# Bell Nordic inc.

Igniting Genius
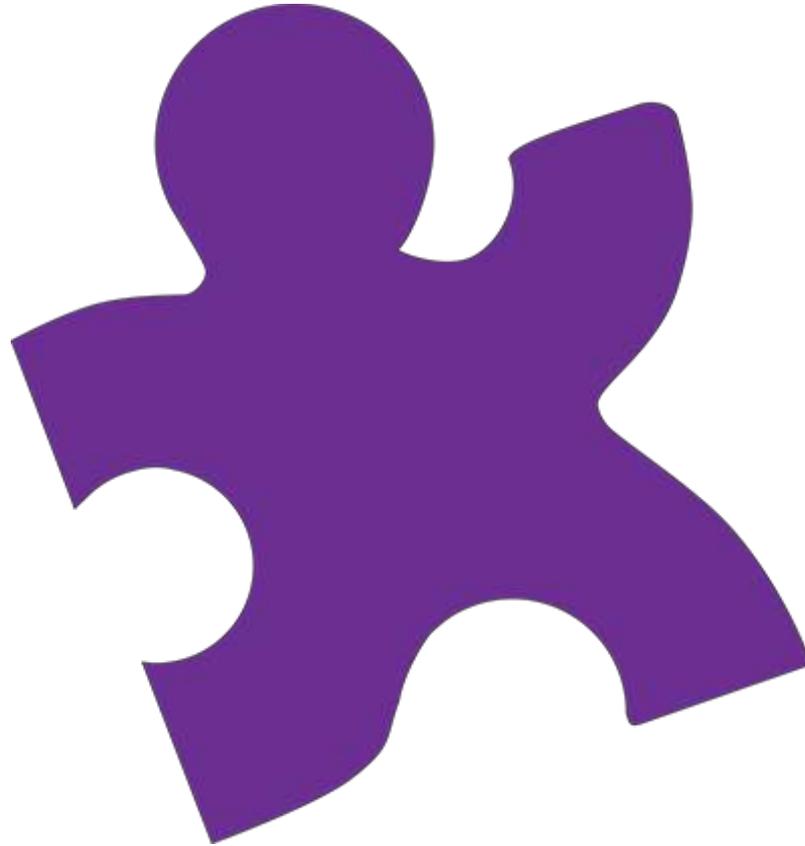
**Toyota *Kata*: a lever to build a culture
of continuous improvement**

www.bell-nordic.com

Marc-Olivier Legentil
marc-olivier.legentil@bell-nordic.com

Translation Notes

Background and Introduction

I first encountered Marc-Olivier at the 2017 Toyota Kata Summit in San Diego. He was there along with his thesis advisor, Sylvain Landry. Marc-Olivier was presenting the preliminary results of this research at the conference, and I was intrigued. Here was some empirical research that seemed to support what many of us knew instinctively: That if we deliberately introduce structure that shifts people's interactions and behavior, the culture of the organization can change.

In June, Marc-Olivier was kind enough to spend over an hour on the phone walking me through his now completed dissertation, his results, his research methods, his analysis. My thought was "More people need to read this. The original, though, is in French."

To be clear, I *do not speak, write or read French*. My knowledge is pretty much limited to "*Je ne parle pas français*" and "*Comment allez-vous*?" though it is best not to ask that question if you won't understand the answer.

Enter Google Translate. On a whim, I ran the dissertation through Google Translate, *et voilà*! It was rough, but understandable enough to edit. I can't translate from French, but editing is something I can do. Thus, I had a target condition: An English version that captures not only Marc-Olivier's results but retains his voice.

What I Learned About Translation

This is not the first time I have edited another author's work, though it is my first attempt at producing a coherent translation. Editing requires more than reading with understanding. I end up parsing, going back through so I can better understand context, all in an effort to extract what the author *really intended to say*. The challenge, then, is to find a way to say it without losing the author's voice.

During this process, I have learned a lot not only about Marc-Olivier's research, but about French. I ended up going through paragraph by paragraph, sometimes sentence by sentence, occasionally researching alternative meanings of specific phrases and words. If we compare *any* two languages we never find a 1:1 correlation of word meanings. A single

term in one language can have many contextual meanings which may be expressed in *different* terms in another language. Meanings overlap and entangle differently from one language to another.

One term that comes up many times in this dissertation is **la mise en œuvre**. The quick translation is the English noun "implementation," however in my discussions with Marc-Olivier, he was clear that "implement Toyota Kata" is not what he intended to say.

I learned that "*la mise*" is the noun form of the verb "to put," "to place," or "to set." By itself, *la mise* comes out of Google Translate as "setting," but I believe this is the act of setting something rather than a location or scenario. The term "L'œuvre" translates to "work." Thus, we have something like "set into motion" or "put into action" which can be translated as implementation… or not. After some discussion, Marc-Olivier and I settled on the word "deploy." By this we mean to "set Toyota Kata into motion" or "put Toyota Kata into use." This seemed as close as we could come without creating cumbersome language in the document.

Thus, like all translations, *especially this one done by someone who does not understand the original language*, I must caution that some subtlety likely has been, quite literally, "lost in translation." I ask the reader to keep that in mind if you find the terms "implement continuous improvement" or "deploy kata" sound a little mechanistic.

What I Learned About Continuous Improvement and Organizational Culture

Though I am familiar with Edgar Schein's model of organizational culture (which Marc-Olivier uses as one pillar of his framework), I think I understand Schein's model much better after seeing it in actual use here.

This was also my first introduction to the Competing Values Framework by Cameron and Quinn which provides Marc-Olivier's other pillar. Taking the CVF model and asking what it would show if used to assess a true continuous improvement culture is an intriguing concept. We have lots of anecdotal and descriptive theory of Toyota's culture. I think it would be interesting to go back through the literature that digs into Toyota's culture (Spear, Liker for example) and construct a hypothesis of what we would find if we applied Marc-Olivier's analysis to Toyota itself. Then test it. Ideally with a blind test – the people who

do the live assessment are *not* the ones who develop the hypothesis of what they would find.

From a practical standpoint, my own stories about other companies that have engineered culture shifts perhaps even more profound than the ones Marc-Olivier profiles here, tend to back up his findings – at least anecdotally. I certainly don't have any anomalous experiences that contradict anything I read here.

And finally:

Remember: This is a *Translation!*

Marc-Olivier's work *is the French original*.

I want to thank Marc-Olivier for his patient editing and correcting through 15 or so versions of this work – it was a team effort. At the same time, I take all responsibility for any mistakes, typos, mangled sentences, or things that simply do not make sense that you read in this English version.

Enough from me. I hope you enjoy reading this work as much as I did.

Mark Rosenthal
mark@theleanthinker.com
May 4, 2018

HEC MONTRÉAL
School affiliated with the University of Montreal

**Toyota *Kata*: a lever to build a culture
of continuous improvement**

by

Marc-Olivier Legentil

Management Science

(Operations Management Option)

Submission for obtaining
Master of Science degree
(MSc)

April 2017
© Marc-Olivier Legentil, 2017

HEC MONTRÉAL

Comité d'éthique de la recherche

CERTIFICAT D'APPROBATION ÉTHIQUE

La présente atteste que le projet de recherche décrit ci-dessous a fait l'objet d'une évaluation en matière d'éthique de la recherche avec des êtres humains et qu'il satisfait aux exigences de notre politique en cette matière.

Projet # : 2016-2217

Titre du projet de recherche : Toyota Kata: un levier pour instaurer une culture d'amélioration continue?

Chercheur principal :
Marc-Olivier Legentil
Étudiant M. Sc., HEC Montréal

Directeur/codirecteurs :
Sylvain Landry
Professeur, HEC Montréal

Date d'approbation du projet : 14 avril 2016

Date d'entrée en vigueur du certificat : 14 avril 2016

Date d'échéance du certificat : 01 avril 2017

Maurice Lemelin
Président du CER de HEC Montréal

Summary

Deploying continuous improvement and sustaining it over the long-term remains a major challenge for companies. Several authors have identified culture as the foundation for long-term success of continuous improvement (Bessant *et al.*, 1994; Recht and Wilderom, 1998; Bessant, Caffyn, and Gallagher, 2001; Neese and Siew Mui, 2007; Liker and Hoseus, 2008; Mann, 2010; Rother, 2010; Shook, 2010). One method explicitly claims to have influence on the continuous improvement culture of an organization: Toyota *Kata* (Rother, 2010). According to Rother, using *kata* can transform the culture of an organization and support a culture of continuous improvement in the long-term (2010). However, no study specifies the impact of *kata* on organizational culture in support of long-term sustainment of continuous improvement.

This study aims to explore how the deployment of *kata* can affect the organizational culture to support continuous improvement. Based on the literature review presented in this thesis, we have gathered knowledge about continuous improvement, *kata* and organizational culture to develop our conceptual model.

To identify the impact of *kata* on organizational culture we identified the elements favorable to the culture of continuous improvement based on the three levels of organizational culture identified by Schein (2004); the artifacts, the values and beliefs, and the underlying assumptions. We also attempted to define continuous improvement culture based on the culture types of the *Competing Value Framework* of Cameron and Quinn (2011), being the clan culture, the adhocratic culture, the hierarchy culture, and the market culture.

The research methodology used for this study is the multiple-case study. The observed companies are SigmaPoint Technologies and Tulsa Tube Bending. SigmaPoint Technologies is an Ontario based manufacturing company, while Tulsa Tube Bending

is a manufacturing company in Oklahoma (United States). We conducted data collection in October 2016 at the workplaces of both organizations.

The problem being studied was the subject of qualitative measures to identify artifacts, values and beliefs, and underlying assumptions as well as quantitative measures to prepare and present an initial overview of the organizational culture after the deployment of *kata*. We conducted qualitative analysis by coding transcripts of interviews and observations. We also conducted quantitative analysis by compiling all the results of a questionnaire distributed to determine the impact of *kata* on the perception of culture types.

Through multiple-case analysis, we determined the impact of *kata* on the continuous improvement culture. We concluded that *kata* establishes a belief in the ability of individuals to learn, transforms the organization into a place where all employees are experimenters, and contributes to changing the behaviors of executives, managers, and team leaders to become teachers and coaches. The deployment of *kata* is also changing the way employees think in regard to the frequency of improvement activities. It establishes the belief that continuous improvement is an integral part of the work of each employee and not a parallel activity. Finally, the deployment of *kata* creates a work environment that prioritizes cooperation, learning, and employee engagement over employee's individual performances.

Contents

List of Figures

List of tables

Thanks

The backing and support I have received during the completion of this dissertation and during my studies are immeasurable. I feel privileged to be surrounded by people as generous, authentic and passionate.

This dissertation would not have been possible without the support of my thesis director, Sylvain Landry. I want to thank you for the many hours you have invested in this dissertation and my apprenticeship in the field of operations management. Demanding, meticulous, methodical and passionate, you got me out of my comfort zone and you pushed me beyond my limits in this long process. I am convinced that this dissertation will not be our last collaboration and I am confident that we will have many fond memories to share together around a good DIPA in the years to come.

I also want to thank some of the teachers who contributed to the success of my studies and arouse my passions. I want to thank Céline Bareil who instilled in me the enthusiasm for organizational development. Céline, you brought me to incorporate this discipline into my dissertation and take an interest in this field. I also want to thank Kevin Johnson, who helped me throughout this dissertation and greatly contributed to my learning on organizational culture. Your blatant interest in organizational development and your active listening during our meetings were more significant than you imagine.

I also want to thank my parents. Without them I could not have accomplished this feat. My parents have always supported the passions of their children and have always driven us to reach our full potential. You have sacrificed so much for your children throughout your life without any regrets and I consider myself privileged to have such extraordinary parents. Mom, Dad, I love you.

I would like to dedicate this thesis to my family and especially to Josée-Anne, Jean-Marc, Renée and Jean.

Chapter 1 - Introduction

1.1 Background

Toyota is a company that has experienced some of the greatest industrial success of the twentieth century (Landry and Beaulieu, 2016: 23). For the past 30 years, the success of this company through the development of the Toyota Production System (TPS) has encouraged thousands of companies to try to copy them through the implementation of various programs and continuous improvement tools such as Lean, Total Quality Management (TQM) or Just-In-Time (JIT) (Berger, 1997; Mann, 2010; Netland and Ferdows, 2014). Indeed, the Toyota company has become the reference point for the definition and conceptualization of continuous improvement by managers and researchers since the 1980s (Krafcik, 1988; Imai, 1989; Berger, 1997; Mann, 2010; Netland and Ferdows, 2014; Landry and Beaulieu, 2016). Nevertheless, no company that has attempted to emulate Toyota has yet been able to compete with Toyota's ability to adapt and improve its quality and cost consistently and systematically (Spear and Bowen, 1999; Rother, 2010).

In November 2007, Industry Week published the results of a survey about the performance of US plants employing Lean as a continuous improvement program. The results show that only 2% of plants with a Lean program achieved their anticipated objectives and that only 24% of respondents reported having achieved significant results (Pay, 2008; Denning, 2011; Liker and Rother, 2011). In addition, the Shingo Prize committee, responsible to honor companies that excel in the implementation of Lean Manufacturing, also found that several former winners have failed to support their progress following the receipt of their prize (Denning, 2011; Liker and Rother, 2011).

In addition to these results, several failures to sustain continuous improvement reported by some authors led them to question the implementation of these methods and the reasons for their failures (Bessant *et al.* 1994; Berger, 1997; Bessant, Caffyn, and Gallagher, 2001; Spear, 2004; Mann, 2009, 2010, Zu, Robbins and Fredendall, 2010;

Liker and Rother, 2011). The implementation and long-term sustainability of continuous improvement remains a major challenge for many companies (Bessant *et al.*, 1994) unlike Toyota who remains committed to it.

Various findings of these authors in regard to the implementation and long-term sustainability of continuous improvement led them to explore the cultural dimension of continuous improvement. Several authors identified culture as the foundation for long-term success of continuous improvement rather than the more technical aspects associated with the TPS (Bessant *et al.*, 1994; Recht and Wilderom, 1998; Bessant, Caffyn and Gallagher, 2001; Neese and Siew Mui, 2007; Liker and Hoseus, 2008; Mann, 2010; Rother, 2010; Shook, 2010).

Our literature review shows that there are several studies on the relationship between organizational culture of the company and successful implementation of various continuous improvement methods (Recht and Wilderom 1998; Dellana and Hauser, 1999; Detert, Schroeder and Mauriel 2000; Prajogo and McDermott, 2005; Cheng and Liu, 2007; Zu, Robbins and Fredendall, 2010; Lillian Do Nascimento *et al*., 2015). For example, Liker and Hoseus (2008: 5) state that they believe the missing element to create long-term results using Lean or Six-Sigma programs is culture. Meanwhile, Cheng and Liu (2007) suggest that the failure of the implementation of TQM can be caused by a mismatch with the organizational culture of the company. Several authors also mention the need to change organizational culture to be successful in the implementation and long-term maintenance of continuous improvement (Bessant *et al.*, 1994; Bessant, Caffyn, and Gallagher, 2001; Liker and Hoseus 2008; Mann, 2009, 2010; Rother, 2010; Shook, 2010; Landry, Rother, and Halin, 2016). However, these studies remain focused on principles and exemplary behaviors that enables the transformation of the organizational culture. The authors have focused primarily on identifying the key elements in the implementation of methods, practices or tools enabling this transformation. Very few authors have explicitly determined a practical way to enable the transformation of the organizational culture to support long-term continuous improvement.

1.2 Toyota *Kata*

One method explicitly claims to have influence on the culture of continuous improvement of organizations: *Toyota Kata* (Rother, 2010). A *kata* is a practice routine for developing new skills and changing long-term behaviors of employees and managers (Rother, 2015). According to Rother, an organization can use *kata* to transform their culture to support continuous improvement in the long-term (2010: 237). *Kata* is a method that stands out by offering practice routines to transform the organizational culture in contrast to previous studies focusing instead on principles, tools and exemplary practices.

Toyota *Kata* was developed by Rother following his multi-year study of the Toyota management system to better understand Toyota's success and difficulty of the other organizations to replicate this same model (Landry and Beaulieu, 2016: 65). Landry and Beaulieu (2016: 66) describe Toyota *Kata* as "the formalization of the problem-solving approach used intuitively by Toyota managers with their teams, with the aim of rapidly inducing a change towards a culture of continuous improvement in organizations other than Toyota." This concept will be discussed in more detail in Chapter 2 (literature review). Figure 1.1 illustrates the model advanced by the author:

Figure 1.1 - A model for changing organizational culture (adapted from Rother, 2010: 237)
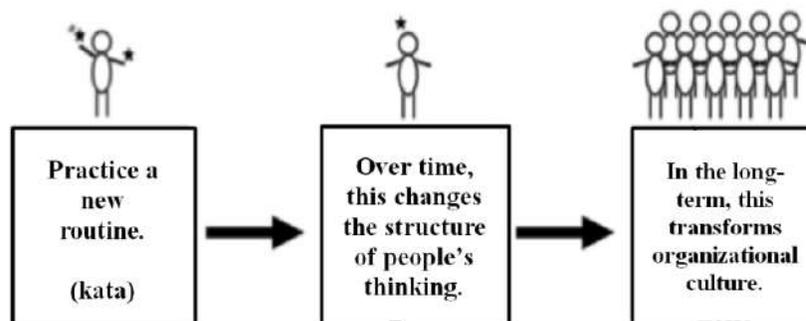
1.3 Research Question

The growing interest for *kata* within the continuous improvement community since the publication of Rother's book in 2010 is undeniable. Training, books and conferences

are increasingly present and the community of *kata geeks* is growing day by day. For example, some computer conferences are interested in the application of *kata* in Agile management while there were three presentations on *kata* at the annual conference of the *Lean Construction Institute* in 2016.

However, no scientific studies have been published about the direct effects of *kata* on organizational culture. Moreover, we have not been able to find any study specifically addressing the impact of implementing any continuous improvement practice on the organizational culture in the present literature. Thus, deepening knowledge in the field of organizational culture transformation and continuous improvement is of interest to researches, because revealing the keystone of the Toyota Production System would allow the opening of a field of research on the sustainability of continuous improvement in organizations.

To support the hypothesis of Rother (2010) that *kata* could transform the culture of an organization in order to support a culture of continuous improvement in the long-term, we propose the following research question:

How can *kata* transform the organization's culture in order to sustain continuous improvement over the long term?

Chapter 2 - Literature Review

This research focuses on the impact of the deployment of *kata* on transforming organizational culture to support long-term continuous improvement. To identify the scope of this research, we will approach this chapter of literature review in two parts: continuous improvement and organizational culture.

In the first part, we begin by defining continuous improvement in order to provide context in relation to our research. Next, we will present the factors promoting the maintenance of long-term continuous improvement to better understand the effort required for sustaining this concept in business. Finally, we will present in detail the concept of *kata* which is the main focus of our research and our case studies.

In the second part, we will define the concept of organizational culture and its place in the literature on continuous improvement. This definition will allow us to define, on one hand, what constitutes a culture of continuous improvement and, on the other hand, to identify the elements of culture conducive to the support of continuous improvement in the long-term. All these elements will enable us subsequently to develop the conceptual model that will be used in our research.

2.1 Continuous improvement

2.1.1 Definition of continuous improvement

As we previously reported in Chapter 1, the Toyota company, due to its performance, has become the benchmark in the definition and conceptualization of continuous improvement by managers and researchers for several decades. This phrase is translated into Japanese by the term *kaizen*. This term is the merger of the words *kai* (watch, analyze and change) and *zen* (good, improve, do better) (Landry and Beaulieu, 2016: 252). The book *Kaizen: The Key to Japan's Competitiveness* published in 1986 by Imai is one of the first works using the term and is one of the most cited books about it (Berger, 1997; Recht and Wilderom, 1998). Imai says the

word *kaizen* means "continuing improvement involving everyone – managers and workers alike." (1986: xx).

The term *kaizen* sometimes refers to a strategy, approach or set of principles (Imai, 1989; Villers *et al.*, 1993; Recht and Wilderom, 1998; Neese and Siew Mui, 2007). For example, the Dictionary of Production and Inventory Management defines it as follows: "A method of management promoting the adoption of small incremental improvements in the manufacturing process to eliminate the causes of problems. [...] "(Villers *et al.*, 1993: 40). In addition, *kaizen* tends to be used as a general term since it obtained the majority of its attributes from other initiatives such as TQM and Lean (Berger, 1997; Bhuiyan and Baghel, 2005). *Kaizen* can be seen as an umbrella concept covering a set of practices as shown in Figure 2.1:

Figure 2.1 - Kaizen umbrella (Imai, 1989: 4)

Just as the word *kaizen*, continuous improvement tends to be used as a generic term and several definitions exist in the literature (Bessant, Caffyn, and Gallagher, 2001; Singh and Singh, 2015). Continuous improvement is often associated with the adoption of approaches such as Lean, employee involvement programs, certain waste reduction campaigns, or to productivity improvement.

Some authors define continuous improvement as an ongoing process of targeted incremental innovations across the organizations that enables performance improvement (Bessant *et al.*, 1994; Bessant, Caffyn, and Gallagher, 2001). Others define it as a sustained improvement culture that targets the elimination of waste through the involvement of all without necessarily making major investments (Bhuiyan and Baghel, 2005; Singh and Singh, 2015). In this study, continuous improvement, inspired by the previous definitions, that of Lean by Landry and Beaulieu (2016: 25) and the definition of Legentil (2016), will be defined as follows:

> A structured approach favoring the adoption of incremental innovations across the entire organization aiming to increase the performance of the organization in order to create value for the customer.

2.1.2 Implementation of continuous improvement

As discussed in Chapter 1, companies worldwide are trying to become more efficient by implementing continuous improvement using well-known methodologies, practices or tools like Lean, Six Sigma or TQM but find this path difficult (Womack, Jones, and Roos, 1990; Singh and Singh, 2015). Several companies are frustrated by the implementation of continuous improvement projects because they only give good results in the short term (Bessant *et al.*, 1994: 18; Liker and Hoseus, 2008: 5). However, some companies have great success (Schroeder and Robinson 1991: 78-79; Zu, Robbins and Fredendall, 2010: 86). We identified three contributing factors to sustaining continuous improvement in the long-term:

1) The involvement and constant participation of employees.
2) The support and involvement of leaders.
3) The establishment of a scientific approach to problem solving.

1) The involvement and constant participation of employees

The involvement and participation of all employees have been identified by several authors as a key principle in maintaining long-term continuous improvement (Imai, 1989; Liker and Hoseus, 2008; Liker, 2012; Singh and Singh, 2015; Landry and Beaulieu, 2016). According to these authors, continuous improvement should involve

all members of an organization and at all levels. It is directed to the efforts of all employees to maintain and improve the company's performance standards (Imai, 1989; Berger, 1997; Singh and Singh, 2015).

Moreover, this involvement must be constant. According to Rother (2010: 13), a process in place is either improving or deteriorating and the best method to prevent entropy is to constantly move forward even if they are only small individual improvements. The author also mentions that continuous improvement means that the company improves all processes every day and makes the assumption that it is through the constant involvement of all employees (Rother, 2010: 11).

2) The support and involvement of leaders

According to Mann (2009, 2010), the failure of the majority of Lean initiatives is linked to the failure of leaders to change their management practices. Thus, the constant and direct involvement of leaders in the implementation and maintenance of continuous improvement greatly increases its long-term success. Maintaining continuous improvement requires a change in habits and behaviors (Bessant, Caffyn, and Gallagher, 2001; Singh and Singh, 2015).

Leaders must also master continuous improvement until it is second nature to them. The only way to achieve this is through practice and participation in improvement activities until they are able to teach these concepts themselves to others (Womack, Jones, and Roos, 1990). Thereafter, the objective of leadership is to train the managers of teams who, in turn, are responsible for improving processes consistently. The leaders therefore act as coaches. Over time, each manager will master the methods and techniques necessary to maintain continuous improvement and become a coach to his employees. The critical transition where managers adopt the role of coach, according to Womack (2002: 268), is the key to success to make an autonomous organization that will sustain continuous improvement. This is critical in the application of *kata* as a means of sustaining a culture of continuous improvement as we shall see later.

Thus, the objective of leadership is to give employees the means to do their work well by empowering them, leading them and giving them the tools necessary to the success of their initiatives and, by extension, their work (Womack, Jones, and Roos, 1990; Liker and Hoseus, 2008; Shook, 2010). This improvement process is initially top-down and begins with the involvement, support and control of continuous improvement by senior management (Womack, 2002). Rother says that if an organization wishes to change its culture, the need for leadership involvement is essential (2010: 243).

3) The establishment of a scientific approach to problem solving

The scientific approach to problem solving is often referred to as PDCA (Plan-Do-Check-Act) inspired by Deming's PDSA (Plan-Do-Study-Act), based, in turn, on Shewhart's reflections in the 1930s (Berger, 1997; Landry and Beaulieu, 2016: 57). The figure is used by several authors to represent the PDCA approach, also known as the Deming Wheel:

Figure 2.2 – Deming Wheel (Calmettes, 2013)
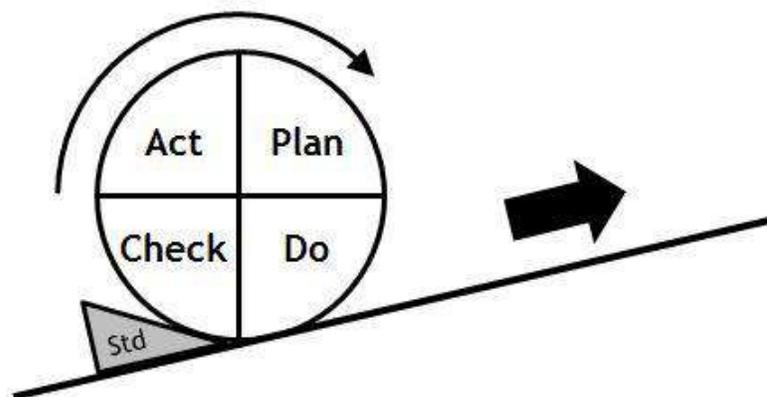
The objective of this scientific approach is to initiate a continuous improvement initiative following the PDCA cycle. This cycle is described by Landry and Beaulieu (2016: 58) thus: "We define the problem and plan the experiment, then action is taken, results are analyzed and finally, according to the results obtained and the learning, we anchor the new practice and continue improving." The wedge illustrated in Figure 2.2 represents the anchoring of the new practice by the establishment of standards to

prevent any backsliding and thus perpetuate the results. The same authors also mention that this problem solving process should never be done alone and must be supervised by a coach (Landry and Beaulieu, 2016: 58). Indeed, the management team must support all employees to develop strong problem solving skills (Womack, Jones, and Roos, 1990: 102).

