IP, and we should buy others' IP whenever it advances our own business model.



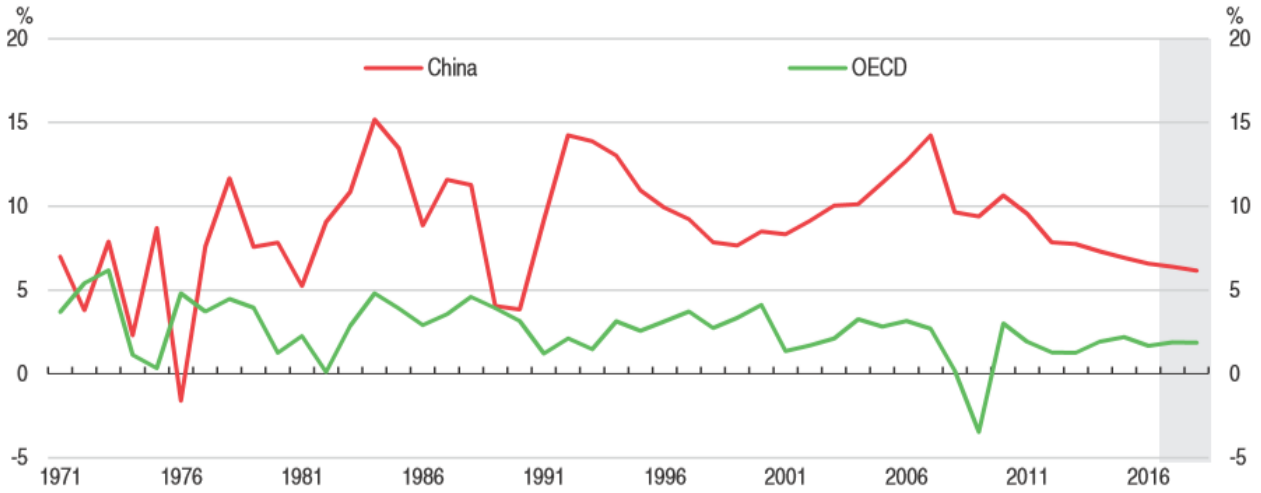
The closed innovation model: in closed innovation, a company generates, develops and commercializes its own ideas.



The open innovation model: a company commercializes both its own ideas as well as innovations from other firms and seeks ways to bring its in-house ideas to market by deploying pathways outside its current business.

Source: Chesbrough, H. (2011). The Era of Open Innovation, *MIT Sloan Management Review*, Sloan Select Collection, Winter: 35-41.

Appendix 4: Real GDP growth in China and OECD



Source: *OECD Economic Surveys, China*, March 2017, p. 15.