According to Liker and Hoseus (2008: 38), there can be no lean transformation without practical continuous process of problem solving conducted on a daily basis. They further say that daily problem solving activity is the key to the Toyota culture and its success (Liker and Hoseus, 2008: 153). For example, at Toyota, all employees are responsible for solving everyday problems in their work cells (Womack, Jones, and Roos, 1990: 57). To do so, the production staff are trained so that they can systematically solve problems and correct them. This problem-solving approach provides employees with the necessary skills to control their work environment (Womack, Jones, and Roos, 1990: 57; Bessant, Caffyn, and Gallagher, 2001; Mann, 2009; Singh and Singh, 2015). It is interesting to note that in 1999, Spear and Bowen recalled the importance of the scientific approach to problem solving shown as the core of *kata*: "Any improvement must be made in accordance with the scientific method, under the guidance of a teacher, at the lowest possible level in the organization." (Spear and Bowen, 1999: 98).

The three factors presented above show that consistency in the participation and involvement of all employees and managers in the scientific approach to problem solving are crucial to the sustainability of continuous improvement. In other words, improving the long-term success in an organization resides, according to the authors, in the behavior of employees and leaders in relation to the scientific method of problem solving applied within the company (Bessant, Caffyn, and Gallagher, 2001: 67). These behaviors are often referred in the literature as routines.

The routine concept is central to *kata* and is an element highlighted by several authors as essential to change an organizational culture (Feldman, 2000; Bessant, Caffyn, and Gallagher, 2001; Becker, 2004; Schein, 2004; Rother, 2010; Duhigg, 2012). It therefore

seems important to understand this concept well before exploring in detail the concept of *kata* and organizational culture.

2.1.3 Organizational routines

To understand the impact of routines on the organizational culture and the culture of continuous improvement, we will first define what is an organizational routine.

2.1.3.1 Definition of organizational routine

Organizational routines are a set of behaviors embedded within an organization and represent the way of doing things. A routine is triggered by a small number of signals and is carried out in a relatively unconscious and automatic way (Bessant, Caffyn, and Gallagher, 2001; Becker, 2004). The organizational routines are an evolving aggregation of a set of behaviors and recurrent interactions within a company.

A key feature of organizational routines is repetition. For a new routine to be anchored within an organization, there must be a repetition and reinforcement of these behaviors over a long period of time (Becker, 2004: 646). In addition, a routine must be supported by a structure or procedures that support its development. There must be a mechanism whereby the practice of these behaviors becomes automatic and ingrained in employee habits for that new routine to become second nature (Bessant, Caffyn, and Gallagher, 2001).

2.1.3.2 Impact of organizational routines on continuous improvement

Some authors mention that organizational routines are part of the organizational culture and the impact of continuous improvement is rarely felt unless there is an incremental change routine in place consistently for a certain period of time (Bessant *et al.*, 1994: 18; Bessant, Caffyn, and Gallagher, 2001; Becker, 2004). Thus, there is little chance of perpetuating continuous improvement within the organization if behaviors such as using a scientific approach to day-to-day problem solving, the constant participation of employees in continuous improvement initiatives, or the coaching of employees in the

use and methods of continuous improvement are not repeated and reinforced by leaders over a long period of time.

Although some of the routines and behaviors that are present in companies that succeed in implementing continuous improvement are known, the way these companies operate is essentially tacit, making it difficult for other companies to imitate them (Bessant, Caffyn, and Gallagher, 2001 : 68). In other words, what distinguishes organizational routines from documents or corporate databases is that they contain tacit knowledge and ways of thinking (Becker 2004: 661) and this is what Rother (2010) observed and formalized with *kata*.

2.1.4 Toyota *Kata*

Intrigued by the success of the Japanese auto giant, Rother decided to study the TPS and found that Toyota managers followed and taught their teams a problem-solving approach to achieve their goals. He called this concept Toyota *Kata* (TK) in his book of the same name, published in 2010 (Landry and Beaulieu, 2016; Landry, Rother, and Halin, 2016). "The term *kata*, borrowed from martial arts, denotes a sequence of movements that are used by beginners and professionals of the art" (Landry and Beaulieu, 2016: 65). The TK proposed by Rother describes an invisible phenomenon that even Toyota executives have trouble naming and that has also never been formalized (Landry and Beaulieu, 2016: 65).

Rother's research leading to the Toyota *Kata* book took place between 2004 and 2009 (Landry and Beaulieu, 2016: 66). Rother sought to answer the following two questions:

1) What are the unseen managerial routines and thinking that lie behind Toyota's success with continuous improvement and adaption?
2) How can other companies develop similar routines and thinking in their organizations? (Rother, 2010: XVII).

Rother tried to formalize Toyota's managerial thinking by drawing on Spear's doctoral research. Spear discovered that every time Toyota defines a specification, it implements

sets of hypotheses that can then be tested. In addition, Spear mentions that the system in place at Toyota encourages employees to engage in experiments and to test the assumptions that are made. This system is not described and is not conscious. It is part of their DNA (Spear and Bowen, 1999: 98). This is what, in essence, Rother called *kata*.

The *kata* consists of two basic routines:

1) The Improvement *Kata* to solve a problem, bring about a change or unlock an obstacle that allows the organization to improve, adapt and evolve.

2) The Coaching *Kata* by which managers and leaders teach the Improvement *Kata* within the organization. It also acts as an operations management and monitoring system (Rother, 2010).

2.1.4.1 Improvement Kata

The improvement *kata* seeks to systematically use the Deming cycle (PDCA) to remove the obstacles that stand between what is called the current condition and the target condition which the organization is trying to achieve in the short term. The target condition is based on a challenge that is aligned with a long-term vision of the organization, that is to say, an ambitious goal that is stable over time and intended to guide resource allocation in the company (Landry and Beaulieu, 2016: 67). The following figure shows the components of the improvement *kata*:

Figure 2.3 - Improvement *Kata* (adapted from Rother, 2015: 41)
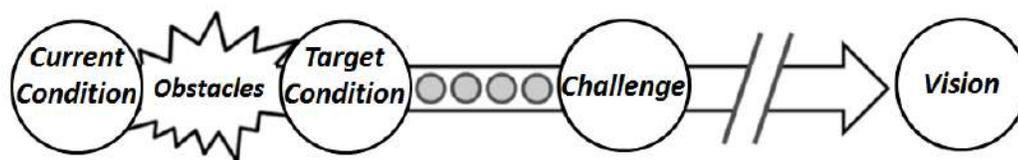
The improvement *kata* invites learners to conduct experiments, preferably changing one parameter at a time. Each experiment targets a selected and specific obstacle and must be accompanied by a hypothesis about the expected effects. Following the

experiment, the learner must bring a personal reflection with respect to the results and their learning. This reflection is reviewed in a structured manner at a meeting facilitated by a coach: the coaching *kata*.

2.1.4.2 Coaching kata

The coaching *kata* aims to teach the improvement *kata* within the organization. It also serves to ensure that employees are engaged in the process of improvement and that they practice the improvement *kata* correctly. The coaching *kata* usually lasts a few minutes (10 minutes on average) and is done in front of a *kata* storyboard, a visual station defining the various elements of the approach and the progress of PDCA cycles and learnings. This storyboard is inspired by the A3[1].

The coaching *kata* follows a specific pattern with fundamental questions aimed at identifying the relevant lessons learned that should be applied to the next improvement cycle (Landry and Beaulieu, 2016: 70). The questions are presented in Figure 2.4:

---

[1] The objective of the A3 sheet is to structure the scientific method of problem solving (PDCA) and to communicate it to the teams and the organization in a standardized way (Sobek and Smalley, 2008; Landry and Beaulieu, 2016).

Figure 2.4 - The fundamental questions of the coaching *kata* (adapted from Rother, 2015)

Description of the target condition:
1. What is the target condition?

Description of current conditions:
2. What is the actual condition now?

Reflect on last step taken:
3. a) What did you plan as your last step?
    b) What did you expect?
    c) What actually happened?
    d) What did you learn?

Reflections on the obstacles that prevent the organization from reaching the target condition:
4. a) What obstacles do you think are preventing you from reaching the target condition?
    b) Which one are you addressing now?

Preparation of the next experiment:
5. a) What is your next step (next experiment)?
    b) What do you expect?
    c) How quickly can we go and see what we have learned from taking that step?

The coaching *kata* involves three actors: the learner, the coach and the second coach. The **learner** conducts the improvement *kata* with his team. The learner can vary from one process or organization to another, but will often be the team leader, the lead, or supervisor (Landry and Beaulieu, 2016: 69). The **coach**, usually the boss of the learner, asks the fundamental questions presented in Figure 2.4 during the coaching *kata* cycle and guides the learner in applying the improvement *kata*. The coach also has a coach, the **second coach**, who observes the interaction between the two main actors and guides the coach in the application of coaching *kata*.

2.1.4.3 Deploying kata

The deployment of *kata* requires a process to improve and a challenge. Ideally, the chosen process enables the team to practice *kata* daily. The frequency of the practice and the level of supervision of this management concept, generally limited by the capacity of the organization to train coaches, will determine the pace of adoption of the routine through the organization. The only way to really understand the fundamentals and learn to apply them in many situations is through repetitive practice of the improvement *kata* in real situations (Rother, 2010: 238).

Several teams can work to improve several processes that collectively will meet the challenge (Landry and Beaulieu, 2016: 68). The challenge acts as a link between the business strategy and the execution of *kata* (Rother, 2010, 2015). Usually reached within a range of six months to three years, the challenge requires the achievement of several target conditions (Rother, 2010, 2015). Moreover, this challenge helps to align improvement efforts and guide the various processes towards the same higher-level goal (Rother, 2010; 2015: 41-46). Thus several teams can work simultaneously to achieve the same challenge by improving different process or different parts of a process. Figure 2.5 adapted from Rother (2015: 46) represents this concept well:

Figure 2.5 - The role of challenge within the organization (Rother, 2015)
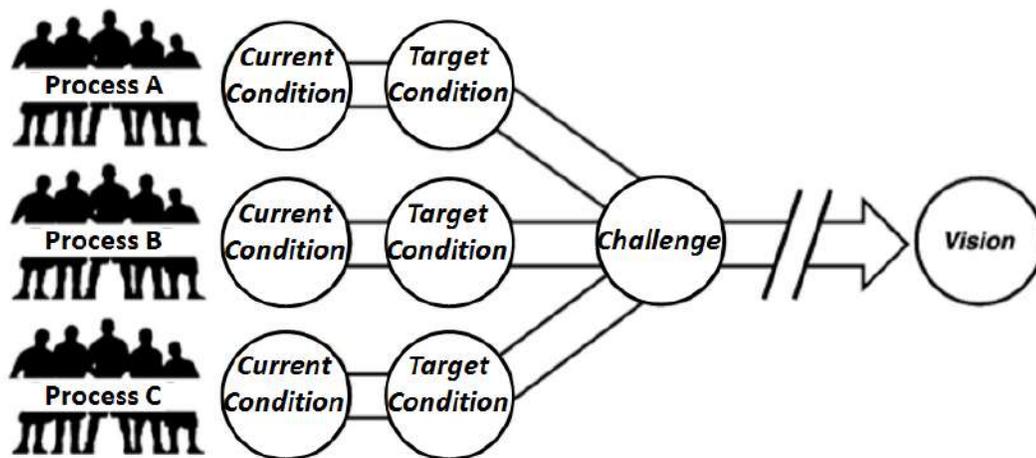
Practicing the improvement *kata* and coaching *kata* thus allows, according to Rother, deployment of routines within the organization that support continuous improvement and transform organizational culture.

2.1.4.4 Kata and organizational culture

According to Rother (2010), the practice of improvement and coaching routines can develop problem-solving ability. By deliberately practicing these routines, new habits develop and change the way of thinking of the members of the organization (Rother, 2010). As shown in Figure 1.1, Rother says that practicing the behavior specified by *kata* influences the way people think and, with time, affects the organizational culture (2010: 237).

In order to clarify these points, it is important to understand what an organizational culture is, and what impact routines can have on the culture of an organization.

2.2 Organizational culture

According to Liker and Hoseus (2008: 5), it is difficult to identify the organizational culture as it requires deciphering what is going on in people's heads. "There are in organizations an intangible and invisible '*je ne sais quoi*' that characterizes them and that sometimes makes them so unique" (Dery, 2012: 3, free translation).

Organizational culture is a complex and dynamic amalgam which entangles values, principles, knowledge, beliefs, techniques, objects, ways, languages, rituals, customs, rules and practices that makes it difficult to decode (Dery, 2012: 3). All organizations have a culture; since it is the inevitable result of the encounter between humans that weave together relationships, build languages, develop plans for the future, interpret their past, build survival techniques and share knowledge, values and beliefs (Dery, 2008: 4). It consists of a set of symbols, rules and common standards that made a collective spirit within the organization (Anderson, 2015: 36).

2.2.1 Definition of organizational culture

The most cited definition of organizational culture in the works consulted (Hatch, 1993; Bessant, Caffyn and Gallagher., 2001; Scott *et al.*, 2003; Liker and Hoseus, 2008; Cameron and Quinn, 2011; Anderson, 2015; Landry and Beaulieu, 2016) is that of Schein:

> A pattern of shared basic assumptions that was learned by a group as it solved its problems of external adaption and internal integration, that has worked well enough to be considered valid and, therefore, to be taught to new members as the correct way to perceive, think, and feel in relation to those problems. (Schein, 2004: 17).

Schein conceptualizes the notion of organizational culture into three levels: artifacts, values and beliefs, and underlying assumptions.

The **artifacts** are the visible and observable phenomena of culture such as organizational routines, written documents, organizational processes, disclosed policies of the company, structural elements (formal descriptions of how the organization's functioning, organization charts, boards, flowcharts) and the physical layout of the workplace. They are easily observable, but it is difficult to draw meaning from them. The cultural significance of these artifacts is influenced by the values and beliefs of members of the organization (Schein, 2004; Liker and Hoseus, 2008).

The **values and beliefs** are the generally accepted rules of behavior of the organization, but are not necessarily written or communicated. They make it possible to judge what is acceptable or not within the group and what must be done in specific circumstances. Values and beliefs will be shared between the group members through a process of social validation (Schein, 2004; Liker and Hoseus, 2008). If we asked the question in an organization about the reason why things are and should be, the responses represent the values and beliefs (Schein, 2004; Liker and Hoseus, 2008; Picard, 2013).

The **underlying assumptions** are shared elements that are taken for granted in a group. They are hidden and difficult to observe. They are "the essence of culture" (Schein, 2004: 25). The underlying assumptions stem from repeated success in implementing previously discussed values and beliefs (Hatch, 1993; Schein, 2004; Liker and Hoseus,

2008). They are mental patterns ingrained in the organization that unconsciously steer perceptions and ways of thinking and doing. The underlying assumptions are the cultural elements that are most difficult to observe and analyze. However, they represent the collective ontological position of members of a group facing the organization's success, of what an organization is, the nature of human and his motivation for example (Schein, 2004; and Liker Hoseus, 2008). Figure 2.6 represents the three levels of a culture and their interactions as described:

Figure 2.6 - The three levels of organizational culture (adapted from Schein, 2004: 26)
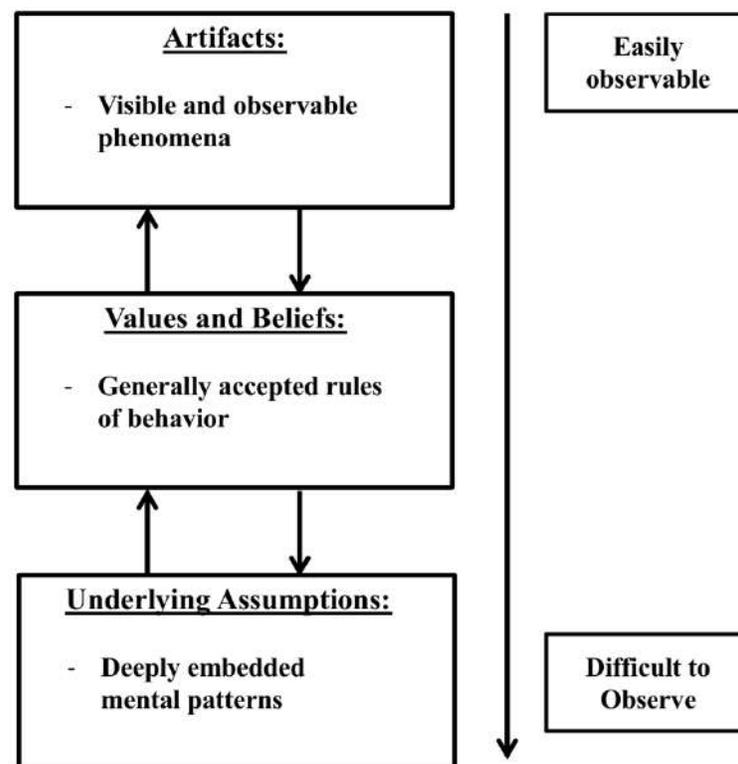
Culture is first and foremost a social phenomenon that develops from the experiences shared by a group and notably by their successes. Learnings that the group draws from these experiences crystallize into underlying assumptions that will guide how the group approaches daily tasks (Scott *et al.*, 2003; Schein, 2004; Anderson, 2015).

Schein (2004) also emphasizes the importance of the role of leadership in the transmission and maintenance of organizational culture. The leaders establish certain values and beliefs, which will, in turn, define the culture. For example, how leaders respond to critical incidents, how they allocate resources and their definitions of routines and tasks to be accomplished reflect their values and beliefs. Through their actions based on these values and beliefs, leaders communicate explicitly and implicitly the underlying assumptions that are themselves the essence of the organizational culture (Schein, 2004).

Some authors criticize the concept that an organization can only have a single organizational culture and an organization could therefore have many subcultures each with their own influences and behaviors (Anderson, 2015: 33). Moreover, although we were referring to culture as an integrated vision, these authors have shown that culture can be differentiated or fragmented (Cameron and Quinn, 2011). These subcultures can be explained, for example, by differences between departments (marketing, engineering, operations, finance) or by a difference in national or local culture of the organization's employees (different factories, assembly lines, or different countries) (Cameron and Quinn, 2011; Anderson, 2015). Nevertheless, each of these subcultures contain common attributes that make up the typical overall culture of the entire organization. In doing so, subcultures can coexist within the same organization.

2.2.2 Types of organizational culture

Given the complexity of the concept of organizational culture, some authors have used different typologies in order to study it. Used in several studies involving continuous improvement and organizational culture, the *Competing Value Framework* (CVF) is an analytical framework that makes use of typologies (Scott *et al.*, 2003; Prajogo and McDermott, 2005; Zu Robbins Fredendall, 2010; Cameron and Quinn, 2011; Lillian Do Nascimento *et al.*, 2015).

Based on four main organizational models presented by Quinn and Rohrbaugh (1983), Cameron and Quinn (2011) present the CFV (Figure 2.7) as a matrix highlighting the

similarities and differences between these models (Picard, 2013 : 9). Four scales are represented in this matrix and each represents the main values and underlying assumptions valued in organizations. These authors classify organizational cultures into four types (Cameron and Quinn, 2011: 41):

The **clan culture** emphasizes teamwork, individual involvement and collaboration. This culture encourages participation and involvement of employees in improving their work environment. Success is measured in terms of the commitment and loyalty of employees and the work environment. The organization is distinguished by its human capital (Quinn and Rohrbaugh, 1983; Cameron and Quinn, 2011; Picard, 2013; Anderson, 2015).

The **adhocratic culture** focuses on innovation and new product development. This culture encourages independence and autonomy of individuals. It is characterized by a flexible structure and flexibility of employees in their work. Success is measured by the originality of products and services introduced to the market (Quinn and Rohrbaugh, 1983; Cameron and Quinn, 2011; Picard, 2013; Anderson, 2015).

The **hierarchy culture** is distinguished by a stable working environment where formal power is distributed according to the number of hierarchical levels. Formal rules, policies and written procedures guide the actions of members and governing decisions. Success is measured by the efficiency, stability and control (Quinn and Rohrbaugh, 1983; Cameron and Quinn, 2011; Picard, 2013; Anderson, 2015).

The **market culture** is characterized by a competitive internal environment where achieving results is the priority. Members of the organization are hardworking and leaders are hard-driving producers and competitors. Success is measured by productivity, market share, profit and company competitiveness Outpacing the competition and market leadership are important. (Quinn and Rohrbaugh, 1983; Cameron and Quinn, 2011; Picard, 2013; Anderson, 2015).

Figure 2.7 - *Competing Value Framework* **(Cameron and Quinn, 2011: 36)**
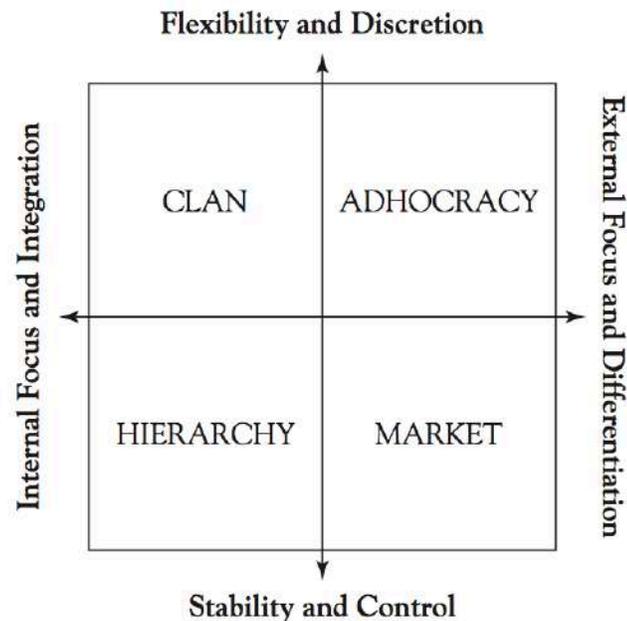
Cameron and Quinn (2011) developed a questionnaire that allows you to draw an overall picture of the organizational culture on the matrix shown in Figure 2.7. This organization culture assessment instrument thus allows us to use a spider chart to visualize the importance that the organization gives each type of culture profiles presented previously (Cameron and Quinn, 2011). Although each type of culture is usually found in organizations, the majority of companies develop a dominant type of culture (Cameron and Quinn, 2011: 46).

Now that we have defined what organizational culture is, it is important to understand what a culture of continuous improvement is. This definition will allow us to understand how the deployment of *kata* could transform the organizational culture to support continuous improvement in the long-term.

2.2.3 Definition of a continuous improvement culture

Given the complexity of the concept of organizational culture, defining a continuous improvement culture is an equally daunting task. Using our review of the literature on

continuous improvement and the identification of factors that support sustained continuous improvement in the long term presented in Section Chapter 1 - 2.1, we identified sets of behaviors, practices, and typical physical attributes of continuous improvement. Despite this, we have not been able to find a firm consensus on what constitutes a culture of continuous improvement.

We therefore propose to group these elements according to the three levels of organizational culture of Schein (2004), that is, tables showing artifacts (Table 2.1), values and beliefs (Table 2.2), and underlying assumptions (Table 2.3). We also divided the artifacts into the six categories defined in section 2.2.1: organizational routines, written documents, organizational processes, disclosed policies, structural elements, and physical layout of the workplace. The elements mentioned thus represent the culture of continuous improvement.

Table 2.1 - Artifacts associated with the culture of continuous improvement according to Schein model (2004)

Artifacts	
Organizational Routines	
Presence of the improvement *kata* (IK) or a scientific approach to problem solving that follows the PDCA cycle to initiate continuous improvement initiatives at all levels of the organization.	Caffyn, 1999; Liker and Hoseus, 2008; Mann, 2010; Singh and Singh, 2015; Rother 2010
Presence of coaching *kata* at all levels of the organization.	Rother, 2010
Daily experimentation by all employees.	Liker and Hoseus, 2008; Rother, 2010
Daily team meetings in the workplace.	Liker and Hoseus, 2008
Daily presence of managers and leaders in the workplace.	Mann, 2010; Rother 2010
Written Documents	
Document of a scientific approach to problem solving (PDCA) available at all levels of the organization (examples: PDCA or A3 forms available or completed, evidence of PDCA cycles on improvement boards).	Spear and Bowen, 1999; Bessant, Caffyn, and Gallagher, 2001; Mann, 2010; Rother 2010
Forms or other opportunities for employees to suggest improvement ideas.	Liker and Hoseus, 2008; Rother 2010
Organizational Processes	
Common language based on the *kata* vocabulary used by employees (current condition, target condition, obstacles, challenge, mission, experiments, learning, coach, second coach, learner).	Rother, 2010
Disclosed Policies	
Leaders and managers ''Open door'' policy.	Womack, Jones, and Roos, 1990; Mann, 2009-2010
Formal recognition by managers and leaders of employee contribution to continuous improvement.	Bessant, Caffyn, and Gallagher, 2001
Structural Elements	
Presence of ideas boards in the workplace.	Mann, 2010
Presence of tools (boards, forms, tickets) to capture employee learning.	Bessant, Caffyn, and Gallagher, 2001
Presence of tools that support employee involvement in continuous improvement (performance charts, daily meetings boards, jidoka, heijunka).	Caffyn, 1999; Bessant, Caffyn, and Gallagher, 2001; Liker and Hoseus, 2008; Mann, 2010
Mission and vision displayed in the workplace.	Rother, 2010
Physical Layout of the Workplace	
Presence of a control room.	Jackson, 2006
Presence of visual boards in the workplace.	Liker and Hoseus, 2008; Mann, 2010; Rother, 2010

Table 2.2 - Values and beliefs associated with the culture of continuous improvement according to Schein model (2004)

Values and Beliefs	
Cooperation and mutual support among members of the organization are a priority.	Liker and Hoseus, 2008
The constant and direct involvement of leaders in the implementation and maintenance of continuous improvement significantly increases the long-term success of continuous improvement.	Womack, Jones, and Roos, 1990; Mann, 2009-2010
Learning is more important than the success of a given experiment.	Caffyn, 1999; Spear and Bowen, 1999; Bessant, Caffyn, and Gallagher, 2001; Liker and Hoseus, 2008; Rother, 2015
Experimentation is encouraged and defended by managers and organizational leaders.	Bessant, Caffyn, and Gallagher, 2001; Rother, 2010
Employees are responsible to solve everyday problems on their workstation.	Womack, Jones, and Roos, 1990
The workplace is a place of learning where employees are developed.	Liker and Hoseus, 2008
Leaders and managers are teachers and coaches.	Womack, Jones, and Roos, 1990; Mann, 2010; Rother, 2010
Continuous improvement is an integral part of daily work of each employee, not a parallel activity.	Bessant, Caffyn, and Gallagher, 2001; Mann, 2010
Respect for people and their opinions.	Liker and Hoseus, 2008; Rother, 2010
Continuous improvement must be linked to strategic objectives.	Caffyn, 1999; Rother, 2010; Singh and Singh, 2015

Table 2.3 - Underlying Assumptions associated with the culture of continuous improvement according to Schein (2004)

Underlying Assumptions	
Leaders are change agents.	Womack, Jones, and Roos, 1990; Schein, 2004; Mann, 2009
Individuals have the ability to learn.	Liker and Hoseus, 2008
Improving every day enables success in the business.	Liker and Hoseus, 2008
All employees are experimenters.	Rother, 2001
The success of the organization depends, first and foremost, on teamwork.	Liker and Hoseus, 2008
The team has the ability to reflect.	Bessant, Caffyn, and Gallagher, 2001; Liker and Hoseus, 2008

These authors agree that to build a culture of continuous improvement, the presence of a scientific approach to problem solving, coaching presence at all levels of the organization, and the constant participation of all employees are elements that must be present within an organization. Moreover, continuous improvement must be encouraged and supported by the leaders. These elements are highly similar to those presented in section 2.2.2 and reinforce the point that success of continuous improvement lies in the behaviors of employees and managers in relation to the scientific method of problem solving applied within the company (Bessant, Caffyn, and Gallagher, 2001: 67). Experimenting, learning every day, teamwork, and improvement activities related to the strategic objectives of the organization are also elements identified by these authors. Still, as we mentioned in Chapter 1, these authors do not explicitly define a practical method for transforming organizational culture to support continuous improvement in the long-term.

We also attempted to define a culture of continuous improvement based on the *Competing Value Framework* (CVF) of Cameron and Quinn (2011) presented in Section 2.2.2: the clan culture, adhocratic culture, hierarchy culture, and market culture. Although we have not found a typical portrait of a continuous improvement culture according to the CVF model, this matrix will help us identify the importance of each type of culture assigned by the organizations in our case studies and help us understand the impact of *kata* on organizational culture. Nevertheless, we can hypothesize, based on our literature review, that the culture of a company with a culture of continuous improvement should have features from each of the four types of cultures. For example, we can assume that the culture of the company studied will possess the characteristics of a clan culture that encourages employee involvement and teamwork. Second, elements of the adhocratic culture should be present, as employees of an organization with established continuous improvement must be autonomous and must develop new standards and innovate. Third, it should have a hierarchy culture, as the establishment of a scientific approach to solving problems must be formally in place. Finally, the elements of the market culture should also be present as continuous improvement increases the performance of the organization in order to create value for the customer

(Cameron and Quinn, 2011: 51). Still, we cannot determine *a priori* which of the four types dominate others.

2.2.4 Changing organizational culture

Changing organizational culture is an extremely difficult process (Sims, 2000: 66). Due to the complexity of identifying and understanding organizational culture, some authors contend that it cannot be changed intentionally. These authors note that it is rare to successfully change a culture due to the complex interactions between artifacts, values and beliefs, and underlying assumptions that shape the organizational culture (Geertz, 1973; Fitzgerald 1988). Nevertheless, other authors assert that an organization can change its culture intentionally. This change can be accomplished by changing the values and beliefs (Schein, 2004; Shook, 2010; Anderson, 2015).

One way to change the values and beliefs is to change the artifacts of the organization by defining the desired actions and behaviors and deploying the necessary work processes to reinforce these behaviors (Geertz, 1973; Schein, 2004; Rother, 2010; Shook, 2010). These changes in behavior can be accomplished by building new routines, using a new language or jargon, using a new method of communication, or adopting a new style of decision making (Anderson, 2015: 33). According to Schein, a culture can be changed through the implementation of actions that explicitly reinforce new values and beliefs. These actions must first come from the company's leaders (Schein, 2004; Anderson, 2015).

Because *kata* is based on two fundamental routines and because organizational routines are artifacts that can potentially change the values and beliefs of an organization by reinforcing new behaviors, *kata* could thus act as an element for transforming organizational culture to support continuous improvement in the long term. Figure 2.8 represents an adaptation of Figure 1.1 and Figure 2.6 by taking account of these new elements.

Figure 2.8 – The relationship between *kata* and the transformation of organizational culture.
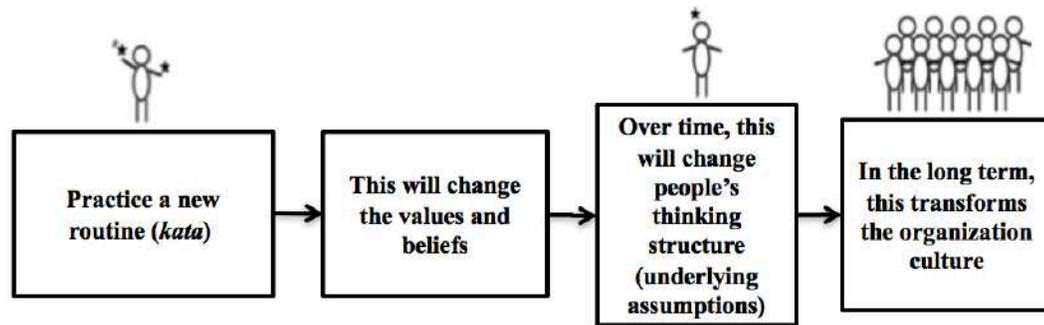
Finally, some authors state that the impact of continuous improvement within an organization is rarely felt unless a routine of incremental changes is in place consistently for a long period of time (Bessant *et al.,* 1994: 18; Bessant, Caffyn, and Gallagher, 2001; Becker, 2004). Knowing that the routines can have an impact on the organizational culture, what impact might *kata* have on organizational culture to help sustain continuous improvement? The conceptual model that we will present next will be used in our research allowing us to answer this question and ultimately our research question.

2.3 Conceptual model

From our literature review, we have grouped the knowledge of continuous improvement, *kata* and organizational culture to build the following conceptual model:

Figure 2.9 - Conceptual model of *kata* impact on organizational culture to support continuous improvement in the long term.
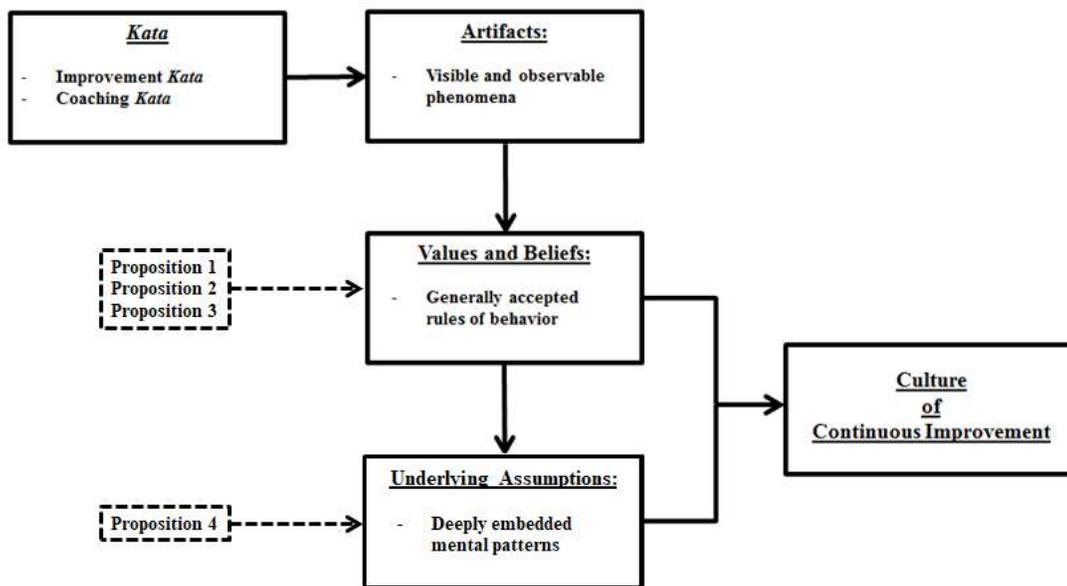
This conceptual model hypothesizes that *kata* is a way to change the values and beliefs of an organization through the introduction of new artifacts and thus act as an element for changing people's thinking structure (underlying assumptions). Thus influencing the three levels of organizational culture (artifacts, values and beliefs, underlying assumptions), *kata* could transform the organizational culture to support the long-term continuous improvement.

This conceptual model also hypothesizes that the indication of the impact of the deployment of *kata* on organizational culture is through the identification of values and beliefs, and underlying assumptions of the members of the organization. Despite the fact that the identification of artifacts makes it possible to define the values and beliefs of organizations and thus the underlying assumptions of them, we cannot rely solely on artifacts to assess changes to the organizational culture. Even if the deployment of *kata*

brings new artifacts and these artifacts influence the values and beliefs of the organization, the artifacts alone do not define organizational culture.

2.4 Conclusion

According to the literature reviewed, *kata* could be a lever for transforming the organizational culture. Indeed, since the reinforcement of new routines is part, according to some authors, of a way to change the values and beliefs of an organization, *kata* could do the same. However, it remains unclear how the deployment of *kata* can transform organizational culture to support the long-term continuous improvement.

To determine the impact of *kata* on organizational culture, we identified artifacts, values and beliefs, and underlying assumptions (presented in tables 2.1, 2.2 and 2.3) that we will assess through interviews, observations, and physical artifacts. In addition, the *Competing Value Framework* (CVF) by Cameron and Quinn (2011) will allow us to identify the impact of *kata* on the dominant culture types using the questionnaire developed by the same authors, so to complement our research. These data collection tools will be presented in chapter 3.

We are now able to identify and develop a methodology that allows us to answer our research question:

> **How can *kata* transform the organization's culture in order to sustain continuous improvement over the long term?**

Chapter 3 - Research Methodology

To explore how *kata* can transform the organizational culture to support continuous improvement, we present in this chapter our choice of research method for this study, the research design, the selection of cases, data collection and data analysis.

3.1 The research method

The method used for this research is the case study. The case study is a unique empirical study where we examine a contemporary phenomenon that the researcher cannot control (Yin, 2014). This analysis makes it possible to extract ideas, links between certain variables and test hypotheses (Eisenhardt, 1989). According to Yin (2014: 4), the case study is a consistent method for researchers trying to determine the why or how of the phenomenon being investigated. This methodology usually recommends several methods of data collection such as archives, interviews, questionnaires and observations (Eisenhardt, 1989: 534). By this definition, the case study seems appropriate for our research, because we are trying to determine how *kata* can transform the organizational culture to support continuous improvement in the long-term. In addition, several data collection methods will be used in our research.

3.2 The research design

According to Yin (2014: 28), the research design is the logic that binds data to the initial research question and therefore its conclusion. In other words, it represents the research plan with the primary purpose of avoiding a situation where the results did not answer the initial research question (Yin, 2014: 29). For our research, we selected the multiple case study.

3.2.1 Multiple case study

Yin (2014) classifies case studies based on the number of cases investigated and the number of units of analysis studied in each case.

Figure 3.1 - The types of case study according to Yin (2014)

	Single Case Study	Multiple Case Studies
A single unit of analysis	Type 1	Type 3
Multiple units of analysis	Type 2	Type 4

According to this typology, our research corresponds to the type 4 design, because more than one case is being studied and several units of analysis are studied in each case, i.e. leaders, managers, team leaders and operators. The multiple case study is also chosen because it is known to be more robust than a simple case study and increases the degree of certainty of results (Yin, 2014: 57).

The multiple case study consists of enumerating the similarities and differences between the cases studied. The objective behind this method is to force the researcher to go beyond the initial impressions gained from first sight of the data from each case study (Eisenhardt, 1989: 541). These comparisons can create new categories or concepts that researchers did not expect at the outset (Eisenhardt, 1989: 541). Nevertheless, it is important to be familiar with each case study before applying this method of comparison. Therefore, the case studies will be presented individually in Chapters 4 and 5 before the comparative analysis presented in Chapter 6.

Figure 3.2 provides an overview of the multiple case method chosen and adapted for our study. The following sections will develop case selection, data collection and data analysis.

Figure 3.2 - The method of multiple cases (adapted from Yin, 2014: 60, free translation)
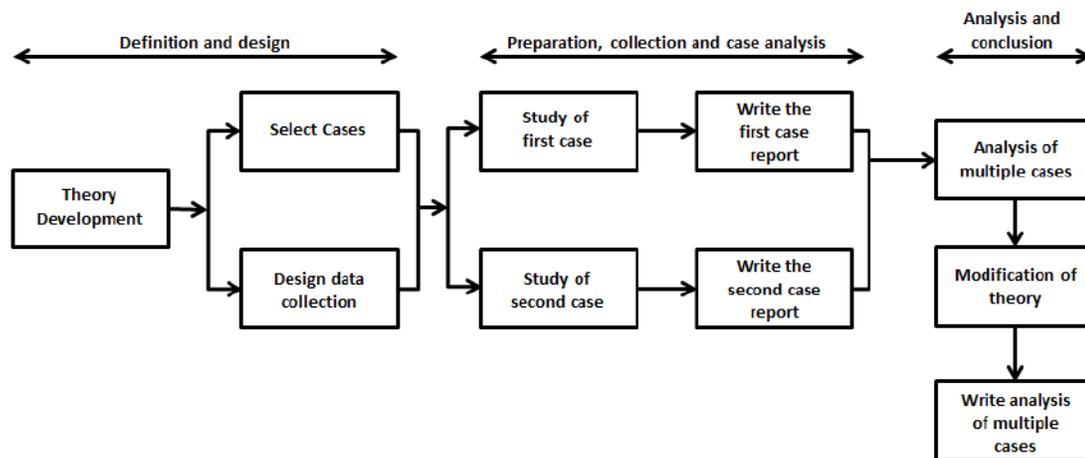
3.3 The selection of cases

The selection of cases was determined by the level of maturity of enterprises in the deployment of *kata* and their openness to the analysis of their organizational culture. Given the specificity of the study, the choice of random case is not preferable, since this reasoned choice gives results as good as a probabilistic method (Yin, 2014).

According to our criteria, we identified two companies that we used as research sites. These companies are SigmaPoint Technologies and Tulsa Tube Bending. SigmaPoint Technologies is an Ontario-based manufacturing company that started deploying *kata* in 2012, while Tulsa Tube Bending is a manufacturing company in Oklahoma (USA) that began deploying *kata* in 2010. These companies were chosen because they both have started the deployment of *kata* in the early years (despite the novelty of this concept born in 2010) and have found that practicing these problem solving routines enabled them to increase the success and sustainability of continuous improvement. It is important to remember that for new routine to become anchored within an organization, there must be repetition and reinforcement of these behaviors for a long

period of time (Becker, 2004: 646) and both companies meet these criteria because they persist in the application of *kata* to date. Both companies have also increased their awareness of *kata* by participating in several international conferences and workshops on the subject.

Telephone interviews with the vice-president of operations of SigmaPoint Technologies and the president of Tulsa Tube Bending helped validate the interest of these organizations towards *kata*, the transformation of the organizational culture and the research project. Once the organizations indicated and confirmed their interest, a research protocol was presented to them verbally and using a PowerPoint presentation to explain the process of the research, people who would be involved, the objective of the questionnaire and the observations to be made. These will be presented in the next section.

3.3.1 The field of analysis

According to Van Campenhoudt and Quivy (2011: 146), during research, the field of analysis needs to be clearly defined. During the presentation of the research protocol with selected companies, we identified a characteristic sample of the population and the elements we wanted to see. The size of this sample was determined by several factors: the time constraint for conducting the research, data collection tools used and the size and composition of the two organizations. In addition, we needed to interview participants who were employed by the organization before the deployment of *kata*. During the presentation of data collection tools, the participating population of each organization will be detailed.

3.4 Data collection

The issue being studied is being addressed qualitatively to identify artifacts, values and beliefs, and underlying assumptions and via quantitative measures to prepare and present an initial portrait of the corporate culture following the deployment of *kata*. The methodology suggested by some authors to analyze the organizational culture is

the use of multiple approaches and tools, which makes it possible to better target different levels of culture and thus arrive at a more exhaustive analysis (Scott *et al.,* 2003: 935).

Using multiple tools tends to increase the level of confidence associated with the results and allows collection of relevant data for our research (Campenhoudt and Quivy, 2011: 182). Using different tools increases the reliability of the results of the study through triangulation, which means studying the convergence of data collected from different sources to validate the consistency of results (Yin, 2014). Triangulation is particularly relevant in terms of the analysis of organizational culture, as different methods can help target different levels of the organizational culture (Scott *et al.*, 2003: 935).

Four tools were used for data collection: the semi-structured interview, observation, physical artifacts, and questionnaire. We conducted data collection in the workplace of both organizations. This data collection took place at SigmaPoint Technologies over the 13, 14, 20 and 21 of October 2016 and at Tulsa Tube Bending during the 24 to 28 of October 2016.

3.4.1 Semi-structured interview

According to Yin, one of the most important sources of information for a case study is interviews (2014: 110). For this study, the semi-structured interview was selected. This type of interview is preferred because it allows flexibility to explore new avenues in the interview following the answers of the participants, while providing a guide to facilitate data analysis and triangulation of the information collected. You will find in Appendix A the guide used during interviews with participants. This interview guide was used to facilitate the data analysis and construct validity.

Semi-structured interviews of varying duration between 15 minutes and an hour, took place face to face, with leaders, managers, team leaders and employees affected or involved in *kata* routines. These meetings took place in private in a closed room to ensure confidentiality of information collected. The following tables show the participants and the duration of their interviews.

Table 3.1 - List of interviewees in SigmaPoint Technologies

SigmaPoint Technologies	
Function	Duration of Interview
President and General Manager	60 minutes
Vice President of Operations	60 minutes
Vice President of Engineering	60 minutes
Lean Transformation Manager	45 minutes
Value Stream Manager (x3)	45 minutes
Group Leaders(x2)	45 minutes
Operators (x4)	15 minutes

The numbers in parentheses represent the number of participants interviewed with the same function within the organization

Table 3.2 - List of interviewees in Tulsa Tube Bending

Tulsa Tube Bending	
Function	Duration of Interview
President	60 minutes
Vice President and General Manager	60 minutes
Production Manager	45 minutes
Manager of Manufacturing Services	45 minutes
Team Leaders (x3)	45 minutes
Purchasing Manager	15 minutes
Engineer	15 minutes
Operators (x4)	15 minutes

The numbers in parentheses represent the number of participants interviewed with the same function within the organization.

The interviews were recorded and transcribed for analysis. We compiled a total of 97 pages of transcripts that we subsequently coded. The encoding method will be defined in the description of our method of analysis.

3.4.2 Observation

Observation was chosen as a tool for this research because the study requires data that cannot be obtained solely from documents or procedures. In addition, Yin (2014: 113-114) mentions that the observation of the state of the environment or workspace may indicate elements related to an organization's culture.

Indirect observation and direct observation were used to collect some elements of the culture. Direct observations, where the researcher proceeds directly to collecting information without involving the subjects concerned (Campenhoudt and Quivy, 2011: 150), enabled us to obtain data on *kata*, continuous improvement routines and methods of solving problems within companies. Indirect observations, where the researcher

interacts with the subject to get the desired information (Campenhoudt and Quivy, 2011: 150), enabled us to ask questions about the context of use of *kata* and problem solving routines. These questions helped us identify certain values and beliefs of the organization. You will find in Appendix B the table of observations used in our research. Table 3.3 presents the participants and duration of observations:

Table 3.3 - Lists of participants observed SigmaPoint Technologies and Tulsa Tube Bending

SigmaPoint Technologies	
Function	Duration of Observations
Value Stream Managers (x2)	0.5 day
Group Leaders (x2)	0.5 day
Tulsa Tube Bending	
Production Manager	1 day
Team Leaders (x3)	1 day

The numbers in parentheses represent the number of participants observed with the same function within the organization.

Although some participants were targeted for observation, interaction with other employees and managers during these days has allowed a more complete analysis of the elements being considered. In addition to these targeted observations, we also attended meetings related to *kata* and continuous improvement to complete our research. During our observations, we have compiled 42 pages of hand-written notes and quoted some overheard conversations. We transcribed these notes for us to encode later.

3.4.3 Physical Artifacts

Some artifacts were observed during this study. These artifacts include tools and methods to support continuous improvement such as *kata* storyboards, charts, daily meetings, posters present in the organization, some work procedures, and the working environment of both organizations. These artifacts have allowed us to develop a perspective and a more complete understanding of the organizational culture (Yin, 2014). These physical artifacts were observed during the direct and indirect observations and are included in the analysis table.

3.4.4 Questionnaire

Using a questionnaire in our study allows the addition of a quantitative analysis to our research. Although the questionnaire leads to a more difficult and complex study, a multi-method approach is preferable in the analysis of organizational culture (Scott *et al.*, 2003; Yin, 2014). According to Scott *et al* (2003: 942), it is unlikely that a single instrument will provide a valid and reliable assessment of the culture of an organization. It is for this reason that the questionnaire and its quantitative nature makes it possible to supplement the qualitative tools presented above.

We found it appropriate to use the organizational culture assessment instrument of Cameron and Quinn (2011) inspired by the *Competing Value Framework* (CVF) presented in Chapter 2. The questionnaire allowed us to gather data to identify the dominant culture types in the two companies before and after the deployment of *kata*. Indeed, through the answers collected using the questionnaire in Annex C, we were able to create a portrait of the organizational culture and determine the importance given by each organization to the four types of culture presented in Chapter 2: clan culture, adhocratic culture, hierarchy culture, and market culture. The results obtained have given us an overall picture of the culture before and after the deployment of *kata* in both organizations.

We distributed our questionnaires to certain leaders, managers and employees of SigmaPoint Technologies and Tulsa Tube Bending that were affected by the deployment of *kata*. For the sake of time and resources, we distributed a limited number of questionnaires. Moreover, given the gradual deployment of *kata* at SigmaPoint Technologies, we distributed our questionnaire on two different value streams. Value stream 1 (VS1) and value stream 4 (VS4) were chosen due to their availability for our study. Table 3.4 represents the people who answered the questionnaire.

Table 3.4 - List of participants in the questionnaire survey

SigmaPoint Technologies
Vice President of Operations
Vice President of Engineering
Member of the Lean Team
Value Stream Managers (x3)
Group Leaders (x3)
Operators (x9)
Tulsa Tube Bending
President
Vice President and General Manager
Production Manager
Team Leaders (x2)
Purchasing Manager
Engineer
Operators (x5)

The numbers in parentheses represent the number of participants in the questionnaire survey with the same function within the organization.

3.5 Data analysis

In our study, the analysis of organizational culture is based on the definition of culture of Schein (2004) and the three levels of culture previously presented in Chapter 2 with the help of our conceptual model shown in Figure 2.9. Our analysis is based on the identification of artifacts, values and beliefs, and underlying assumptions of the organization that promote the sustainability of continuous improvement in the long-term.

3.5.1 Qualitative and quantitative analysis

We conducted qualitative analysis by coding the transcripts of our semi-structured interviews, observations and physical artifacts previously presented in Chapter 3. Coding allows the analyst to quickly identify, extract, and then group all of the segments related to a given question, hypothesis, concept or theme. It paves the way for the analysis (Huberman and Miles, 1991: 97). The codes used in our analysis are the elements of a culture of continuous improvement based on the three levels of culture in the Schein model presented in Tables 2.1, 2.2 and 2.3. We assigned a code to summarize text segments of our transcription using these tables and our key elements of a culture of continuous improvement identified in Chapter 2. Following the

assignment of codes, we identified the most recurrent and we determined that these were the most dominant following the deployment of *kata* in both organizations studied. These were those selected for the writing of the cases presented in Chapters 4 and 5 and will be presented in narrative form. We conducted the encoding using the ATLAS.ti software.

Finally, we performed quantitative analysis of our collected questionnaires. We have compiled all the results of the questionnaires in an Excel spreadsheet to get a result on the four culture types presented in Chapter 2 and thus identify the dominant culture types in each organization before and after the deployment of *kata*. We also consolidated results by different trades to analyze the different perceptions of members of the organization on the impact of *kata* on organizational culture. These results allowed us to later present the results in a spider chart.

Following the data analysis, we checked the validity of our results within the two organizations studied. During a meeting with the vice-president of operations at SigmaPoint Technologies and telephone meeting with the president of Tulsa Tube Bending, we read and reviewed the case analysis to validate and enrich the content. These two meetings were held in February 2017.

3.5.2 Multiple case analysis

Following the qualitative and quantitative analysis of the two cases, we conducted multiple case analysis data comparison. This comparison of data increases the reliability of the results of the study using triangulation and allowed us to identify the elements of organizational culture affected by the deployment of *kata* in both organizations.

Now that the methodology of research has been presented in detail, we are able to present the case studies. Chapter 4 and Chapter 5 will be divided into two parts. First, we present the case study based on the information we gathered through our interviews, our observations and the distribution of our questionnaire. Second, we will analyze and discuss the organizational culture of each company and the impact of *kata* on the

culture of continuous improvement with our conceptual model. In Chapter 6, we will list the similarities and differences between each of the two cases.

Chapter 4 - SigmaPoint Technologies

4.1 Introduction to SigmaPoint Technologies

Founded in 1999, SigmaPoint Technologies (hereinafter SigmaPoint) is an electronic manufacturing services provider (EMS). This company mainly manufactures electronic components for the telecommunications, medical equipment, defense, energy, and transportation sectors. Employing more than three hundred employees, this plant in Cornwall (Ontario) has built its success on the quality of its products and short delivery times. SigmaPoint intends to double its sales in the coming years and continue to compete with the Chinese and Mexican EMS providers based on their five pillars of success: quality, cost, delivery, morale and safety (QCDMS).

Upon our arrival, we can see the vision and mission of the organization displayed at the entrance of the factory. The company describes its vision and mission as follows:

Vision:

- *We will be the North American EMS provider of choice by achieving operational excellence. We will be renowned for our simplicity and high velocity of execution.*
- *We will have an on-going company strategic alignment by having the best in class Hoshin Kanri deployment.*
- *We will enable a culture founded on openness, fearlessness and employee empowerment. Leading with humility, developing our people and nurture long-term relationships.*
- *We will attain success when all our customers and suppliers recommend us for our value add!*

Mission:

- *We are an Electronics Manufacturing Services (EMS) partner delivering complete engineering, supply chain and operation solutions.*
- *We act with a Lean Management culture that enables rapid changes to adjust to a constantly shifting world.*
- *We strive every day to create a fun and stimulating environment where people are free to affect change and are encouraged to challenge what was learned today to make a better tomorrow.*
- *We believe our efforts yield solid relationships by making our customers' life simple.*

The management of SigmaPoint attributes the success of the organization to individuals working in the company (their commitment, their loyalty, their learning) and the current working climate. When we asked Dan Bergeron, president and CEO of SigmaPoint, to describe the culture of the organization, employees are always at the center of conversation: "*The biggest thing is people. It's the toughest thing to manage, but it is the most important part of the business. […] If I focus on the culture, you should see people that are smiling and interacting with one another.*" Dan Bergeron wants to ensure that they have fun and take pleasure in their work: "*If you don't like what you are doing, life is too short, find something that you are passionate about and go do it. That is kind of the spirit of the organization […]. I think that is the foundation of the company.*" The management of SigmaPoint also values respect for people, honesty, integrity, commitment and teamwork. These values are found on a large poster at the entrance of the factory in front of the mission and vision of the organization and on the employees and visitors badges. These values were also mentioned by members of the organization during interviews and indirect observations.

The perceived atmosphere in the organization during our observations reflects an environment where employees seem very close to each other. For example, a few brief personal conversations were heard before or after a coaching or an interaction between two employees about their work. We observe a collaborative environment open to all ideas. Teamwork seems strongly encouraged, as described by Steve Blouin, vice-president of engineering:

> I would describe the organizational culture as being very collaborative, very team-oriented. It's open door policy to such an extent that it may have even led us in the past to have many functions stepping on each other's toes.

No barrier is felt between the different hierarchical levels. We can see throughout the day managers working on visual boards and communicating with all employees.

We have also seen that the ideas of employees seem greatly solicited and encouraged. We find *ideas boards* throughout the organization where employees can fill out *idea tags* offering ideas to improve their daily work. We also find several somewhat

humorous posters showing the face of Dan Bergeron on the body of Uncle Sam, where we read: *Uncle Dan wants your ideas!* Steve Blouin described the solicitation ideas from employees as follows: "*If an idea is generated, whether bad or good, we do not judge. It is an idea and that is what counts [...] This is the kind of thing that defines our culture.* "

Finally, although the culture of the organization is strongly oriented towards employees, the customer remains the priority according to executives: "*Often people will use it as a buzzword: customer first. For Dan Bergeron, it really is customer first, not to mention employees through that and respect for people*" (Stéphane Dubreuil, vice-president of operations).

4.1.1 Management structure of SigmaPoint

The SigmaPoint management structure is greatly inspired by that of Toyota. The leaders call this structure the *gemba* management structure. The *gemba* management structure is present on each production line designed according to the value stream model. Each of these value streams (five in total), contains several production cells, and includes group leaders, a value stream coordinator, and a value stream manager.

Figure 4.1 – SigmaPoint "*Gemba* Management Structure"
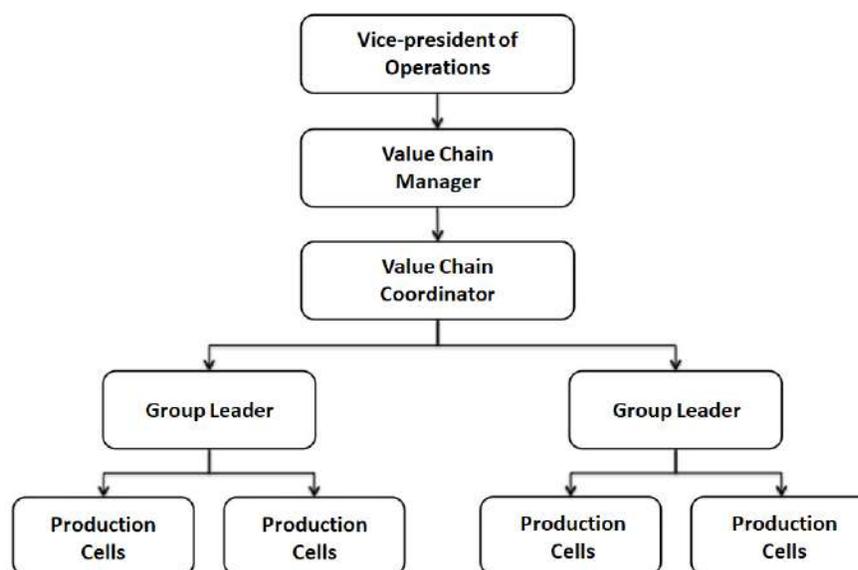
Each of these actors has specific roles:

Group leaders take care of the day-to-day operations of their respective production cells and oversee the operators to facilitate their work and solve problems during the day. Group leaders are available to help operators follow the standard work and help coordinators develop their own standards and quality standards.

Value stream coordinators oversee the value stream group leaders and ensure production standards are met. They are responsible for improving the productivity and quality of their value stream and for developing the skills of their subordinates. Coordinators are also responsible for scheduling production in their value stream and reporting it to their manager.

Value stream managers are in turn responsible for the entire value stream to which they are assigned. They are responsible for human resources management for all employees. They also have the role to assist the vice-president of operations in improving their entire value stream and in developing the skills of their employees.

These value streams are supported by the **vice-president of operations**, Stéphane Dubreuil, who determines the challenges and ensures that the structure is constantly improving:

> *My role is to push the structure. I spend 80% of my time outside of operations. I am present at the executive level to see the problems of others and understand the weaknesses of their structure. I am also present to give a little push on the inertia wheel to make it move a little faster if necessary.*

The *gemba* management structure is present to support the continuous improvement at SigmaPoint and is closely related to *kata*. According to Stéphane Dubreuil, this structure allows them to link the problem solving approach using PDCA to the company's vision. Figure 4.2 adapted by Landry and Beaulieu (2016) illustrates this management structure and the link with *kata* which will be detailed in the next section.

Figure 4.2 - Relationship of *gemba* management structure and *kata* (adapted from Landry and Beaulieu, 2016: 79)
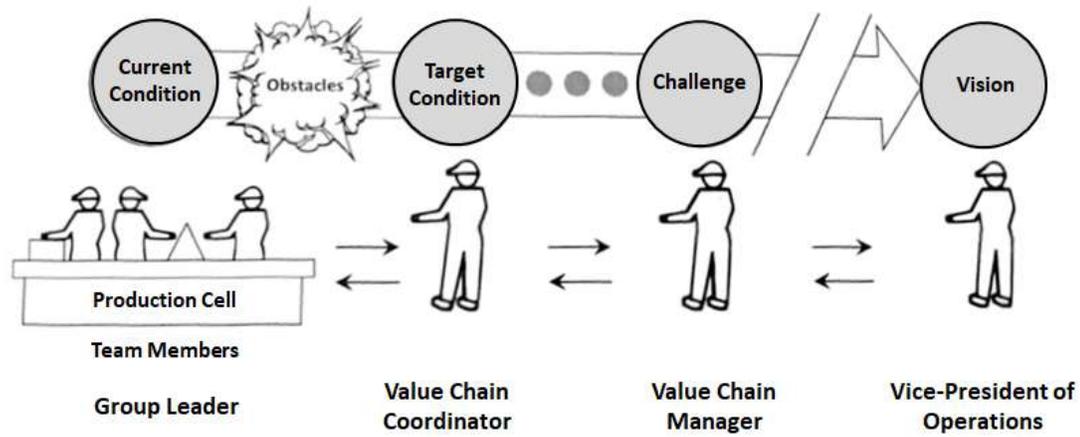
According to the company leaders, this structure also helps to create stability in the process and creates more visibility on the daily production tasks and continuous improvement initiatives: "*with the gemba management structure, I can see we are improving daily and increasing capacity, eliminating the waste and the focus on kata*" (Dan Bergeron).

According to Stéphane Dubreuil, the management structure at SigmaPoint translates into a certain rigidity of the structure and by precise and clear definition of the different roles of operators, managers and the management team. During our observations, we found that each employee had specific tasks and a method to get there. All are guided by a well-defined structure.

4.1.2 Implementation of continuous improvement

SigmaPoint began the implementation of various Lean initiatives in 2006. In addition to the *gemba* management structure, the company relies on visual management to quickly distinguish between normal and abnormal conditions in the value streams so to identify opportunities for improvement. This visual management is supported by several Lean tools like *jidoka* and statistical tools such as control charts to identify value-adding and non-value adding activities. Several visual indicators are also present

directly on the machines to identify at a glance the production cells that do not meet production standards. Several other concepts are present at SigmaPoint such as leveling of production (*heijunka*), standard work, and the just-in-time manufacturing model based on the Toyota model, all present before the deployment of *kata*. SigmaPoint also uses *gemba* walks to support continuous improvement within the organization. Executed religiously, the *gemba* walks are conducted every day with all leaders, managers and coordinators at SigmaPoint. Every morning from 8:46 am until 9:01 am, a meeting is held in the office of the CEO among executives and managers of the value streams. Tactical in nature, this meeting helps communicate the day's priorities and the status of continuous improvement initiatives. As a follow-up to this meeting, a *gemba* walk is conducted in each of the different value streams.

The *gemba* walk, which lasts about 15 minutes, consists of visiting the value stream with the *gemba* team which includes: the value stream coordinator, the team leaders, the production controller, the buyer, the products engineer, and the account manager responsible for representing the needs of customers. A value stream manager described the aim of the *gemba* walk as follows:

> We will look at what we are due to make today. If there is something [to know], everyone is there. If there are questions, the answers are there. We walk the value stream and we look on the shop floor the different signals to make sure everything is correct, make any needed adjustments to the required production and to determine priorities in team. If you have constraints and need support, it's also the time to raise it.

Every day, Dan Bergeron also goes on a *gemba* walk to talk with employees and observe the ongoing improvements.

We also observed the strong presence of Stéphane Dubreuil in the production plant during our three days of observations. Daily meetings with managers in front of the visual stations of the different value streams with Stéphane Dubreuil seem to be a standard at SigmaPoint.

Finally, continuous improvement is supported and aligned with the business strategy by *hoshin kanri* (HK). To link strategy with daily operations, HK allowed SigmaPoint

to connect *kata* and daily improvements with policy deployment by executives. According to the leaders, the HK is central to the implementation of continuous improvement within the organization. On the other hand, they also mention that without *kata*, the deployment of HK would have been much more difficult to accomplish. Indeed, experimentation and deployment of *kata* were crucial to SigmaPoint to get to be successful with HK. These will be detailed in the next section on the deployment of *kata*.

4.2 Deployment of *kata*

The deployment of *kata* at SigmaPoint began in 2012. Following a meeting at a conference in Jacksonville with Brad Frank, president of Tulsa Tube Bending (Chapter 5), Dan Bergeron, Stéphane Dubreuil and Steve Blouin purchased the *Toyota Kata* book. This reading brought the leaders to perceive *kata* as the missing link to support their long-term Lean initiatives, as described Dan Bergeron:

> It [*kata*] was kind of the missing link we had in terms of sustaining Lean. We were already moving in the Lean direction. When Jacksonville came on board, that gave us clarity on how we were going to go from top down to bottom up. The bottom up was: how are we going to grow a culture of CI [continuous improvement]? We called it an army of scientific thinkers. That's kind of the vehicle we chose which was the *kata*.

The leaders perceived *kata* as a method to build an "army of scientific thinkers" by establishing a scientific approach to problem solving using the PDCA. "The *kata* is building an army of scientific thinkers. It is the connection of the seven levels of experiments of *hoshin kanri* whose last four levels for us is *kata*" (Stéphane Dubreuil). Thus, the company saw *kata* as the link to deploy the organization's strategy through a scientific approach to problem solving at all operational levels, where *kata* is the last four levels of HK illustrated in Figure 4.3.

Figure 4.3 - The seven levels of *hoshin kanri* experiments (SigmaPoint, n.d)

4 Teams		7 levels of experiments (PDCA)	
1	Hoshin Team	1	5-10 years
		2	3-5 years
		3	1-3 years
2	Tactics Teams	4	Future State Map 1 year
3	Operational Teams	5	(Challenge) 6 months
4	Action Teams	6	(Target Condition) 6 weeks
		7	Daily *Kata* (PDCA)
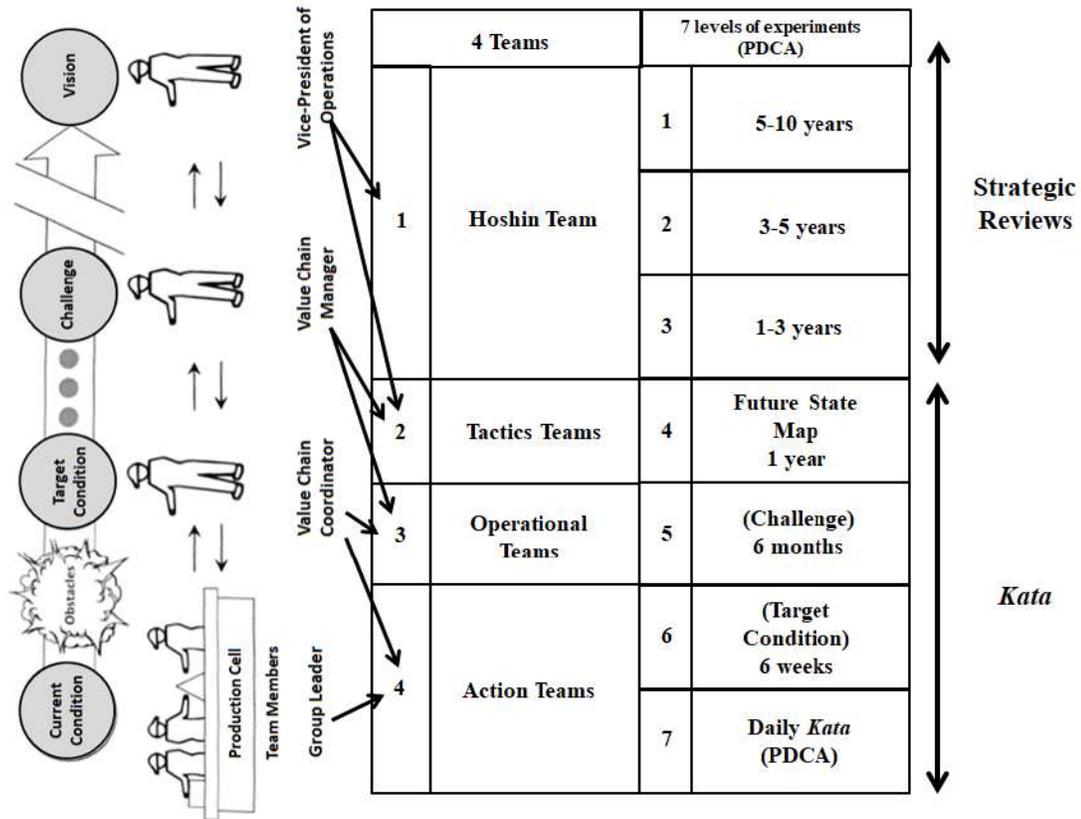
SigmaPoint began experimenting with *kata* on value stream 1 (VS1). The *kata* put in place included a *kata* storyboard for the entire value stream. After some experimentation and practice with the coaching and improvement *kata* of VS1, Stéphane Dubreuil and the Lean team began incorporating *kata* in their operations and their visual boards already in place to create what they call today *kata* boards.

Figure 4.4 - Structure of a SigmaPoint *kata* board
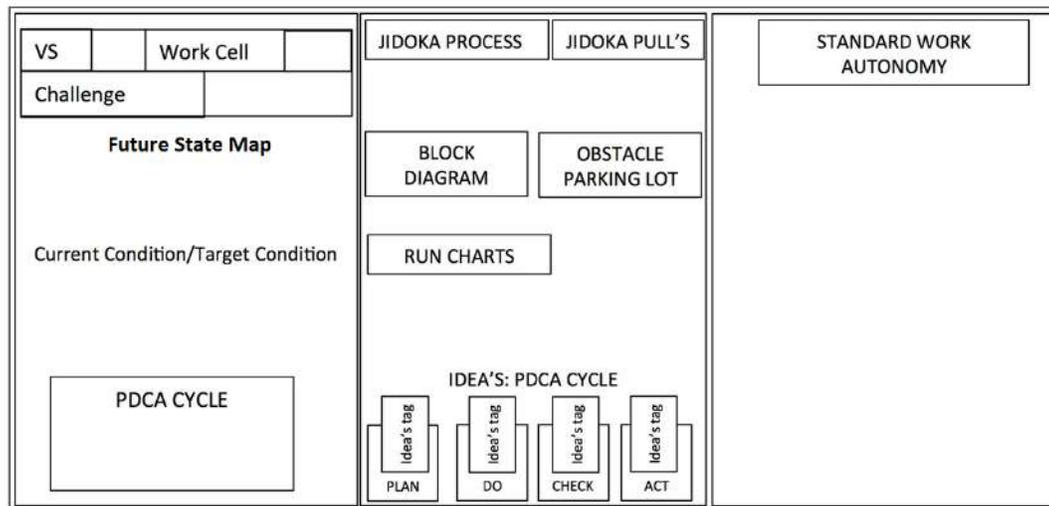
Each value stream has at least one board based on their maturity with *kata*. For example, VS1 contains a *kata* board for each production cell while the value stream 5 (VS5) has only one board for the full value stream since they have only recently implemented *kata* in that area. According to Stéphane Dubreuil, the more a value stream has experimented with *kata*, the more stable their process, and lower the level *kata* can be implemented.

A *kata* board consists of several elements. First, it includes standard elements of the *kata* storyboard as described by Rother (2010): the name of the process involved (VS and work cell), the challenge connected to the vision and mission of the company, the target condition and the current condition, the PDCA cycles and the obstacle parking lot identified during the improvement *kata*. Figure 4.4 shows this board with a few iterations made by SigmaPoint. The major changes include elements of the plant's lean structure to better identify the target and current condition. The *kata* board also includes elements which were already present in the visual stations before the deployment of *kata*, including assessment of the maturity of the continuous improvement of the value streams. Finally, one last element was added: tracking of ideas tags written by employees and their progression in the PDCA cycle. The objective of this latest

addition is to allow employees to see the progress of their ideas, as described Steve Blouin:

> From the moment you see the *kata* board, you have the ideas submitted by the employees. Everyone who has any idea generates it, puts it on the board and can see the progress sequence of that idea, from the idea created to the idea processed. They see the evolution.

The *kata* board is fed by several people and processes within SigmaPoint. Besides tracking the ideas tags from the previous idea tag boards, the *kata* board is fed by the *gemba* walk, the improvement *kata* and the coaching *kata*.

4.2.1 Improvement *kata* and coaching *kata*

The improvement and coaching *kata* are conducted at each *kata* board in the company. Each value stream contains at least one *kata* board where the value stream manager acts as a coach for his coordinator. The Lean team members act as a second coach. This team of two people is responsible for the development of new coaches, and is also responsible for supporting and developing continuous improvement within the organization.

In the value streams that have been experimenting longer with *kata*, such as VS1, *kata* boards are also present in each production cell. The improvement and coaching *kata* are then practiced at the lowest managerial level. For example, the improvement *kata* is practiced by the team leaders with coordinators acting as coaches and the manager as the second coach. The company wants to eventually have a *kata* board in each production cell as Stéphane Dubreuil described during our interview:

> A value stream can have multiple production cells. We're going to have a *kata* board for each production cell. All that will be connected to the vision of the company, which means all will be connected to the seven levels of experiment of the *hoshin kanri* and that all these cells will be mature in *kata*. [...] Each production cell will have its autonomous continuous improvement structure connected to the True North of the company.

The objective of SigmaPoint is deploy *kata* as rapidly as possible throughout the organization, thereby increasing the speed of improvement and autonomy of the production cells:

> *Let's say we have a kata for the entire plant. Your kata will change often or often die, because you have too much fire to extinguish, you look at it at a too high level and you always ask the question whether we work on the good thing or not [...]. If you have a kata for each value stream, it's better because it's five kata, so you're already at a lower level. You just remove the chaos on the decisions you have to make, but it's still too high for me. If you do a kata per [production] cell, there is no one that will come bother you, so you give yourself a target and no one will tell you that you do not work on the right thing* (Stéphane Dubreuil).

SigmaPoint goal is to spread *kata* throughout the company, including office areas (marketing, human resources, finance, etc.), as described by Dan Bergeron:

> Five years from now, you would see *kata* in offices opposed to just operations. There would be a better understanding of the *kata* and the benefits of it throughout the whole organization in terms of the Lean enterprise methodology.

Now that we have introduced the deployment of *kata* within SigmaPoint and the surrounding structure, we will present how *kata* has transformed the culture of the organization in order to support continuous improvement in the long-term.

4.3 Impact of *kata* on the continuous improvement culture

In order to observe the impact of *kata* on the organizational culture, observations, interviews and the distribution of questionnaires were carried out. The results of our research will be presented first with respect to the three levels of the organizational culture: artifacts, values and beliefs, and underlying assumptions so to observe the impact of *kata* on the culture of the organization and identify the elements that support continuous improvement in the long-term. Finally, we will present the results of the questionnaire to supplement the results obtained from the analysis of the three levels of organizational culture.

4.3.1 Artifacts

The artifacts are visible and observable phenomena of culture such as organizational routines, written documents, physical layout of the workplace, organizational processes, policies disclosed in the company, and the structural elements. We followed two team leaders and two value stream managers in order to observe the dominant artifacts of the culture of continuous improvement following the deployment of *kata*. We observed the following dominant artifacts and will discuss them in this section:

- Experimentation between team leaders and operators.
- Ideas tags filled by the operators.
- Formal recognition by the team leaders of experiments proposed by employees.
- Presence of coaching, similar to the coaching *kata*, in the daily work of all production employees.
- Common language based on *kata* vocabulary used by all employees.
- President expressing to managers and leaders his desire to integrate *kata* throughout the organization.
- *Kata* coaching between the manager (coach) and the value stream coordinator (learner).
- Presence of *kata* boards.

During our day with the team leaders, we observed two experiments between a group leader and an operator. Although they did not explicitly follow the coaching *kata*, the group leaders encouraged their employees to conduct these experiments. For example, an operator had proposed to his group leader, using an idea tag, to move a work table to facilitate daily operations. Following this idea, the group leader encouraged the employee to try the experiment the next week. As the group leader who participated in this experiment told us, the table has been moved and a number of small improvements have taken hold. "*even if this small improvement was enhanced later, this experiment has improved the flow of the product. We had to try it.*" According to the group leaders, these small sporadic improvements were not as present before the deployment of *kata*.

We also observed several interactions between the operators in the production cells and the Lean team members rather than with the value stream managers. During four of the six interactions between team leaders and an operator we attended, the conversation

ended up in a group of three with an operator, a team leader and a coordinator or a member of the Lean team. In one of these conversations, we witnessed a discussion between a member of the Lean team, the team leader and an operator.

During this interaction, the Lean team member asked the following questions to the team leader: "*What is your concern? What is your understanding of the situation? Can you show me?*" When these questions were answered, the Lean team member went to the operator together with the team leader to see the problem there. During this interaction, we heard some terms used by the operator who seem to derive directly from *kata*: "*These are my obstacles. Here is our current condition on the machine*". After this interaction, the manager asked some questions to the team leader: "*What is your mid-term objective? [...] What is your next step? [...] Who do you need to talk to? [...] I think you are on the right track*". We were also able to observe coaching of a group leader by a member of the Lean team using language similar to the coaching *kata*. Moreover, once the issue was resolved, the Lean team member went back to the team leader to understand what they learned. This example represents the typical interactions between the staff we observed during our day. According to Vice President of Operations Stéphane Dubreuil, the deployment of *kata* has not only played an important role in transforming this type of interaction between employees and their team leaders but also between the value stream managers and their coordinators. He went on to emphasize that coaching is more present in the daily lives of employees than before.

Other artifacts were also found during our two days with the value stream managers. During these days, we attended three meetings: changeover of a value stream for the production of a product, a quality meeting, and a sales, operations and finance planning meeting. At these meetings, the term "obstacle" was mentioned eight times, while the expressions "target condition" and "current condition" were mentioned respectively three times, once at each meeting early in the meeting. Although the coaching *kata* is not incorporated systematically in meetings, the vocabulary associated with *kata* seems to be integrated into the everyday language of employees.

At a meeting on product quality in response to a request from a supplier, we observed several interactions between Dan Bergeron and the management team. At that meeting, Dan Bergeron sat back and listened as the employees discussed possible solutions. Following discussion by all stakeholders and questioning of team members on how to solve the problem in question, Dan Bergeron made an intervention:

> How do we show the client what we are doing right now? Where are we and what is the long-term plan? How do we put the quality department in the *kata* loop? There's got to be a mentality shift in the department. […] With *kata*, we experiment, make mistakes, learn and make the changes to support them. I have to see this everywhere. I want to see the PDCAs of the *kata*s. Let's integrate and include quality in the *kata* and choose the obstacles to work on.

Throughout the meeting, Dan Bergeron never asked the employees for a solution to the problem, he instead asked them to use *kata*. He gave a direction and a working method for the team to find solutions to these obstacles. This intervention shows the desire of Dan Bergeron to integrate *kata* throughout the organization and his support in this deployment. Moreover, following the meeting, the quality manager and the value stream managers met to discuss *kata* and how it might be implemented in the quality department.

Besides the meetings we attended, we observed a value stream manager during his daily morning routine. First, we observed the *gemba* walk discussed above. At this meeting, the entire *gemba* walk team walked the floor and reviewed the visual stations to identify any anomalies and to ensure that the orders would be ready in time for delivery to customer.

After the *gemba* walk, we attended a coaching *kata*. During this coaching *kata* between the value stream manager (coach) and the value stream coordinator (learner), the following questions were asked:

1) *What is the current condition?*
2) *What is the target condition?*
3) *What was your last step? What did you expect? Have you measured this? Do you have a metric for this?*
4) *What was your last experiment? What actually happened?*

5) What did you learn? Do you think all coordinators know the process? Do you think all operators understand the process?
6) What are the obstacles?
7) What is your next step? What do you expect? How will you measure?
8) When can you show me the results?

During the meeting, the coach asked the coaching *kata* questions plus some additional questions to ensure understanding of his employee on the functioning of the value stream.

However, the coaching *kata* we attended is the only one we observed during our 3 days of observations. Indeed, only one value stream manager practiced the coaching *kata* during the two working days we attended and he had not updated the *kata* board for nearly a month. We also observed two *kata* boards in VS1, the value stream that has been using these routines for the longest time, that had not been filled for almost a month. In fact, for about the previous four months, the SigmaPoint teams had not practiced *kata* due to a lack of time caused by a higher level of orders than anticipated, as explained by Stéphane Dubreuil:

> *Starting about four months ago, I have had a huge capacity problem. Everything is crashing right now, even my continuous improvement structure. [...] The people I have put in place are no longer able to do the job [kata], because I have put them on the floor to make orders. When you need capacity, you take them there, because otherwise you "crash" the whole company and we cannot afford that. All this is very fragile.*

Stéphane Dubreuil went on to say that during periods when demand is higher than normal, all team leaders and coordinators spend most of their time in the production of products. These measures are taken to help stabilize processes and production cells. Mr. Dubreuil mentioned that when the process is stable again, *kata* will resume throughout the organization.

Finally, during our visit, we observed the members of the Lean team preparing a *kata* board for offices associated with VS1, showing SigmaPoint's interest in extending *kata* throughout the organization. The written challenge, linked to the vision and mission of SigmaPoint, was: "*Wouldn't it be nice if we could have a continuous improvement structure in the VS1 office that is autonomously driven by everyone, every day!*" Although this board is for the office workers, the structure remains the same: a place

indicating the target condition and current condition, the PDCA cycle, the ideas brought forward by employees and their progression throughout the PDCA cycle, the obstacle parking lot and the continuous improvement maturity evaluation of the value streams.

4.3.2 Values and beliefs

Values and beliefs represent the generally accepted rules of the organization, but are not necessarily written or communicated. During the interviews, we heard evidence from participants that certain values and beliefs were developed or reinforced as a result of *kata* deployment. Among the 13 participants interviewed, the following values and beliefs are the most dominant:

- Experimentation at all levels is supported and encouraged.
- Continuous improvement is an integral part of the work of each employee and not a parallel activity.
- Learning is more important than the success of a given experiment.
- According to the leaders, the success of continuous improvement requires a rigid structure to align the experiments with the strategic objectives of the organization.
- Employees must be autonomous in solving everyday problems.

In this section, we will detail the five dominant values and beliefs identified above.

First, continuous improvement through experimentation is a value that seems to have developed strongly after the deployment of *kata*. Experiments are encouraged and supported by the leaders of the organization and the involvement of all employees is solicited. In our interviews, the four operators told us that since the deployment of *kata*, ideas they brought and wrote on the boards were tested faster than before and that they were part of these experiments: "*The group leaders were not as involved, where now they get involved and they help everyone to be sure that everything goes as planned. [...] We attack very small details to make improvements. That's the biggest change*" (operator).

Second, the leaders all mentioned that the involvement of all operators in improvement initiatives is a very strong value of SigmaPoint:

> An employee is not afraid to give an idea in a *gemba* walk because he knows and he sees his idea evolve and end up in a *kata* storyboard. He can test his idea with an experiment that, five years ago, he was not able to run because no one listened to him (Steve Blouin).

In addition, these experiments are supervised by managers and coordinators of each of the value streams with the support of leaders, as shown in this excerpt from an interview with one of the value stream managers:

> If I try something with my group, it is necessary that I feel comfortable trying it. It may not work, but I need to feel supported by Dan [Bergeron] and Stéphane [Dubreuil] in this. They need to trust me and I try to transmit that same thinking to my team. If you have no failures, you do not have place to improve. [...] You have more to learn in failure than in success.

This extract shows that experimentation is supported and encouraged at SigmaPoint but also that learning is more important than the success of the experiment. This value encourages employees to develop new skills and managers to encourage learning and improving their working methods through experimentation.

Third, these experiments are framed by a structure created by management to ensure that these experiences allow the organization to improve and move in the right direction. According to the executives, the success of continuous improvement requires a rigid structure to align the experiments with the strategic objectives of the organization. This rigid continuous improvement structure, as expressed by Stéphane Dubreuil, also allows SigmaPoint to improve faster. "The speed of continuous improvement, this is where *kata* is hard to beat," mentioned a manager: "that helps bring focus and alignment of all the different groups on what we work on and why we are working on it." The speed of continuous improvement quickly grew at SigmaPoint through employee coaching following the *kata* and the deployment of *kata* boards in the organization. It is this so-called rigidity of the continuous improvement structure that aligns the application of *kata* allowing SigmaPoint to move much more quickly and to ensure that the experiments are always aligned with the mission and vision of the organization:

> *Kata* is a very rigid structure, which sounds counterintuitive. A very rigid structure, a very clear understanding of the expectations and a very clear understanding of each

member who have their own responsibilities. The structure is rigid, the role and responsibilities are rigid, but it is all designed to support continuous improvement. […] The structure creates a pipeline and that pipeline means now that the executive team could define the challenge many years to a strategic deployment that is connected directly with the cells through the challenge at a process level (Member of the Lean team).

Fourth, the company values the autonomy of employees in problem solving to support continuous improvement in the long-term. Indeed, the key to support continuous improvement, according to managers, is to create an autonomous army of scientists able to experiment every day. By increasing the number of *kata* boards, coaches and learners, SigmaPoint wants to ensure the involvement of all employees at all levels of the organization, one of the team leader described:

> Since the *kata*, I do the PDCA with my team and let them know what they have done and ask them what they think is the next step. We will talk about it. […] He's on his own now, he does PDCA on his own, it's huge (leader).

Continuous improvement for SigmaPoint seems to mean accelerating the implementation of improvement initiatives while increasing the number of initiatives and experiments. As Dan Bergeron described, *kata* allowed them to understand that small daily improvements can advance continuously towards the target condition and ensure the improvement effort does not deviate from the goal:

> The key thing is the change that happened is small, but keep you very close to the target condition as opposed to the other way where you would think you are going faster, but you are not because you are moving away from your target condition. […] You are continually moving, you are not moving away from the mark.

4.3.3 Underlying assumptions

Underlying assumptions are mental patterns rooted in the organization that unconsciously steer perceptions and ways of thinking and doing. Based on our interviews, observations, and previous two sections, the following paragraph will express our perception of mental patterns entrenched following the deployment of *kata* in the organization. We identified three underlying assumptions that appear to be the most dominant:

- All employees are experimenters.

- Individuals have the ability to learn.
- Leaders are change agents.

Following the deployment of *kata*, the work environment at SigmaPoint seems to encourage all employees to become more involved in the continuous improvement initiatives than before. Although the leaders had encouraged the initiatives and ideas before the deployment of *kata*, they now want all employees to experiment compared to only team managers and leaders. This suggests that an underlying assumption of the organization is that all employees are experimenters.

Second, since the deployment of *kata,* the leaders and managers see their work environment more as a place of learning and place great importance on feedback from experiments with their employees to foster their development. Managers and executives seem to be more teachers and coaches than before. This suggests that SigmaPoint believes in the ability of individuals to learn.

Finally, leaders at SigmaPoint are agents of change and key players in the sustainability of continuous improvement within the organization, and have been since before the establishment of *kata*. According to SigmaPoint leaders, leadership support is necessary for the transformation of the organizational culture to support continuous improvement in the long-term. This echoes comments by Stéphane Dubreuil on the importance of support from leaders in the deployment of *kata* and other continuous improvement initiatives:

> *If Dan, Steve and I leave, I do not even give eight months before the company become once again traditional. Although there are many people who believe in kata and CI initiatives, if the new leaders did not have our philosophy, which would probably happen, they would push something else to the supervisors and they will make everything crash. This is because the executives believe it, we take it as a priority and not as a project like many others.*

4.4 Portrait of organizational culture

Using the questionnaire, we developed five profiles based on the *Competing Value Framework* to identify the dominant culture types before and after the deployment of

kata. The five profiles represent the responses of operators in VS1 and VS4, group leaders, managers, and the leader and members of the Lean team and describe their perception of the organizational culture before and after the deployment of *kata*.

4.4.1 Operators

The perception of the transformation of the organizational culture following the deployment of *kata* at SigmaPoint is relatively neutral among the operators in VS1 and VS4. There was no significant change from the four types of culture, i.e. clan, adhocratic, hierarchy, and market. Although operators we interviewed expressed greater participation in continuous improvement and an increase in the number of experiments they were involved in following the deployment of *kata*, it is difficult to illustrate this transformation of organizational culture with the results from the questionnaire.

Figure 4.5 - Perception of SigmaPoint VS1 operators about transformation of the organizational culture following the deployment of *kata*
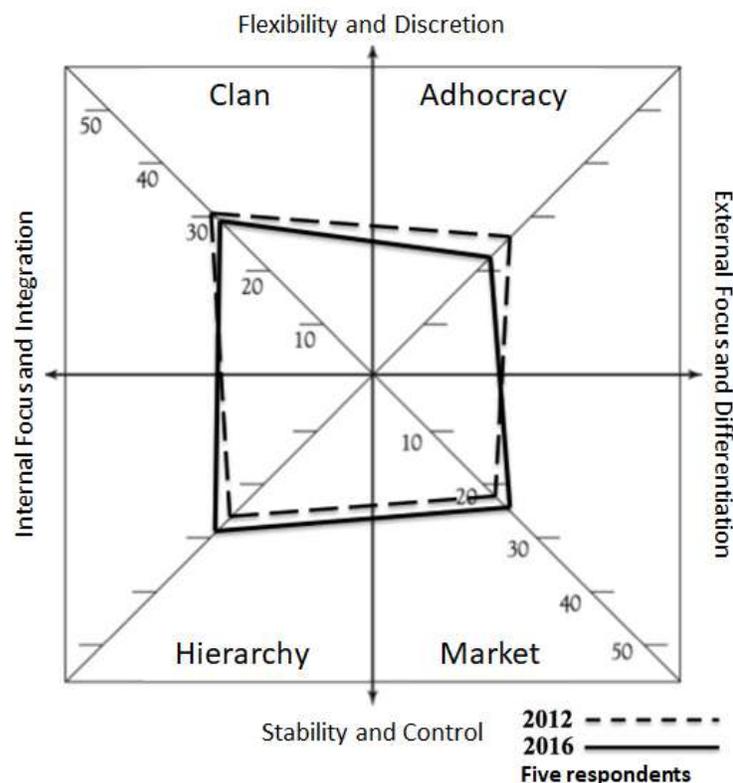
Figure 4.6 - Perception of SigmaPoint VS4 operators about transformation of the organizational culture following the deployment of *kata*
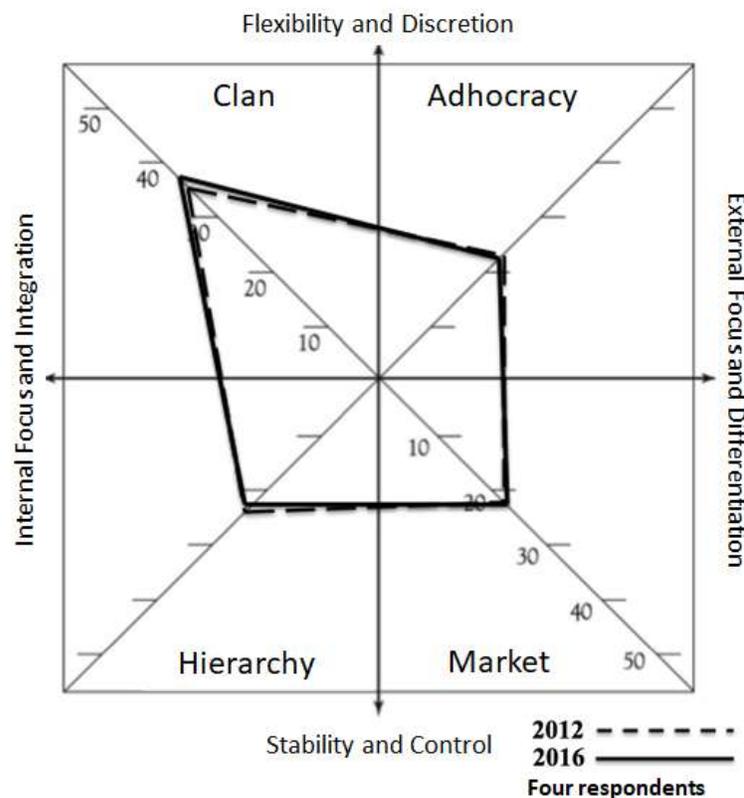
4.4.2 Group Leaders

The perception of the group leaders of the transformation of the organizational culture following the deployment of *kata* is more noticeable than that of the operators. We can observe a slight increase in the clan culture, while market culture decreases. This change seems to confirm that the deployment of *kata* changes the perception of the group leaders who now see greater importance in collaboration and teamwork and a working environment with less emphasis on individual performance and internal competitiveness. Although we do not notice any change in the importance of adhocratic and hierarchy culture following the introduction of *kata*, clan culture becomes dominant for group leaders. This change shows that their involvement and participation in continuous improvement initiatives is now a higher priority.

Figure 4.7 - Perception of SigmaPoint group leaders about transformation of the organizational culture following the deployment of *kata*
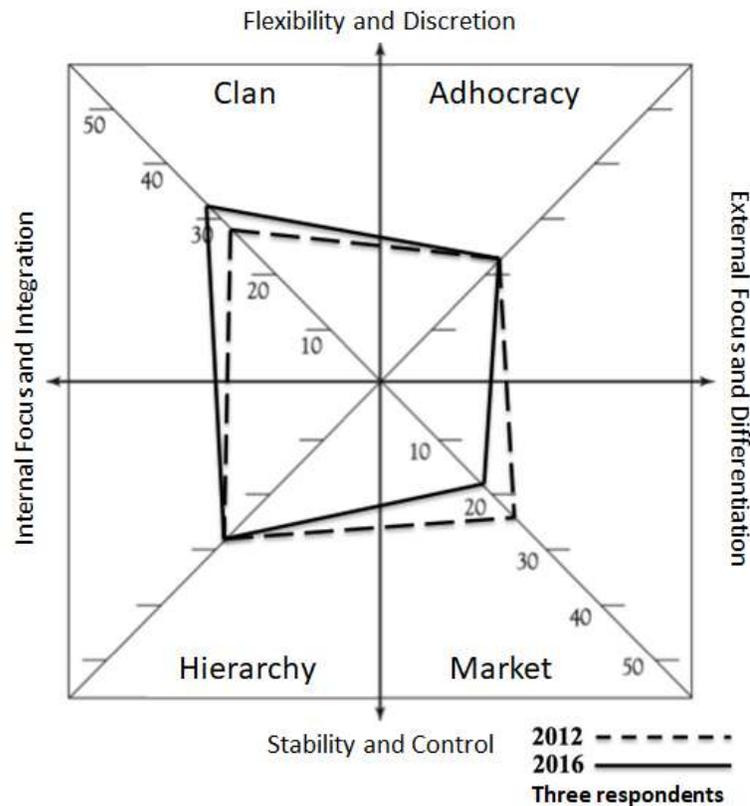
4.4.3 Managers and Member of the Lean Team

During the analysis of questionnaires distributed to managers and a member of the Lean team, we can observe that the clan culture is much higher while the market culture and the hierarchy culture undergo a significant decrease. This change could confirm that the managers perceive that the deployment of *kata* has increased the importance of collaboration and teamwork while the internal environment is less competitive and less focused on individual results. We can also explain the decrease in the hierarchy culture by a perception of an environment allowing great flexibility and greater autonomy of managers and the member of the Lean team in their work.

Figure 4.8 - Perception of SigmaPoint managers and member of the Lean team about the transformation of the organizational culture following the deployment of *kata*
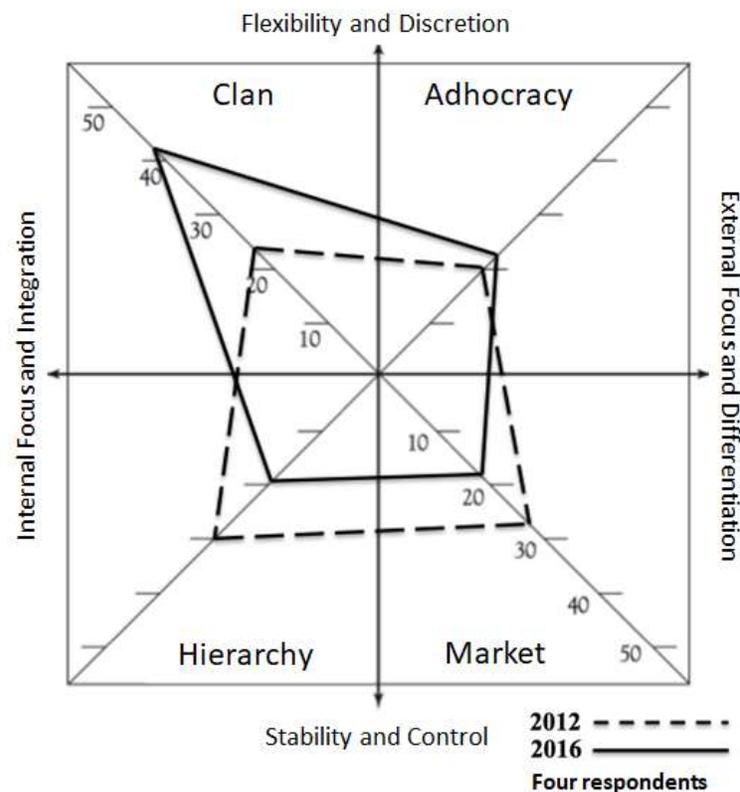
4.4.4 Executives

The executives' responses to the questionnaire indicate a different perception from all other SigmaPoint employees. The leaders seem to say that the deployment of *kata* increases the importance of the hierarchy culture and diminishes the importance of adhocratic culture. This difference may result from the leader's perception that lower hierarchical levels can operate more autonomously within the framework of rigid structure for continuous improvement. We also notice that the clan culture and market culture did not change following the deployment of *kata*. Nevertheless, we note that the clan culture is still dominant for leaders, which shows that collaboration among members of the organization, teamwork and the involvement of all employees remains a priority for SigmaPoint.

Figure 4.9 - Perception of SigmaPoint executives about the transformation of the organizational culture following the deployment of *kata*
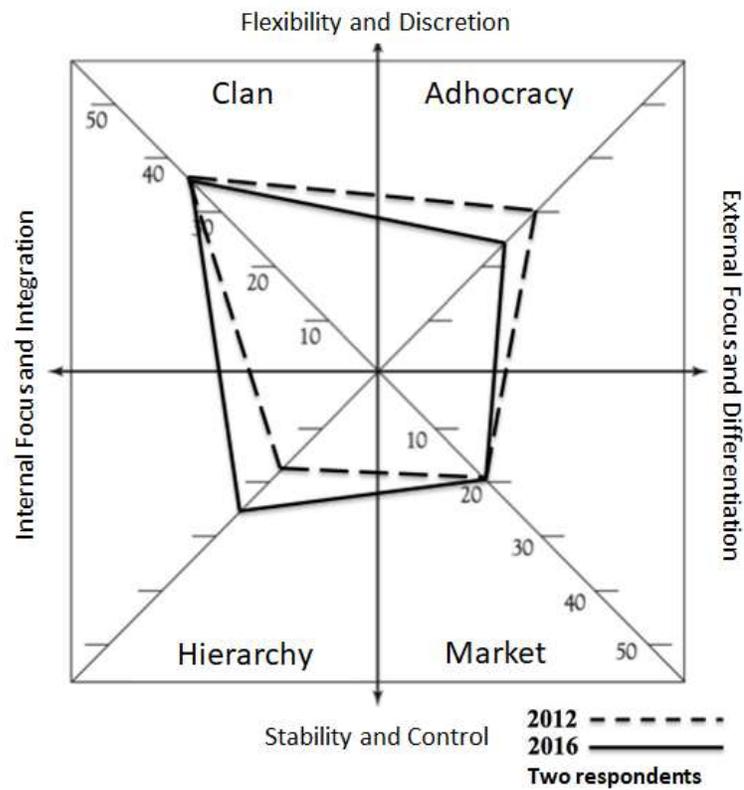
4.5 Conclusion

Using the data collected, we identified several elements to show the likely impact of the deployment of *kata* on organizational culture to support continuous improvement in the long-term.

When we analyzed the observations and interviews at SigmaPoint, we identified the artifacts, values and beliefs, and underlying assumptions of the dominant culture of continuous improvement following the deployment of *kata*. Tables 4.1, 4.2 and 4.3 represent a synthesis of these three levels of culture according to Schein (2004).

Table 4.1 - Dominant artifacts observed at SigmaPoint following the deployment of *kata*

Artifacts
Organizational Routines
Presence of coaching similar to the coaching *kata* in the daily work of all production employees.
Coaching *kata* between a manager (coach) and a value stream coordinator (learner).
Experimentation conducted jointly by group leaders and operators.
Written Documents
Ideas or opportunities for improvement tickets completed by employees.
Organizational Processes
Common language based on the *kata* vocabulary used by all employees.
Disclosed Policies
President who expresses to leaders and managers his desire to integrate *kata* into the entire organization.
Formal recognition by team members of employee experiments.
Physical Layout of the Workplace
Presence of *kata* boards in the workplace.

Table 4.2 – Dominant values and beliefs at SigmaPoint observed following the deployment of *kata*

Values and Beliefs
Experimentation at all levels is supported and encouraged.
Continuous improvement is an integral part of the work of each employee and not a parallel activity.
Learning is more important than success of a given experiment.
According to executives, the success of continuous improvement requires a rigid structure to align the experiments with the organization's strategic objectives.
Employees must be autonomous in solving everyday problems.

Table 4.3 – Dominant underlying assumptions at SigmaPoint observed following the deployment of *kata*

Underlying Assumptions
All employees are experimenters.
Individuals have the ability to learn.
Leaders are change agents.

Finally, the results of the questionnaire indicate SigmaPoint places increased importance on the clan culture. Indeed, the clan culture type became dominant for group leaders, managers, and members of the Lean team following the deployment of *kata*, while it remains dominant for employees and executives of the organization. This change of culture towards greater importance of clan culture, which is characterized by

a high importance on human capital, teamwork, and collaboration, supports our observations of SigmaPoint's desire to include all employees in continuous improvement. This change of dominant type of culture is also characterized by perception of a less internally competitive work environment. Nevertheless, it is important to remember that the results of the questionnaire are based on responses from only 19 employees within the organization and the size of this sample does not allow us to assert that these are significant changes.

Chapter 5 - Tulsa Tube Bending

5.1 Introduction to Tulsa Tube Bending

Founded in 1958, Tulsa Tube Bending (hereinafter TTB) is the largest plant in North America dedicated to bending of steel pipes (tube bending is the umbrella term for metal forming processes used to permanently form pipes or tubing). The tube bending specialist for the oil and gas industry since its inception, TTB offers products in more than 25 different industries in North America, including those in the construction, food and sports equipment sectors. Based in Tulsa, Oklahoma, TTB is the national leader in terms of market share, variety of products and quality. TTB considers itself to be an innovative company in the field and has designed the majority of its bending machines internally. The company employs over 50 people.

When we arrived at the factory, we noticed a large poster on the building featuring a photo of employees and the company mission: "*Serving Others. Building People. Pursuing Excellence.*" The mission of the company is very important to Brad Frank, president and owner of TTB. Every week, the president schedules a meeting with the vice president, managers and team leaders to discuss the mission of the organization. During the meeting lasting 30 minutes, the employees discuss an article or a book chapter related to the mission of the organization. According to the President, the meeting ensures that everyone works in the same direction and that the mission is the priority of the organization. We also find the mission of the company next to the TTB logo throughout the organization, both on the business cards and at the entrance to the front desk and in every department. We also find the vision of the company in the office and factory:

Be a place everyone wants to work and no one wants to leave.
Our employees have the knowledge and ability to solve any problem
3 days/3 weeks at the lowest cost.

Brad Frank considers the welfare and development of its employees as the priority of the organization. His goal is that employees are engaged in their work, are happy to be present every day and can grow constantly:

> Our culture is one trying to develop a coaching/mentoring and more of a personal approach to some things. […] The target would be the highly engaged workforce and managers that are looking a little deeper than just results and trying to make long-term decisions for the people.

This is achieved through close proximity of leaders with their employees and a friendly and welcoming family environment, as described by Laura Oskey, vice-president and general manager of the company:

> I think we like to have fun with each other. We care about each other personally. We know about spouses, children and things like that. […] We have very good people working here. Nobody is perfect, but morally and ethically most people here I would trust in my home. […] It's a culture that has fun, but we are not a laid-back type of culture.

One of the team leaders also describes the purpose of the organization as follows:

"The objective is developing people, pulling knowledge from them and not just coming to work" We can also observe a welcoming and family environment from the various recreation activities provided to employees (pool table, foosball, arcade, etc.) and used daily during lunch and breaks.

During our four days of observations, we saw an organization where employees are very curious and socially engaged. During our meetings with managers, team leaders, and employees, each person wanted to begin by learning more about us, our hobbies and the goal of our research. For example, a team leader told us about his passion for hunting and martial arts before asking us about our own passions. It seems very important for employees to know the people with whom they interact. In addition, at the end of our interviews, team leaders and managers all had two or three questions about our research or on continuous improvement in general, which shows a level of curiosity of all employees. During our four days on site, we also observed the president touring the factory and having personal conversations in addition to a few jokes with employees. We saw a very family-like work environment during our visit.

Finally, to achieve a high level of employee commitment at TTB as well as a pleasant working environment, the company has been using the Gallup Q12 questionnaire since the late 1990s. Using the questionnaire, TTB measures the level of employee commitment to their colleagues and their perception of management and organizational commitment to them. Measured twice a year, the Q12 is, according to Brad Frank, the tool that allows them to constantly increase their revenues and improve productivity while increasing well-being at work for their employees.

5.1.1 TTB management structure

A job-shop type of business, TTB has a management structure centered on the expertise and skills of their employees. The president and the vice-president are present on the production floor and in daily operations. Since the process of tube bending is very specialized, employees are trained internally and managers are all former operators. Each order is different and each product is custom, which requires flexibility and increased expertise of all operations.

The organization is mainly divided into four departments: production, manufacturing services, sales / marketing and purchasing. Despite what the flowchart in Figure 5.1 shows, the president seemed to be closer to the team of manufacturing services and production and vice-president closer to sales and purchasing during our visit. According to the president, his responsibilities and those of the vice-president vary depending on the time of year and current priorities.

Figure 5.1 – TTB Organization Chart
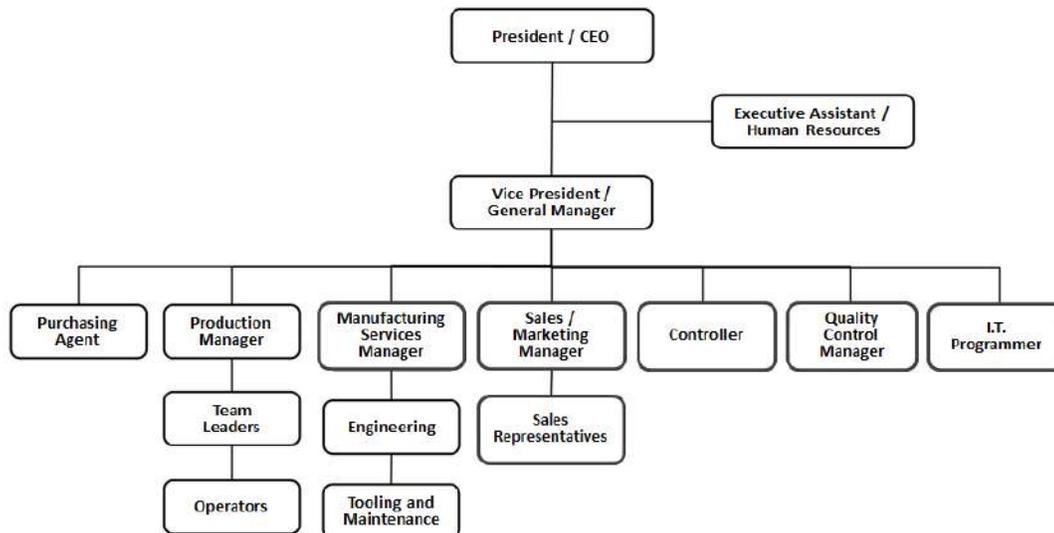
At TTB, production is divided into three bays: the welding bay, the rotation bay and the heat bending bay. Each bay is supported by a team leader, the production manager and the manufacturing services department. These actors have specific roles:

The **team leader** is responsible for coordinating activities and the production in their bay. The team leader is also available to help employees make the right decisions about the chosen method of production for each order to meet production standards. The team leader is the expert of the department and responsible for the quality control of production.

The **production manager** is responsible for supporting the team leaders and ensures that they meet production standards. The production manager is also the reference and support for team leaders when they have difficulty making a decision on the bending method. The manager also ensures coordination between the various bays when the different departments must interact to manufacture a product. He is also responsible for the management of human resources and skills development for all employees.

Each bay is also supported by a **maintenance operator**. The maintenance operator is responsible for machine maintenance and producing the dies and tools often required to set up the machines for the customer requirements and product specifications.

The maintenance operators report to the **manager of manufacturing services** who is responsible for improving the various departments through the manufacture of new equipment or tools. He is also responsible for prioritizing tasks of the maintenance team to eliminate the obstacles necessary for production.

Centered on the expertise and skills of their employees, the structure of TTB is also based on teamwork and the ability of all employees to cooperate, as described by one of the managers on what they look for in an employee:

> We look at social competence, social skills, team players and technical skills. You need to be socially and technically competent. If you look a bit deeper, we look for somebody who wants to learn, has a high level of integrity, somebody I can trust and that is not afraid of hard work.

5.1.2 Implementation of continuous improvement

TTB started the implementation of continuous improvement initiatives in 1993. The company began with SMED in the factory to reduce the cycle time of some bending machines. Some changeovers took more than three hours, thus the aim of the organization was to reduce the setup time as much as possible. Following the success of this initiative and recognition by employees of the benefits from SMED, Brad Frank decided to hire some external resources to teach his team of managers how to implement other continuous improvement initiatives. Since 2002, the company has conducted more than 60 workshops and kaizen events. In addition to these events, TTB relies heavily on the participation of employees to support continuous improvement. Employees can fill in opportunities for improvement (OFI) forms or a "yellow ticket" when they have an idea for improvement. The opportunities for improvement are the small improvements that work crews can perform themselves while yellow tickets represent improvements that require the maintenance team to make or modify work equipment. There are also financial incentives related to the impact of these improvements on the performance of the organization, which seems popular with employees.

TTB also relies on daily meetings to support continuous improvement. Twice a day, at 7:45am and 1:45pm, the production manager and team leaders meet for 15 minutes in the "war room" around their daily management system board. A few minutes before the meeting, team leaders record specific performance indicators for their department on the board. The problems and obstacles faced by the team leaders to achieve their productivity goal and their next experiment are also displayed on this board. During the meeting, the team looks at the schedule for the day, the number of people needed in each bay, the distribution of teams and concerns of each department. This board also includes the list of improvement projects and experiments to be done during quieter periods of the year. These daily meetings were set up after the deployment of *kata*.

According to Brad Frank, the implementation of Lean tools at TTB, despite their successes of the last 15 years, does not alone ensure long-term success of continuous improvement in their organization. He goes on to say that a high level of employee engagement and the unconditional support of managers and leaders in the scientific approach to problem solving is essential to achieving the sustainability of continuous improvement within the organization. Additionally he asserts that the Q12 survey plays a key role in achieving these goals. Overall, the president believes that managers have the key role in supporting the continuous improvement in the long-term:

> We believe it's the manager's jobs to create systems that force our employees to solve problems. It sounds heavy handed, but we learned that from our Toyota mentor. […] We believe that the proper systems can also help create the behavior, which helps create a change in the way we think.

Indeed, Brad Frank told us that, in his view, the establishment of a "system" that forces employees to solve problems allows the introduction of new behaviors within the organization and thus supports long-term continuous improvement.

5.2 Deployment of *kata*

TTB began deployment of *kata* in 2010. The company began by experimenting using these routines to develop and design a new heat-induction tube bending machine. After Brad Frank and the manufacturing services manager read the book *Toyota Kata*, the

company experimented with *kata* with the company engineer. Initially, the president was doing the coaching *kata* with the engineer every day, with the manager of manufacturing services as the second coach. The objective of this *kata* was to build a machine that could meet certain specifications achieved by no other American company and innovate in the field:

> Our challenge was to be able to produce this product to this specification and we had no idea how to do that. There were 24 different aspects. I think we had 7 or 8 challenges and 30 or 40 different target conditions that we had to make on this project. For us, it was really detailed (Brad Frank).

For two years the coaching *kata* and improvement *kata* took place between the president (coach) and engineer (learner) to develop new features and test concepts with minor changes on existing TTB machines. According to Brad Frank, the new machine, manufactured after two years of *kata*, would never have been conceived without the help of *kata*:

> Without *kata*, we could not have been able to make this happen. […] We think we are the only company to have developed something like that in house since the first company 30 years ago. We are proud to have been able to do it in house (Brad Frank).

The engineer also described how *kata* allowed TTB to develop this new machine:

> You don't need to take everything all at once. […] Maybe there are 10 different areas to work on. If you don't know where to start, just pick one and start from there. Being able to use *kata* as a roadmap to solve a really huge problem is why I really liked this approach, because you can chunk up a project and very quickly make progress and you don't get as overwhelmed with the huge scope.

So *kata* was first deployed as a method to try and reduce the complexity of a project to small improvements to move forward as quickly as possible to the challenge. After a few iterations of this first *kata* application, the improvement and coaching *kata* were deployed throughout the organization.

5.2.1 Improvement *kata* and coaching *kata*

Between 2010 and 2015, each bay at TTB had a *kata* storyboard and practiced the improvement and coaching *kata* every day. *Kata* was happening between the production manager (coach) and team leaders (learner) with Brad Frank or the manager

of manufacturing services as a second coach. The engineering team, and purchasing and sales also all had *kata* storyboards where either the president or the vice president was the coach and the manager of manufacturing services was acting as a second coach. Therefore, all production and office teams each had at least one *kata* storyboard all with the same vision and corporate mission.

Despite putting this structure and these routines in place, TTB formally stopped the improvement and coaching *kata* as described by Rother (2010) in late 2015. During our visit, *kata* storyboards in the different bays were being used sporadically and daily meetings between coach, second coach and learner had ceased to take place daily. The production manager, team leaders and employees all told us that these changes were made gradually and cannot determine the exact time of the transition. Brad Frank told us that this change of direction took place during a meeting with a consultant in 2015:

> During the implementation of TK, we came upon the opportunity to meet this [consultant x], this lady who taught TPS to [Toyota] North America for 10 years. She ran the department that taught that. I was thinking: how can we pass this up? […] What she asked is: you need to make a choice. Am I going to apply TK every day or I am going to try to learn TPS with her? […] I talked to my team and told them I was going to go this way because she is whom she is. [...] I think that was part of what de-emphasized *kata* in some ways.

Ultimately Brad Frank decided to set up a method of continuous improvement different from *kata* with this consultant:

> She was not a TK fan at all at first. She really thought it was kind of TPS light or something. I think later she would tell you that she did not completely spend enough time with it to see it. […] Standing at the boards seemed very superficial to her. [...] What I learned later is that she wanted to create a system that forces the learner to solve problems, not a thing that we would stand at the boards and work on stuff. She believes, and Toyota believes, that the best learning is when we have no choice but to solve the problem. If we think about what Ohno did early on in his career, he would say: would you please remove one person from your team and find a way to make it happen. [...] She was seeing this [*kata*] as I was pushing this on my people. If you want to teach this, change your systems so that it forces your employees to solve problems and coach your employees to solve those problems.

So, following this meeting, Brad Frank decided to stop the improvement and coaching *kata* as a formal approach. Nevertheless, the President of TTB told us that *kata* prepared them and helped to set up this new method: "*We believed that if we hadn't found kata*

and found [consultant x] first, it would be like we were talking two different languages. I think kata prepared us better for [consultant x]. "

Despite the end of these routines, Brad Frank mentions that *kata* has really changed the way of working and thinking of his company and its employees:

> We do not do a lot of IK/CK coaching sessions while standing at a storyboard as a company would that was learning IK/CK. Our work with IK/CK has changed the way we think as a management team. We constantly speak of current condition, target condition, obstacles and we run experiments to test our hypotheses. […] We are a huge IK/CK fan and supporter. However, our company culture has been molded much more via our Gallup work than by our IK/CK work. We believe that the management patterns the IK/CK teaches are similar to the management patterns we learned through our Gallup study.

Several elements of *kata* are still present in TTB and presented in the next section. We still find *kata* storyboards similar to that of Figure 5.2 in the office of the vice president, sales representatives, as well as the purchasing manager. These boards are used according to the cycles of experiments and are reviewed on a daily or weekly basis according to the needs of different departments.

Moreover, despite the mention of the president that the improvement and coaching *kata* are no longer formally used and *kata* storyboards are not used daily, we find a different form of *kata* in the daily routines within the organization. *Kata* storyboards are also present in the factory for certain projects or when a department wants to improve a process which employees and the manager or team leader expect will require several iterations before reaching the target condition, as described a team leader:

> Sometimes we use *kata* for improving if we have a recurring fire. If I have something that keeps popping up as an issue, I will do *kata* to dig deeper into it. Sometimes I also give my guys a board [...]. If they are having an issue, they can write that project on it and we can talk about it on our team meetings […], which is another coaching opportunity.

Figure 5.2 – Tulsa Tube Bending *kata* board

Vision:			OUTCOME METRIC	IN THE MOMENT METRIC
Challenge:		Date:		
Theme:				
CURRENT	TARGET			
			OBSTACLES	
PARKING LOT			PDCA LOG	

The displayed *kata* boards include several elements of the Rother *kata* storyboard Rother (2011) including the target condition and current condition, the PDCA cycles, the obstacles parking lot, vision and challenge. TTB also added a place to put some performance indicators of the department. In addition, the organization has reserved a space for the theme that allows the company to determine the process or department related to the board. For example, we observed a theme that was the revision of quotes before sending to the customer.

So, despite the fact that the improvement and coaching *kata* are no longer formally used as described by Rother (2010) within the organization, according to the employees and management, several elements are always present and *kata* seemed to have evolved in recent years in addition to having had an impact on the organizational culture of TTB.

5.3 Impact of *kata* on the culture of continuous improvement

In order to observe the impact of *kata* on organizational culture, observations, interviews and questionnaires were conducted at TTB. The results of our research will

be presented according to the three levels of the organizational culture (artifacts, values and beliefs, and underlying assumptions) to identify the elements that support continuous improvement over the long-term. Finally, we will present the results of the questionnaire to supplement the results obtained from the analysis of the three levels of organizational culture.

5.3.1 Artifacts

During our observations over four days, we followed three team leaders as well as the production manager to identify the dominant artifacts of the culture of continuous improvement following the deployment of *kata*. We observed the following dominant artifacts and will discuss them in this section:

- Experimentation between managers or team leaders and employees.
- Communication of learnings by employees to their team leader following experiments.
- Formal recognition by the managers and leaders of the employee contribution to continuous improvement.
- Presence of certain elements of *kata* integrated into the daily meeting boards.
- Presence of coaching similar to the coaching *kata* during the daily meetings.
- Presence of coaching similar to the coaching *kata* by executives to managers and team leaders.
- Common language based on *kata* vocabulary used by executives, managers and team leaders.
- Presence of a scientific approach to problem solving (PDCA).

First, we attended two experiments conducted between team leaders and employees. During these experiments, the team leaders made sure that employees learn from their experiments, whether or not they achieved the desired results. For example, during a day in the maintenance department, an employee tried to install new steps on a machine in order to facilitate access for employees and the test was not conclusive. Nevertheless, the employee communicated his learning to the manager and explained what he understood from his mistakes and from that experience. Following this feedback, the employee asked if he could try a new approach. The manager immediately agreed and released the funds necessary for the execution of this new experiment.

We also attended for three days, the daily meetings between the production manager and team leaders in their room for this purpose. When first put into place, the board

used for these meetings was changed to incorporate some elements of *kata*. As the president said, and as we can see in Figure 5.3, the learning column (Learned), vision, mission, current condition, and the target condition were added during the creation of these meetings. These additions show that some elements of *kata* are still present in the organization.

Figure 5.3 – Daily meeting board in Tulsa Tube Bending

During the six meetings we attended, the production manager always asked the same questions to team leaders present:

> *What is the plan for today?*
> *Any fire or problems?*
> *What happened with your last experiment? What did you learn?*
> *What are your experimentations for today?*
> *Any new obstacles?*
> *Do you need anything for today?*
> *How is the morale? Is the spirit good?*

These questions, similar to the coaching *kata,* are answered by each of the team leaders in turn and the answers are thus shared to all. According to Brad Frank, this method allows a greater learning of the entire team than the individual coaching *kata* previously experienced in the company. In addition, the production manager mentioned in his interview that he believed that this method of team learning during daily meetings is preferable to individual learning: "*The strength is that we are all different with different experiences and we all learn from each other. We have created an environment that encourages that behavior.*" So notwithstanding Brad Frank talking about the formal disappearance of the improvement and coaching *kata*, a different form of *kata* seems consistently present within the organization. Moreover, learning during the coaching *kata* changed from individual learning to group learning.

Following these questions and individual answers, the manager asks the team leaders for their ideas to eliminate the obstacle being worked on by each team leader or to address issues raised during the meeting. A brainstorming session of a few minutes began to find the next day's experiment for each team leader related to an obstacle or an identified problem. This type of brainstorming and team meeting seems to be the TTB standard. We observed several impromptu meetings in all departments. For example, in the heat-induction bending department, we have seen this type of meeting when there was a tube with a value of several thousand dollars to be bent with which employees were not accustomed to working. The team leader gathered the employees and asked for their expertise in order to find the best possible solution. Following this meeting and a consensus of the team, the team leader then proposed the solution and its expectations regarding the result to the production manager to know his opinion on the suggested technique. Finally, following the bending of the tube, the entire team met with the production manager to record and share their learning.

In our interviews with the president, we have also observed two interactions between the president and employees who had some questions for him. During these interactions, Brad Frank always asked several questions:

What do you think about the situation?
What would you do?
Are you concerned with anything else?
You looked more into this than me. Based on what you are saying, what do you think?

Although these are not the coaching *kata* questions, the president mentioned that following the deployment of *kata*, his approach with its employees had changed radically:

> Part of what *kata* changed in my view of the world is: as the coach, it's ok to let the learner make some mistakes and have the wrong ideas, and there's a place where we talk about it […]. Old Brad, before *kata*, would be telling [employee x] what to do. New Brad, since *kata*, is saying: how can I engage [employee x] in a way were we almost set up experiment with what he wants to do, because what he wants to do, I think is highly developed TPS knowledge. In our level, the way he and I talk every week, we talk in *kata* terms and we still use *kata* terms. We still talk about vision, challenge, what is our condition and what we want it to look like.

So, we have observed that the deployment of *kata* has changed the approach of managers to the problems raised by their employees and that coaching is much more present than before.

During our observations with managers and team leaders, we could also observe the interactions between them and their employees. During these interactions, several questions came up several times: "*What is your next step? What are your obstacles? What did you learn? What is your next experiment?*" In addition to the finding of our observations, employees also mentioned that since the establishment of *kata*, managers and team leaders ask more questions and ensure that employees learn from their experiments. In addition, team leaders make sure to change only one variable at a time, as two of the three team leaders described: "*Let's change one thing and do it, see what happens […]. I still ask a lot of questions and I still try to change one thing and see what you learn. Always one thing at a time*"

5.3.2 Values and beliefs

In our interviews, participants raised elements that seem to reflect some changes in values and beliefs. Following the analysis and coding of the 13 interviews, the following values and beliefs seem to be most dominant:

- Experimentation at all levels is supported and encouraged.
- Continuous improvement is an integral part of the work of each employee.
- Learning is more important than the success of a given experiment.
- Leaders, managers and team leaders are teachers and coaches.
- Cooperation and mutual support among members of the organization are a priority.

First, "Experimentation at all levels is supported and encouraged" is the value that was mentioned most often during interviews, including the president of TTB: "*If you do this daily, you are continuously building an experimenting culture. Before kata, I thought there were no places for experiments in the business.*" Nine out of thirteen people also mentioned that the most important impact of the deployment of *kata* was that all employees are now experimenting daily and that these experiments are strongly encouraged by the managers and leaders of the organization. For example, an employee described the impact of *kata* as follows: "*That's really what I use on a more daily basis; just having that type of mindset of what is a quick experiment I can run and to try to test out the hypothesis that I've got for whatever problem I am working on*" So, employees seem to experiment much more than before the deployment of *kata* and make sure to test their hypotheses.

Second, *kata* seemed to have changed the organization's previous mindset to do only big projects and three to five day-long kaizen events and instead focus on small everyday experiments, as described by one of the operators:

> *Kata* helps show you more of what you really need to be working on. What are the most important things to get the company where you are at now and where you want to be and that is not always doing a 5S or a kaizen in that area or that area. You get benefits from that, but if it's a pretty small problem, the benefits really are minimal. So, it's being able to focus on what is really important.

Several other operators also mentioned that the deployment of *kata* has sometimes led them to favor small experiments to large projects:

"With *kata*, it's kind of not so much just jumping there and throwing a big problem, but making a smaller or minor change, collect some data and see if it did anything and slowly seeing the effect of it."

Third, the experiment is seen as a learning vector, which seems to be a very important element for the organization. As far as experimentation is encouraged, learning from these experiments seems to be the most important element for the leaders, which is a big change in the organization, as one of the team leaders described: "*It's unreal the support that we get from Brad and Laura. The backing that we get to try things and not worry about the after effect as long as we learn something. If we take something away from that experience, they are fully on board with it.*" Finally, five people including the president, vice president and production manager told us that it was acceptable to make a mistake as long as the person learns from this failure. This belief was not present at TTB before the deployment of *kata*: "*At very first, [one employee] was very defensive about kata, but she opened up and came up at that because it was ok to make mistakes*" (Laura Oskey). It is important to mention that the experiments are supervised and approved by managers before being put into action, as the coaching *kata* teaches.

Fourth, leaders and managers see themselves more as teachers and coaches than before, as described by the manager of manufacturing services:

> We have got much better as a management team of assessing the threshold of knowledge with our employees and hopefully becoming better coaches in taking what we have learned in a structured environment and using it in a work environment.

This value is also shared by the president of the organization:

> How it changed me personally was seeing my role more as a coach and not just as somebody's primary person responsible for the financial income statement. Yet, I think as we done the coaching better, it helped our financial income.

This element also seems to be shared by the operators who have told us that a coaching relationship with their team leaders had been established following the establishment of the *kata*. As one of the operators described: "*Now it's really just people instead of running and tracking your boss, they teach you to think for yourself a lot of time.*"

Finally, the three team leaders and two managers also mentioned that the deployment of *kata* has changed the relationship and interactions they have with the leaders of the organization. Indeed, *kata* has given many employees the chance to work concretely on a project with their superiors, which was not done before, as explained by the production manager:

> It was exciting to work with people that I wanted to work with before. [...] To work on a problem or a project with somebody that I did not work before was good. You are working with your direct supervisor on a project when traditionally you would not be without [*kata*]. I think that *kata* helped build relationship and increase that level of trust where you could really work better together to solve problems. […] *Kata* helped break down those relationships, help to build trust and make a project with Brad for the first time.

Employees also mentioned that since the deployment of *kata*, the reflex to include employees affected by an experiment or a change permeates the organization. "*When I do an experiment, I always try to include the team on the shop floor and get their ideas too before experimenting,*" explains a member of the engineering team. So *kata* seems to have increased cooperation and mutual support among members of the organization.

5.3.3 Underlying assumptions

Using our interviews, our observations and the previous two sections, the following paragraph will express our perception of deeply rooted mental patterns that were established following the deployment of *kata*. We identified three underlying assumptions that appear to be the most dominant:

- All employees are experimenters.
- Individuals have the ability to learn.
- Leaders are change agents.

First, leaders, managers and team leaders seem to encourage all employees to experiment, which was not a common practice within the organization before the deployment of *kata*. Moreover, as we have shown in the previous chapter, leaders and managers defend employees during a failure related to an experiment, which suggests that a new underlying assumption of the organization is that all employees are experimenters.

Second, the ability of individuals to learn seems to be a more significant underlying assumption than previously in TTB. By linking the experiments to learning and by communicating the message that some failures during experiments are normal indicates a strengthening of the belief within the company in the ability of individuals to learn. The leaders also appear to consider themselves more as teachers and coaches than before as we have seen in the previous section.

Finally, according to Brad Frank, to change the culture of an organization, leaders must be agents of change:

> It's our job to create the systems that determine our employees' effectiveness. […] First, focus on changing the senior level management behaviors and performance. Only when significant results are achieved there that you broaden the focus to other managers. Much later, work directly on employee behavior and performance.

The president is so convinced by this principle he refuses visits to his factory from other organizations unless he has a 20 to 30 minute meeting with the senior leader to ensure that he is actively participating in continuous improvement initiatives they want to implement.

5.4 Portrait of organizational culture

Using the evaluation questionnaire of organizational culture from Cameron and Quinn (2011) to identify the dominant culture types before and after the deployment of *kata*, we developed three profiles based on the *Competing Value Framework* for TTB. The first profile represents the responses of operators, engineering, and purchasing manager, the second profile represents the responses of the production manager and team leaders and the third profile represents the responses of managers in relation to their perception of the current organizational culture and that before the deployment of *kata*.

5.4.1 Operators, engineer and purchasing manager

Following the deployment of *kata*, the operators, engineer, and purchasing manager have the perception that clan culture is more dominant in the organization than before

while market culture is less important. These changes tend to confirm that the organization encourages more cooperation and teamwork while individual performance seems to be less important than the overall performance of the organization. Indeed, these employees seem to perceive the work environment as a place encouraging the participation and involvement of all. We can also see that the perception of employees on the importance of adhocratic and hierarchy culture does not seem to have changed.

Figure 5.4 – Perception of operators, engineer and purchasing manager at TTB about the transformation of the organizational culture following the deployment of *kata*
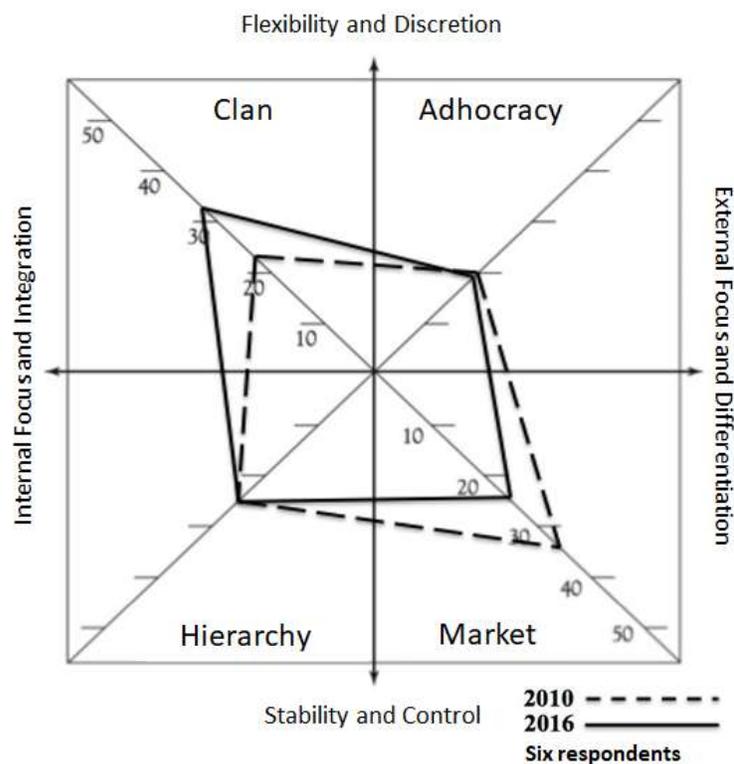
5.4.2 Production Manager and team leaders

Similar to operators, culture change perceived by the production manager and the team leaders is mainly due to a transition from a market culture dominance to a clan culture. We see that the manager and team leaders seem to encourage teamwork with the brainstorming sessions and coaching *kata in* groups during daily meetings previously

discussed. We also see a greater importance of adhocratic culture following the deployment of *kata* which can be explained by an increase in employee leeway in their work, increased autonomy in experiments and problem solving and a less hierarchical structure.

Figure 5.5 - Perception of TTB production manager and team leaders about the transformation of the organizational culture following the deployment of *kata*
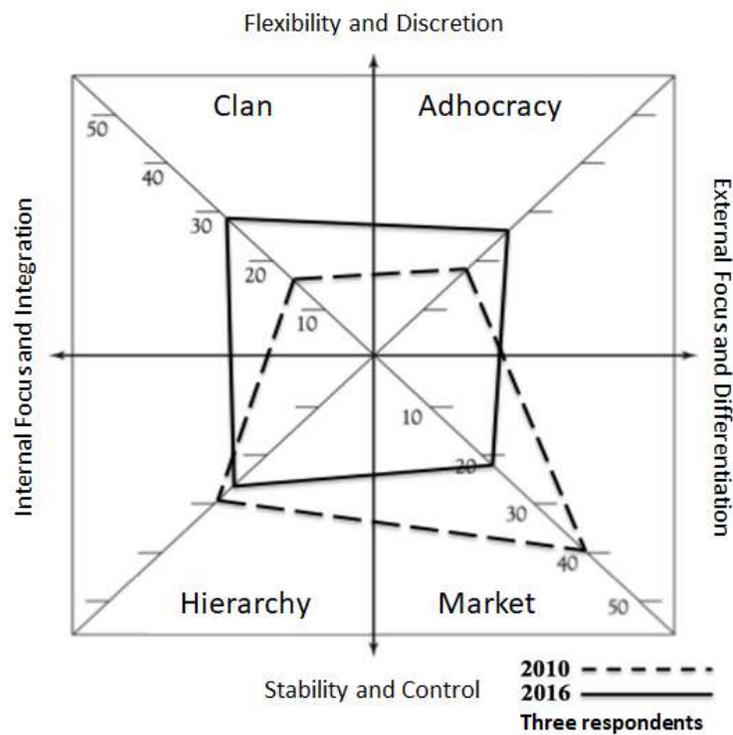
5.4.3 Leaders

Based on the results from the questionnaire, the perception of the organizational culture by leadership is the one that has changed the most. The leaders seem to perceive that the clan culture is dominant following the deployment of *kata* while the market culture significantly diminished. We can explain this change by reduced importance to managers of individual employee performance and their desire to encourage teamwork and the overall performance of TTB. We also see a greater importance on adhocratic culture by leaders, that we can explain by the desire of leaders to encourage employees to experiment and desire to make employees autonomous in problem solving.

Figure 5.6 – Perception of TTB leaders about the transformation of the organizational culture following the deployment of *kata*
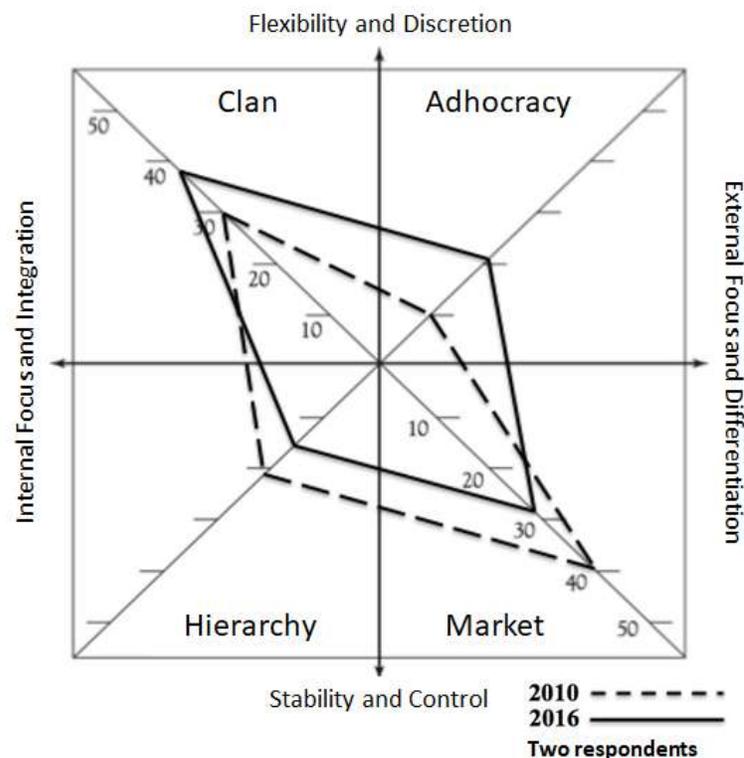
5.5 Conclusion

Using the data collected, we identified several elements to show the impact of the deployment of *kata* on organizational culture to support continuous improvement in the long-term.

Using our analysis of the observations and interviews at TTB, we identified the artifacts, values and beliefs, and underlying assumptions of the dominant culture of continuous improvement following the deployment of *kata*. Tables 5.1, 5.2 and 5.3 represent a synthesis of these three levels of culture according to Schein (2004).

Table 5.1 - Dominant artifacts observed at TTB following the deployment of *kata*

Artifacts
Organizational Routines
Presence of a scientific approach to problem solving (PDCA).
Presence of coaching by leaders and managers similar to the coaching *kata.*
Presence of coaching similar to the coaching *kata* during the daily meetings.
Communication of learning by employees to their team leader following experiments.
Experimentation by managers or team leaders together with their employees.
Organizational Processes
Common language based on *kata* vocabulary used by leaders, managers and team leaders.
Disclosed Policies
Formal recognition by managers and leaders of employee contributions to continuous improvement.
Physical Layout of the Workplace
Presence of certain elements of the improvement *kata* integrated into the daily meeting board.

Table 5.2 – Dominant values and beliefs observed at TTB following the deployment of *kata*

Values and Beliefs
Cooperation and mutual support among members of the organization are a priority.
Learning is more important than the success of a given experiment.
Experimentation at all levels is supported and encouraged.
Continuous improvement is an integral part of the work of each employee.
Leaders, managers and team leaders are teachers and coaches.

Table 5.3 – Dominant underlying assumptions observed at TTB following the deployment of *kata*

Underlying Assumptions
Leaders are change agents.
All employees are experimenters.
Individuals have the ability to learn.

Finally, we also observed, through the results of the questionnaire, a greater emphasis on clan culture within TTB. Despite the different change profiles presented, we observe an increase of clan culture and a decrease in market culture at all levels. Clan culture becomes the dominant culture for operators, managers, team leaders and managers with market culture undergoing a net decrease. These changes confirm a culture giving greater importance to cooperation, teamwork, and learning than to individual performance. Moreover, we see an increase in the importance of adhocratic culture for

managers, team leaders, and leaders, which shows a desire of these three groups to encourage further experimentation and autonomy of all employees in these experiments. Nevertheless, as mentioned in Chapter 4, it is important to remember that the results of the questionnaire are based on responses from only 11 TTB employees and the size of this sample does not allow us to assert that these are significant changes.

Chapter 6 - The Multiple-Case Analysis

Following analyses of cases performed at SigmaPoint and TTB, in this chapter we present the multiple case analysis using the methodology described in Figure 3.2. This analysis will enable us to answer our research question:

How can *kata* transform the organization's culture in order to sustain continuous improvement over the long term?

The multiple case analysis will be done by comparing the elements emerging in the wake of the deployment of *kata* in SigmaPoint and TTB according to the three levels of the Schein culture model (2004), i.e. artifacts, values and beliefs, and underlying assumptions. We will compare the emerging elements of this analysis with tables 2.1, 2.2 and 2.3, so to identify the elements that can occur following the deployment of *kata* and to support the long-term continuous improvement. We will also compare the results of the organizational culture assessment instrument of Cameron and Quinn (2011) on the dominant culture types identified so to paint a picture of organizational culture in fall 2016. This profile will enable us to identify the impact of *kata* on the perception of the dominant culture types to complete our research.

6.1 Elements of the emergent organizational culture following the deployment of *kata*

In this section, we will compare emerging elements of the organizational cultures at SigmaPoint and TTB according to the three levels of the Schein culture model (2004) and identify similarities and differences.

6.1.1 Artifacts

First, we observed in both organizations the presence of a common language based on *kata* vocabulary used by all employees. The terms obstacle, experimentation, learning, vision and mission are used daily in SigmaPoint and TTB in conversations and

discussions we observed. Through repetition of the improvement and coaching *kata*, the organizations seem to have developed a common language, allowing better communication between all employees and managers. It is important to note that the terms target condition and current condition were not frequently heard in TTB (once) compared to SigmaPoint (six times) during our observations and interviews. In addition, we observed that this common language based on *kata* vocabulary was used by all employees at SigmaPoint, while we have not observed operators use this language in TTB.

Besides the presence of a common language, we observed the presence of some elements of *kata* integrated with visual stations already present in both organizations. Although both companies had already visual stations in place, integrating elements of *kata* has enriched the boards with the addition, for example, of new elements such as vision, mission, target condition and current condition. Several visual stations were also added within both organizations, including *kata* storyboards in the offices and for special projects in TTB and *kata* storyboards in each production cell in SigmaPoint. The boards have also been enhanced with the addition of the element "learning" to capture employee learnings as a result of an experiment, which did not seem to be present before.

The integration of elements of *kata* within the visual stations was more easily observable at SigmaPoint than at TTB given the scientific problem-solving approach (PDCA) present throughout SigmaPoint and in some work cells with the deployment of *kata* storyboards at lower levels. We also observed, with the help of the *kata* storyboards, this scientific approach to problem solving in the SigmaPoint organization as a whole, compared to TTB which uses the boards selectively for specific projects or departments. According to Spear and Bowen (1999) and Landry and Beaulieu (2016), the presence of the scientific approach to problem solving performed daily, and at the lowest level possible in the organization, is a factor that contributes to maintaining continuous improvement in the long-term.

Experimentation between team leaders and employees is an artifact that we observed both at SigmaPoint and TTB. We observed two experiments between the team leaders and their employees at SigmaPoint and TTB respectively. Experimentation seems to be a part of daily life of all employees and the frequency of experiments seems to have increased in both companies, either by issuing ideas tickets in SigmaPoint or improvement opportunities and yellow tickets at TTB. Employees in both companies reported noticing an increase in the number of experiments following the introduction of *kata.* In the fall of 2016 they were experimenting more on the problems they were facing on a daily basis than before the deployment of *kata* where these efforts were focused on special projects and continuous improvement events, which is a significant change. Daily experimentation by all employees allows this constant participation as well as preventing entropy throughout the organization (Rother, 2010: 13).

During our days of observations, we also noted the presence of the coaching *kata* or the presence of coaching similar to the coaching *kata* within both organizations. These coaching routines at SigmaPoint and TTB were not present before, according to employees, managers and executives. Several questions asked repeatedly by managers and team leaders are also very similar to coaching *kata* no matter the circumstances. The questions were focused on:

> What was the last experiment?
> What have you learned from this experiment?
> What are the obstacles?
> What obstacle are you addressing now?
> What is your next experiment?

In addition, we attended a coaching *kata* at SigmaPoint between the manager (coach) and the value stream coordinator (learner). The coaching *kata* as described by Rother (2010) seems to be part of the daily SigmaPoint routine unlike TTB where we observed a different form of coaching *kata* during our observations. Nevertheless, as discussed in Chapter 4, this coaching *kata* is the only one we have seen during our three days of observation at SigmaPoint. In fact, SigmaPoint teams did not practice *kata* in the fall of 2016 due to unusually high levels of customer demand. Still, leaders at SigmaPoint

and TTB seem to have developed a mechanism to ask questions of their employees when they have a problem to solve. This routine, triggered by the signal of a problem to be solved and done unconsciously and automatically (Bessant, Caffyn, and Gallagher, 2001; Becker, 2004), allows employees to develop their problem solving skills in addition to a certain autonomy. Thus coaching routines are as much part of the everyday work of employees at SigmaPoint with coaching *kata* at all levels of the organization as TTB during daily meetings on the floor and at meetings in offices around *kata* storyboards. This shows that new organizational routines are now in place in both organizations and they are part of the organizational culture. By incorporating these routines for some time, the impact of continuous improvement appears to be felt more than previously, and the chances of sustainability of continuous improvement within both organizations are greatly improved. (Bessant *et al.*, 1994: 18; Bessant, Caffyn, and Gallagher, 2001; Becker, 2004).

Subsequently, we observed in both organizations a formal recognition of the contributions of employees to continuous improvement by the team leaders, managers, and leaders. Both at SigmaPoint and TTB, team leaders encouraged their employees to try their proposed experiments and immediately accepted running these tests through the approval of an ideas ticket or financial assistance required for the experiment in question. This involvement and direct support of team leaders, managers and executives shows a change in their habits and behavior, significantly increasing the long-term success of continuous improvement within their organizations (Bessant, Caffyn, and Gallagher, 2001; Singh and Singh, 2015).

Some differences were also observed between the two organizations. The first artifact we noticed to be different is our observation of an operator at SigmaPoint filling out an idea ticket connected to an idea he wanted to test. We also saw, at a meeting in SigmaPoint, the president publically expressing his desire to integrate *kata* throughout the organization.

We also noted two different artifacts at TTB following the deployment of *kata*. First, contrary to SigmaPoint, no scientific approach to problem solving (PDCA) was present

every day at TTB before the establishment of *kata*. Second, we observed on two occasions an operator communicating his learning after an experiment to his team leader even before he is asked.

Thus, many artifacts were observed at SigmaPoint as well as TTB. Having compared these elements with those in Table 2.1 (artifacts associated with the culture of continuous improvement), we developed Table 6.1 which shows which artifacts associated with a culture of continuous improvement are new (indicated by N) and those which appear to have been reinforced (indicated by R) within the two organizations following the deployment of *kata*. It is important to mention that the artifacts indicated by an x means that these artifacts may have been present, but they have not been affected by the deployment of *kata*.

Table 6.1 - Comparison of the dominant artifacts observed at SigmaPoint and TTB following the deployment of *kata*

Artifacts	SigmaPoint	TTB
Organizational Routines		
Presence of the improvement *kata* or other form of scientific approach to problem solving that follows the PDCA cycle to initiate a continuous improvement initiatives at all levels of the organization.	R	N
Presence of coaching *kata* at all levels of the organization.	N	N
Daily experimentation by all employees.	N	N
Daily team meeting in the work area.	x	x
Daily presence of managers and leaders in the work area.	x	x
Written Documents		
Documentation of the scientific approach to problem solving (PDCA) available at all levels of the organization (examples: PDCA or A3 forms available or completed, evidence of PDCA cycles on improvement boards).	R	N
Ideas tickets or opportunities for improvements completed by employees.	R	x
Organizational Processes		
Common language based on the *kata* vocabulary use by employees (current condition, target condition, obstacles, challenge, mission, experiments, learning, coach, second coach, learner).	N	N
Disclosed Policies		
Open door policy for executives and managers.	x	x
Formal recognition by managers and leaders of employee contribution to continuous improvement.	N	N
Structural Elements		
Presence of ideas boards in the workplace.	x	x
Presence of tools (boards, forms) to capture employee learning.	x	x
Presence of tools that support employee involvement in continuous improvement (performance charts, daily meetings, jidoka, heijunka).	R	R
Mission and Vision displayed in the workplace.	N	N
Physical Layout of the Workplace		
Presence of a control room.	x	x
Presence of visual stations in the workplace.	R	R

N : New artifacts
R : Reinforced artifacts
x : Artifacts not impacted by deployment of *kata*

6.1.2 Values and beliefs

We examined three similar values and beliefs as well as two different ones between SigmaPoint and TTB. First, "Experimenting at all levels is supported and encouraged" represents a value that seems to be important and significant in both organizations. Indeed, this value was mentioned 10 times at SigmaPoint and 12 times at TTB during interviews. By involving employees in the improvement and coaching *kata* for several years, both TTB and SigmaPoint seem to have integrated as a value that all employees

must experiment daily. This support from executives and managers increases the chances of success of continuous improvement (Bessant, Caffyn, and Gallagher, 2001; Singh and Singh, 2015).

Second, "learning is more important than the success of a given experiment" is also a new belief which did not seem to be present in both cases before the deployment of *kata*. Indeed, officers and managers value the feedback after the deployment of any initiatives and try to instill this value in all of their employees. This belief is evidenced by the tools for capturing learnings present in the daily management boards and *kata* storyboards and during interactions between employees where learning from the results obtained is often discussed. Furthermore, leaders seem to instill a value indicating that learning in experiments is more important than success by promoting experiments and defending employees during failures. These failures are accepted as long as it is a learning experience for the employees and that the experiments proposed by the employees are approved by their supervisor at both SigmaPoint and TTB.

Third, we observed that continuous improvement appears to be an integral part of the work of each employee and not a parallel activity. The leaders want their employees to experiment and participate in various continuous improvement initiatives, leading to an environment that values the exchanges and communication rather than an environment where conversations are unidirectional. The constant participation of all employees has been identified by several authors as a key principle in maintaining continuous improvement in the long-term (Imai, 1989; Liker and Hoseus, 2008; Liker, 2012; Singh and Singh, 2015; Landry and Beaulieu, 2016), making this emerging value very important.

Some dominant values and beliefs which followed the establishment of *kata* arose independently in SigmaPoint and TTB. At SigmaPoint, the deployment of *kata* seems to have created a strong link between continuous improvement and the strategic objectives of the company. According to the leaders of the organization, the success of continuous improvement requires what they called a rigid structure to align the experiments with the strategic objectives of the organization. This structure and the

formal link between *kata* and *hoshin kanri* (HK) values the importance of linking employees' experiments to the organization's strategy, as we have shown in Figure 4.3 with the integration of *kata* and the seven levels of experiment of HK. Although SigmaPoint seemed to already have this value within the company, the deployment of *kata* seems to have made this value even more important.

Leaders at SigmaPoint also seem to believe that employees should be autonomous in solving everyday problems. With the help of *kata* still in place and the explicit desire to increase the number of *kata* storyboards using the PDCA, SigmaPoint shows that they want all employees to autonomously use the scientific approach of problem solving in a structured way on a daily basis.

As for TTB, the dominant values and beliefs following the deployment of *kata* are related to the relationship between the different employees of the organization. First, cooperation and mutual support among members of the organization are a priority to TTB. In addition to their use of the Q12 questionnaire to measure the level of employee commitment to their colleagues and their perception of the commitment of managers and leaders towards them, following the establishment of *kata* the company seems to value cooperation and teamwork even more. The practice of *kata* has led many employees to experiment and work with their managers and other colleagues with whom they did not work before. The employees seem to have developed the habit of including other employees affected by the results of an experiment. Second, the organization values executives, managers and team leaders as teachers and as coaches. Within the daily activities of various departments, the exchanges between employees and their managers and leaders seem much less unidirectional and there is more emphasis on soliciting employee ideas than before. Although we observed that SigmaPoint also valued the roles of teachers and coaches to executives, managers and team leaders, this value does not seem to be as dominant after the deployment of *kata* as in TTB.

We find the set of values and beliefs discussed in this section in Table 6.2. We compared the elements of this section with Table 2.2 (values and beliefs associated

with the culture of continuous improvement) so to present the new values and beliefs and those that appear to have strengthened in both organizations following the deployment of *kata*.

Table 6.2 - Comparison of dominant values and beliefs observed at SigmaPoint and TTB following the deployment of *kata*

Values and Beliefs	SigmaPoint	TTB
Cooperation and mutual support among members of the organization are a priority.	x	R
The constant and direct involvement of leaders in the implementation and maintenance of continuous improvement significantly increases the long-term success of continuous improvement.	x	x
Learning is more important than the success of a given experiment.	N	N
Experimentation is encouraged and defended by managers and organizational leaders.	N	N
Employees are responsible to solve everyday problems on their workstation.	R	x
The workplace is a place of learning where employees are developed.	R	R
Leaders and managers are teachers and coaches.	N	N
Continuous improvement is an integral part of daily work of each employee, not a parallel activity.	R	N
Respect for people and their opinions.	R	R
Continuous improvement must be linked to strategic objectives.	R	x

N : Values and beliefs that are new
R : Values and beliefs have been reinforced
x : Values and beliefs not impacted by deployment of *kata*

6.1.3 Underlying assumptions

Despite the fact that underlying assumptions are elements which are often hidden and difficult to observe, we have identified three in SigmaPoint and three in TTB. These three underlying assumptions are the same for both organizations studied.

"Individuals have the ability to learn," appears to be an underlying assumption which emerged within both organizations. Whether through coaching routines in both cases or repetition by the leaders of the importance of feedback from the initiatives and actions taken by the employees, learning by all employees seems to be a must in both SigmaPoint and TTB.

We also perceive that the two organizations believe that all employees are experimenters. The *kata* seems to have created a less directive and more participatory environment thereby increasing the number of initiatives and experiments in both SigmaPoint and TTB. Although the leaders encouraged initiatives and ideas before the deployment of *kata*, today they want all employees to experiment compared to only team managers and leaders doing so. We perceive a deep desire to have all operators participate in continuous improvement.

Finally, both organizations told us that without the unconditional support of the leaders and their active participation in the deployment of the *kata* and other continuous improvement initiatives in recent years, long-term support of continuous improvement within organizations would not be possible. According to the leaders at SigmaPoint and TTB, no change can be achieved without the support of the leaders. So there is certainly an assumption in both organizations that the contribution and support of leaders in organizational change are critical to its success. This leads us to believe that leaders are agents of change. This shows that the constant and direct involvement of managers in the implementation and maintenance of continuous improvement greatly increases its long-term success (Bessant, Caffyn, and Gallagher, 2001; Singh and Singh, 2015).

The following table summarizes the underlying assumptions discussed previously in this section. We compared the elements of this section with those of Table 2.3 (underlying assumptions associated with the culture of continuous improvement) so to present the new underlying assumptions and those that appear to have strengthened in both organizations following the deployment of *kata*.

Table 6.3 - Comparison of dominant underlying assumptions observed at SigmaPoint and TTB following the deployment of *kata*

Underlying Assumptions	SigmaPoint	TTB
Leaders are change agents.	R	R
Individuals have the ability to learn.	R	R
Continuous improvement every day enables success in the business.	x	x
All employees are experimenters.	N	N
The success of the organization depends, first and foremost, on teamwork.	x	x
The team has the ability to reflect.	x	x

N : Underlying assumptions that are new
R : Underlying assumptions that have been reinforced
x : Underlying assumptions not impacted by deployment of *kata*

6.1.4 Summary

To summarize the elements that can be demonstrated to support long-term continuous improvement following the deployment of *kata*, we propose to group artifacts, values and beliefs, and underlying assumptions that were impacted by *kata* in both SigmaPoint and TTB. Table 6.4 represents a synthesis of the comparative analysis according to these three levels of culture.

Table 6.4 - Summary table of the impact of the deployment of *kata* on organizational culture

Artifacts
Organizational Routines
Presence of *kata* improvements or other form of scientific approach to problem solving that follows the PDCA cycle to initiate a continuous improvement initiatives at all levels of the organization.
Presence of coaching *kata* at all levels of the organization.
Daily experimentation by all employees.
Written Documents
Document of the scientific approach to problem solving (PDCA) available at all levels of the organization (examples: PDCA or A3 forms available or completed, evidence of PDCA cycles on improvement boards).
Organizational Processes
Common language based on the *kata* vocabulary used by all the employees. (current condition, target condition, obstacles, challenge, mission, experiments, learning, coach, second coach, learner).
Disclosed Policies
Formal recognition by managers and leaders of employee contribution to continuous improvement.
Structural Elements
Presence of tools that support employee involvement in continuous improvement (performance charts, daily meetings, jidoka, heijunka).
Mission and vision displayed in the workplace.
Physical Layout of the Workplace
Presence of visual stations in the workplace.
Values and Beliefs
Learning is more important than the success of a given experiment.
Experimentation is encouraged and defended by managers and organizational leaders.
The workplace is a place of learning where employees are developed.
Leaders and managers are teachers and coaches.
Continuous improvement is an integral part of daily work of each employee, not a parallel activity.
Respect for people and their views.
Underlying Assumptions
Leaders are change agents.
Individuals have the ability to learn.
All employees are experimenters

6.2 Portrait of organizational culture

We also observed a trend in the perception of the transformation of the organizational culture following the deployment of *kata* with the analysis of the responses of the questionnaire based on the *Competing Value Framework* of Cameron and Quinn (2011).

The clan culture is perceived as the dominant culture at the time of data collection for all employees of both organizations. The clan culture also became the dominant culture for team leaders and managers at SigmaPoint and all employees in TTB. This trend

seems to confirm that organizations encourage more cooperation and teamwork following the deployment of *kata*. We see that human capital is more important than it was before, and employee development through experimentation is paramount. These results show a perception of all employees, managers and executives that the participation and involvement of employees in continuous improvement are a priority.

This transformation of the dominant type of culture is mainly observed by a decrease in the importance of market culture perceived by team leaders and managers at SigmaPoint and all employees to TTB. Both companies seem to place more value in the human capital and organizational learning than with individual productivity of employees represented by the market culture. Nevertheless, it is important to mention that the two companies aim to increase their market share and profits and that these objectives can be achieved, according to the two companies, through strong collaboration, prioritization of teamwork and a strong human capital.

The figure below shows the analysis results of the 30 questionnaires based on the organizational culture assessment instrument of Cameron and Quinn (2011). This figure represents the overall perception of all employees at SigmaPoint and TTB of the transformation of the organizational culture following the deployment of *kata*. It also shows the change from the perception of a dominant market culture to dominant clan culture as previously discussed. It is important to mention that this figure represents the perception of 30 employees and the size of the sample makes it difficult to claim that these are significant changes throughout the two organizations.

Figure 6.1 - Perception of all employees surveyed in SigmaPoint and TTB about the transformation of the organizational culture following the deployment of *kata*
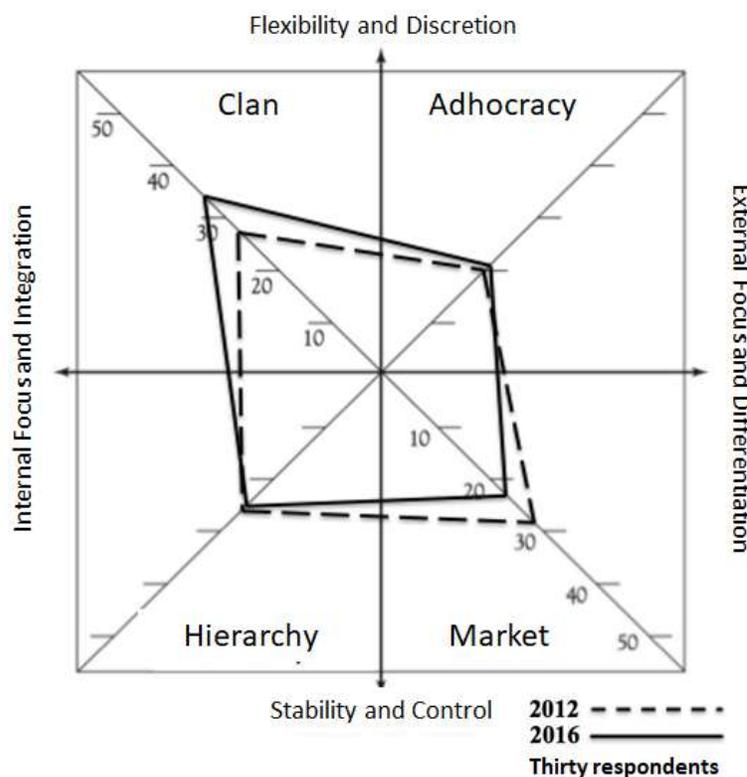
6.3 Summary of the multi-case analysis

As a synthesis of the multiple case analysis, we identified the elements following the deployment of *kata* which seem to transform the culture of an organization in order to support continuous improvement in the long-term. These are based on our summary table presented in Table 6.4 and the portrait of the perception of all employees at SigmaPoint and TTB of the transformation of organizational culture presented in Section 6.2. These elements allow us to present our proposals. It is important to mention that the external validity of case studies allows analytic generalization and therefore it is possible to develop a theory based on the results of the present study (Yin, 2014).

The choice of our first four propositions presented is based on the conceptual model shown in Figure 2.9. This model hypothesizes that *kata* can transform the organizational culture to support the long-term continuous improvement by influencing

the three levels of organizational culture according to the Schein model (2004): artifacts, values and beliefs, and underlying assumptions. The summary table of the impact of the deployment of *kata* on organizational culture (Table 6.4) confirms this hypothesis demonstrating the validity of our conceptual model.

Our first four propositions are thus based on the identification of values and beliefs, and underlying assumptions present at SigmaPoint and TTB. As we mentioned in Section 2.3, we cannot rely solely on artifacts to choose our propositions since although the artifacts are easily observable, it is difficult to draw meaning from them (Schein, 2004).

The figure below shows our first four propositions using our conceptual model:

Figure 6.2 - Presentation of the first four propositions with the conceptual model
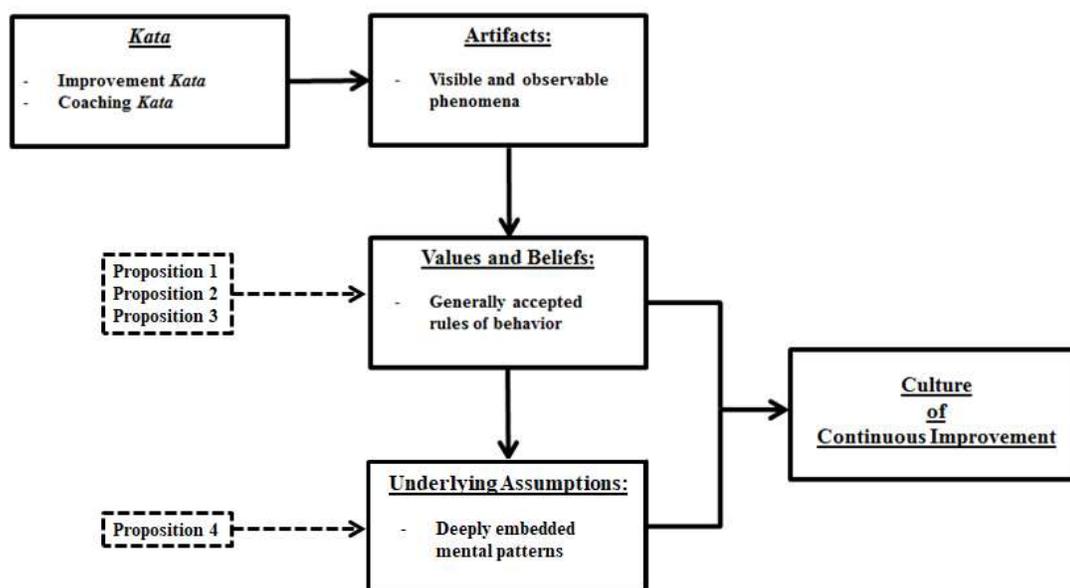
6.3.1 Leaders and managers are teachers and coaches

Practicing the *kata* changes the behavior of managers and leaders in response to questions from their employees. We see that the deployment of *kata* has changed the

relationship and interactions between leaders, managers, and team leaders with regard to their employees. Leaders, managers, and team leaders now asking questions instead of giving the answers to their employees when they have obstacles, thereby allowing employees to develop problem solving skills and gain greater autonomy. These behaviors encourage employees to participate in continuous improvement and changes the relationship between employees and their managers, who thereby become more teachers and coaches.

Proposition 1: The deployment of *kata* contributes to changing the behavior of leaders, managers and team leaders toward becoming teachers and coaches.

6.3.2 Continuous improvement is an integral part of the work of each employee, not a parallel activity

The deployment of *kata* leads companies to want to improve every day. Indeed, *kata* changes the employees' way of thinking. Thus, for these employees, continuous improvement does not mean doing big projects, but rather small daily improvements throughout the organization. The deployment of *kata* is also developing the value and belief that employees, managers and leaders must overcome obstacles using a scientific approach to problem solving (PDCA). In addition, employees' ideas are much more solicited than before in the daily efforts of various departments. We see the desire of leaders to have their employees experiment and participate in various continuous improvement initiatives, leading to an environment that values continuous improvement on a daily basis.

Proposition 2: The deployment of *kata* changes the way of thinking of employees with regard to the frequency of improvement initiatives. It establishes the belief that continuous improvement is an integral part of the work of each employee and not a parallel activity.

6.3.3 The workplace is a place of learning where employees are developed.

Following the deployment of *kata*, the workplace is a place of learning where employees develop. Leaders and managers give more importance than before to feedback from employees' experiments to foster their development and see the work environment more as a place of learning. Learning is either captured on a storyboard or discussed in the team. Moreover, the failure of an experiment is also accepted provided that we can bring out learning, showing that learning is now more important than the success of a given experiment.

Proposition 3: The deployment of *kata* transforms the organization into a learning environment that promotes employee development.

6.3.4 All employees are experimenters

Experimentation is a daily activity of all employees, even outside of improvement and coaching routines. Following the establishment of *kata*, the frequency of experiments increases and extends to the entire organization, increasing the number of participants in continuous improvement initiatives. Moreover, the experiments are promoted and defended by executives, managers and team leaders and the involvement of all employees is requested. As we discussed in the previous proposition, the fact that learning is more important than the success of a given experiment also encourages employees to experiment and shows that leaders and managers encourage experimentation at all levels of the organization.

Proposition 4: The deployment of *kata* transforms the organization into a place where all employees are experimenters.

6.3.5 The working environment stimulates cooperation, learning and employee engagement

We also observed a trend in the perception of the transformation of the organizational culture following the deployment of *kata* with the analysis of the responses of the questionnaire based on the *Competing Value Framework* of Cameron and Quinn

(2011). Although this quantitative analysis is complementary to our conceptual model, the results have allowed us to observe a change in the dominant type of culture.

Following the deployment of *kata*, organizations encourage more cooperation and teamwork while individual performance seems to be less important than before. We see that a clan culture develops as market culture decreases. The exchanges between employees and their managers or their leaders seem much less unidirectional and employee ideas are much more stressed than before in the daily efforts of various departments. Companies therefore prioritize teamwork, involvement of individuals, and collaboration rather than individual productivity of employees as represented in the market culture.

Proposition 5: The deployment of *kata* creates a work environment that stimulates cooperation, learning, and employee engagement and reduces the importance attributed to individual employee performance. Following the deployment of *kata*, the dominant clan culture develops as market culture decreases.

So by multiple case analysis, we identified the elements following the deployment of *kata* which seem to transform the culture of an organization in order to support long-term continuous improvement. The deployment of *kata* transforms the organization into a place where all employees are experimenters and contributes to changing the behavior of executives, managers, and team leaders, who become teachers and coaches. The deployment of *kata* also changes employees' way of thinking with regard to the frequency of improvement initiatives. It establishes the belief that continuous improvement is an integral part of the work of each employee and not a parallel activity. Finally, the deployment of *kata* creates a work environment stimulating cooperation, learning and employee engagement.

Chapter 7 - Conclusion

According to the results from multiple case analysis in Chapter 6, we identified several emerging elements of organizational culture following the deployment of *kata* that can support continuous improvement in the long-term. Using our conceptual model and our method of research, we have identified several new artifacts, values and beliefs, and underlying assumptions to answer our research question. In addition, we observed a trend in the perception of the transformation of the organizational culture following the deployment of *kata* with the help of the *Competing Value Framework* of Cameron and Quinn (2011).

7.1 The contribution of the study

This dissertation allows us to contribute to the theoretical and practical knowledge in the field of continuous improvement and organizational culture.

First, no scientific studies have been published about the direct effects of *kata* on organizational culture. This research allows us to support the hypothesis of Rother (2010) that *kata* could transform the culture of an organization. Indeed, with the multiple case analysis, we determined the impact of *kata* on organizational culture and the elements that support continuous improvement in the long-term. This research shows that by deliberately practicing these routines, new habits have evolved and changed the way of thinking of the members of the organization (Rother, 2010).

Second, the identification of artifacts, values and beliefs, and underlying assumptions associated with the culture of continuous improvement identified in Tables 2.1, 2.2 and 2.3 is in itself a contribution to research on continuous improvement. For managers as well as for researchers, this summary provides a better understanding and is a starting point to identify the types of elements that define a culture of continuous improvement. In addition, the identification of the impact of *kata* on organizational culture presented in Table 6.4 with the three levels of culture according to Schein (2004) and the portrait of the

organizational culture presented in Figure 6.1 with the *Competing Value Framework* of Cameron and Quinn (2011) present an example of using this table and this matrix. These examples may be helpful for researchers and professionals wishing to analyze the present and future continuous improvement culture.

7.2 Limitations and biases of the research

Due to our methodological choices identified in Chapter 3, we identified certain limits and biases in our research.

First, several approaches and tools have been developed in recent years to help researchers analyze the organizational culture (Schein, 2004; Cameron and Quinn, 2011; Déry, 2012; Denison, Nieminen and Kotrba, 2014). Regardless of the method chosen to perform the analysis of organizational culture, a comprehensive analysis is almost impossible since many dimensions are difficult to grasp (Schein, 2004: 22). All methods of analysis of organizational culture have their limitations in terms of scope, ease of use or scientific properties and experts rarely agree on which are the essential dimensions to measure a phenomenon such as organizational culture (Scott *et al.*, 2003; 938). The answer is that it depends on our own definitions of culture, the objective of the study, the planned use of the results, and the availability of resources (Scott *et al.*, 2003; 929). However, during the process of analysis, the analyst can collect enough information to attempt to explain the observed phenomena. The analysis of organizational culture is very complex and difficult to decipher, and this element represents a limit and a bias in our research. So although we have collected enough data to try to explain the observed phenomena, some biases exist in our analysis of the organizational culture. It is important to remember that our analysis considers that companies have only one culture, which may lead to generalizations and an incomplete picture of the entire organization since we have not based our research, for example, on departments that have not been directly affected by the deployment of *kata*.

Second, time bias limited our research. We were not present prior to the deployment of *kata* which may bias the response of those interviewed and the response to the questionnaire, since employees to must recall the past. In addition, data collected between

the two cases may seem difficult to compare or incomplete. Each organization had a different culture of continuous improvement when *kata* was implemented. The contribution of *kata* may be more significant at certain levels of culture in some organizations.

Third, we consider the sample size of the research as a possible bias and a limit to our results. Although the external validity of case studies allows analytical generalization (Yin, 2014), we consider some samples as small compared to the size of the analyzed organizations. It is important to remember, for example, that some profiles of the perception of organizational culture in Chapter 4 and 5 are based on only a limited number of employees within the organization. So, given that we did not collect the views all employees in our interviews, our observations and the distribution of our questionnaire, the results presented above are possibly biased.

Fourth, the social desirability bias on the part of respondents also can reduce the validity of the collected answers. This bias may emerge from participants' tendency to want to respond positively to our questions by saying that the deployment of *kata* has changed the ways of thinking and working within their organization, regardless of their actual experience. Some respondents may have responded based on what we wanted to illustrate and by extension, could have reduced the validity of the findings of our research.

Finally, other factors that we have not included in our research could have influenced the organizational culture in parallel with the deployment of *kata*. The introduction of new methods, practices and tools in parallel with the deployment of *kata* has possibly affected the organizational culture at SigmaPoint and TTB, which could potentially bias some results.

7.3 Future research

This research has allowed us to observe the transformation of several elements of the organizational culture. Nevertheless, we suggest some directions for future research that

could contribute to the advancement of knowledge about the culture of continuous improvement and deployment of *kata* in organizations.

The analysis of organizational culture before and after the deployment of *kata* would be an interesting avenue of research. A study conducted during the progression of the deployment of *kata* would allow a more detailed and less biased analysis of the impacts of these routines on organizational culture to support continuous improvement in the long-term.

It would also be interesting to analyze the evolution of the culture of continuous improvement in SigmaPoint and TTB in a few years so to confirm the long-term sustainability. Indeed, to the extent that *kata* is a recent initiative, the notion of "long-term" is relative. It would therefore be relevant to analyze the impact of *kata* on the culture of these organizations in the years to come.

Given some differences in the impact of *kata* in two cases analyzed, analysis of multiple cases of other enterprises would be one avenue to consider. For example, some elements of a culture of continuous improvement were identified in one case and not in another. Analysis of other cases could confirm the real impact of these elements on the organizational culture. Table 7.1 represents the elements of Tables 6.1, 6.2 and 6.3 having had the impact on only one of the two organizations studied:

Table 7.1 - Artifacts, values and beliefs, and underlying assumptions associated with the culture of continuous improvement in only one case study

Artifacts	SigmaPoint	TTB
Ideas tickets or opportunities for improvement completed by employees.	R	x
Values and Beliefs	**SigmaPoint**	**TTB**
Cooperation and mutual support among members of the organization are a priority.	x	R
Employees are responsible to solve everyday problems on their workstation.	R	x
Continuous improvement must be linked to strategic objectives.	R	x

R : Artifacts or values and beliefs have been reinforced
x : Artifacts or values and beliefs not impacted by deployment of *kata*

Subsequently, our analysis considers that companies have only one culture. Several authors criticize the concept that an organization can have only one culture and assert that an

organization could have many subcultures. It would be rewarding to assess the impact of the deployment of *kata* on subcultures of an organization and identify differences in the influence of *kata* on the beliefs and behaviors of employees. These subcultures could represent, for example, different departments of the organization or different value streams.

It would also be interesting to deepen and enrich the elements conducive to supporting the continued long-term improvement identified in our dissertation. Thorough research on the culture of continuous improvement would improve Tables 2.1, 2.2 and 2.3 and thus improve the comparison and analysis tool. Moreover, it would be rewarding to develop a profile type of a culture of continuous improvement based on the *Competing Value Framework* of Cameron and Quinn (2011). The development of this matrix would help to better understand the results of questionnaires distributed during our research and identify whether the transformation of employee's perceptions of the dominant culture type, is indeed a culture of continuous improvement. In this research, the sample size could also be increased.

During our research, we observed that SigmaPoint stopped practicing *kata* when there was a lack of capacity rather than use this method to try to resolve this problem. This observation leads us to question the role of *kata* within organizations and the ability of this method to integrate with employees on a daily basis regardless of the circumstances.

We also found in our research two elements conducive to future research. Indeed, we learned that SigmaPoint stopped using the improvement and coaching *kata* for 4 months and TTB formally stopped the improvement and coaching *kata* as described by Rother (2010) in late 2015. These observations lead to several questions about the role of *kata* within organizations and the evolution of *kata* in the medium and long-term in companies that have implemented this method. A future avenue of research would be to observe how the practice of *kata* evolves in the long-term within organizations and what elements within the culture that we should observe presenting the successful deployment of *kata*. For example, determine if *kata* routines and boards can only be used at certain convenient times and whether these routines should fade over time, or should always be present in the long-term.

Finally, a research avenue to explore would be to determine the significance of artifacts related to *kata* once the transformation is orchestrated and that the values and beliefs, and underlying assumptions associated with the culture of continuous improvement are present in the organization. Indeed, it begs the question: Must the formal practice of improvement and coaching *kata* as described by Rother (2010) always be evident once these values, beliefs and underlying assumptions are present?

7.4 In the end

The implementation of continuous improvement and long-term sustainability remains a challenge for businesses. This difficulty has led many authors to question the reasons for the failure of the long-term maintenance and explore the aspect of the organizational culture as a vector for its success. We have shown that certain elements of culture may change following the deployment of *kata* and we hope that these results will help managers and leaders to support the long-term continuous improvement within their organizations. We also hope that this research will help future analysis of the organizational culture and the impact of other methods, practices and continuous improvement tools. Despite this research, several questions in relation to support continuous improvement in the long-term and in relation to the impact of the deployment of *kata* on organizational culture remain unanswered and the key to this success is yet to be discovered. We hope that this dissertation will allow some researchers and professionals to elaborate on these subjects and that our thesis is will be useful to them.

Appendix A – Semi-Structured Interview Guide

Employees / Operators

(Translation Note: Original document in English)

THEME	DIMENSIONS	QUESTIONS
CI Introduction	- PDCA cycles - Problem solving skills - Visual Management Board - CI Routines - Open discussions about problems - Coaching, learning, adapting Participation, teamwork, communication, common goals -See potential for improvement, sense of responsibility, encouraged to experiment, CI competence development - Striving toward new patterns of operation and new level of performance versus reacting or troubleshooting	**1. Can you describe your typical day at work?** **2. What challenges do you face on a daily basis?** **3. How does the team improve on a daily basis? How does it work? Do you have an example?** **4. What are you doing when a problem occurs? Who do you speak to when something goes wrong? Do you have an example?** **5. How do you participate in CI?**
***Kata* initiatives**	- Common language: - **IK :** PDCA, experiments, hypothesis, TC, CC, Obstacles, Challenge, Vision, challenge - **CK :** Coaching, reflections, learning, Storyboard, 5Q - Routines - Problem Solving - Threshold of knowledge - Adapting	**6. How are you participating in *kata*?** **7. What got you interested in *kata*?** **8. What could be done differently?** **9. What are you doing since the deployment of *kata* that you were not doing before?**
Changes following *kata*		**10. What have you learned from *kata* since your involvement?** **11. Have you seen any changes in the *kata* practice since the beginning of this journey?**

Management

(Translation Note: Original document in English)

THEME	DIMENSIONS	QUESTIONS
CI Introduction	**- Problem solving structure and scientific thinking:** - PDCA cycles - Problem solving skills - Visual Management Board - See potential for improvement - Experimentation and learning - Striving toward new patterns of operation and new level of performance versus reacting or troubleshooting **-Involvement and participation of all employees:** Teamwork, communication, working through common goals, sense of responsibility, **- Support and involvement of leaders:** Encouraged to experiment, coaching, and presence on the *gemba*.	**1. Can you describe your typical day at work?** **2. What challenges do you face on a daily basis?** **3. How does your team usually solve problems?** **4. How do you currently try to improve? What is the current CI culture the organization is trying to achieve?** **5. If I would go on the shop floor and walk around the organization, what tangible signs would I see reflecting the CI culture of this organization?** **6. What can I see today that I wouldn't have seen 3-4 years ago?** **7. How do you involve/mobilize your team in improving your process daily?**
TK	- Common language: **- IK :** PDCA, experiments, hypothesis, TC, CC, Obstacles, Challenge, Vision, challenge **- CK :** Coaching, reflections, learning, Storyboard, 5Q - Routines - Problem Solving - Threshold of knowledge - Adapting - Structure	**9. What is your role in *kata*?** **10. When did you know that you were ready to become a coach? (if coach)** **11. How do you know that someone is ready to become a coach?** **12. What changed since the deployment of *kata*? What are you doing that you were not doing before?** **13. What got you interested in *kata*?** **14. If I would come back in 5 years, how would the CI culture be? What would have changed?**

Top Management

(Translation Note: Original document in English)

THEME	DIMENSIONS	QUESTIONS
CI Introduction	**- Problem solving structure and scientific thinking:** - PDCA cycles - Problem solving skills - Visual Management Board - See potential for improvement - Experimentation and learning - Striving toward new patterns of operation and new level of performance versus reacting or troubleshooting **- Involvement and participation of all employees:** Teamwork, communication, working through common goals, sense of responsibility, **- Support and involvement of leaders:** Encouraged to experiment, coaching, and presence on the *gemba*.	**1. How would you describe the culture of your organization?** **2. If I would go on the shop floor and walk around the organization, what tangible signs would I see reflecting the CI culture of this organization?** **3. What can I see today that I wouldn't have seen 3-4 years ago?** **4. What are the differences that I would observe if I were to go and see VS1 and VS5 in terms of CI culture?** **5. If I would come back in 5 years, how would the CI culture be? What would have changed?** **6. When you hire a new executive or a new employee, what are the criteria's that you are looking for that would fit the culture of your organization?**
TK and cultural change	- Common language: **- IK :** PDCA, experiments, hypothesis, TC, CC, Obstacles, Challenge, Vision, challenge **- CK :** Coaching, reflections, learning, Storyboard, 5Q - Routines - Problem Solving - Threshold of knowledge - Adapting - Structure	**7. When Stéphane/Brad came with the *kata* as a new CI initiative, what were the elements that got you on board?** **8. Now that *kata* has been deployed for some time, what do you like about *kata*? What does *kata* bring to your organization?** **9. What changed since the deployment of *kata*? What are you doing that you were not doing before *kata*?** **10. What are the new behaviours and skills that the employees developed following the deployment of *kata*?** **11. What led to the success of the *kata* in the organization?**

Leaders (SigmaPoint Technologies (Translation Note: Translated from original in French)

THEME	DIMENSIONS	QUESTIONS
Introduction	**Problem solving structure and scientific thinking:** - PDCA cycles - Problem solving skills - Visual Management Board - See potential for improvement - Experimentation and learning - Striving toward new patterns of operation and new level of performance versus reacting or troubleshooting **Involvement and participation of all employees:** Teamwork, communication, working through common goals, employees' sense of responsibility **Support and involvement of leaders:** - Experiments are encouraged - Development of employees capabilities and competencies. - Coaching .	**1. How would you describe the culture of your organization?** **2. What are the tangible signs of continuous improvement on the shop floor and through the organization that reflect the organizational culture of continuous improvement?** **3. What can I see today that I wouldn't have seen three of four years ago?** **4. What would I see differently between VS1 (more mature) and VS5 (less mature) in my observations?** **5. What is your vision for continuous improvement for the coming years? What would I see in five years that I would not see now?** **6. What are the elements that allow you to say that you are moving in the right direction?** **7. During an interview for an executive or employees, what are you trying to learn about the person? What are you looking for in an employee?** **8. Why do you train employees in-house instead of hiring coordinators or managers from outside? What does this bring to the organization?**
TK	**TK:** - Routines - Problem Solving - Threshold of knowledge - Adapting - Structure **- IK :** PDCA, experiments, hypothesis, target condition, current condition, obstacles, challenge, vision, mission **- CK :** Coaching, reflections, learning, Storyboard, 5Q	**9. What led you to want to introduce *kata*?** **10. After having experienced it, what do you like about *kata*?** **11. What has changed since the deployment of *kata*? What has *kata* brought to your organization?** **12. What led to the success of *kata* in your organization?** **13. How do you know when a learner is ready to become a coach and a coach ready to become a second coach?**

Appendix B – Table of Observations

- Routines for continuous improvement (improvement and coaching *kata*)		- Work environment that promotes teamwork and cooperation	
- Scientific approach to problem solving (PDCA) at all levels in the organization		- Vision and mission publically displayed	
- Involvement and participation of employees (employee engagement)		- Identification of potential improvements and experiments	
- Common language: current condition, target condition, obstacles, challenges, mission…		- Engagement of managers and leaders in the scientific approach to problem solving	
- Open discussion of problems		- Learning and daily training in the workplace	
- Visual Boards		- Ability of employees to solve problems	

Observations	Actors	Artifacts	Values and Beliefs

Appendix C - Questionnaire

HEC MONTRÉAL

Toyota *Kata*: A path to continuous improvement sustainability?

The following pages contain an anonymous questionnaire, which we invite you to complete. This questionnaire was developed as part of a Master's thesis at HEC Montréal.

Since your first impressions best reflect your true opinions, we would ask that you please answer the questions included in this questionnaire without any hesitation. There is no time limit for completing the questionnaire, although we have estimated that it should take about 15 minutes.

The information collected will be anonymous and will remain strictly confidential. It will be used solely for the advancement of knowledge and the dissemination of the overall results in academic or professional forums.

You are free to refuse to participate in this project and you may decide to stop answering the questions at any time. By completing this questionnaire, you will be considered as having given your consent to participate in our research project and to the potential use of data collected from this questionnaire in future research.

If you have any questions about this research, please contact the principal investigator, Marc-Olivier Legentil, at the telephone number or email address indicated below.

HEC Montréal's Research Ethics Board (REB) has determined that the data collection related to this study meets the ethics standards for research involving humans. For transparency purposes and to allow you to make an informed decision, we want to mention that your client Accedian Networks currently hires Marc-Olivier Legentil as a consultant. If you have any questions related to ethics, please contact the REB secretariat at (514) 340-6051 or by email at cer@hec.ca.

Thank you for your valuable cooperation!

Marc-Olivier Legentil
Master's Student
HEC Montréal
514-827-1851
marc-olivier.legentil@hec.ca

Sylvain Landry
Professor, Department of Logistics and
Operations Management
HEC Montréal
514-340-6749
sylvain.landry@hec.ca

HEC MONTRÉAL

Organizational Culture Assessment Instrument

The purpose of the Organizational Culture Assessment Instrument is to assess six key dimensions of organizational culture. There are no right or wrong answers for these items, just as there is no right or wrong culture.

The OCAI consists of six items. Each item has four alternatives. Divide 100 points among these four alternatives, depending on the extent to which each alternative is similar to your own organization. For example, on item 1, if you think alternative A is very similar to your organization, alternatives B and C are somewhat similar, and alternative D is hardly similar at all, you might give 55 points to A, 20 points each to B and C, and 5 points to D. **Just be sure that your total equals 100 for each item.**

Example

1. *Dominant Characteristics*	Before *kata*	Now
A - The organization is a very personal place. It is like an extended family. People seem to share a lot of themselves.	**55**	
B - The organization is a very dynamic and entrepreneurial place. People are willing to stick their necks out and take risks.	**20**	
C - The organization is very results-oriented. A major concern is with getting the job done. People are very competitive and achievement oriented.	**20**	
D - The organization is a very controlled and structured place. Formal procedures generally govern what people do.	**5**	
Total	100	100

Note that the left-hand response column for the instrument is labelled "Before *kata*'' and the right response column is labelled ''Now''. These responses mean that you are rating your organization before the deployment of *kata* (*before kata*) and as it is *currently (now)*. The *before kata* refers to your organization or department before it started using the improvement and coaching *kata* routines.

Instructions:

1) Complete the *before kata* rating for the first item (left-hand response column).
2) Complete the instrument again for the first item, this time responding as your organization is *now* (right-hand response column).
3) Complete step 1 and 2 for the 5 other items.

HEC MONTRĒAL

Role in the organization: _____

Department or VS: _____

1. Dominant Characteristics	Before kata	Now
A - The organization is a very personal place. It is like an extended family. People seem to share a lot of themselves.		
B - The organization is a very dynamic and entrepreneurial place. People are willing to stick their necks out and take risks.		
C - The organization is very results-oriented. A major concern is with getting the job done. People are very competitive and achievement oriented.		
D - The organization is a very controlled and structured place. Formal procedures generally govern what people do.		
Total	100	100

2. Organizational Leadership	Before kata	Now
A - The leadership in the organization is generally considered to exemplify mentoring, facilitating, or nurturing.		
B - The leadership in the organization is generally considered to exemplify entrepreneurship, innovation, or risk taking.		
C - The leadership in the organization is generally considered to exemplify a no-nonsense, aggressive, results-oriented focus.		
D - The leadership in the organization is generally considered to exemplify coordinating, organizing, or smooth-running efficiency.		
Total	100	100

HEC MONTRÉAL

3. Management of Employees	Before *kata*	Now
A - The management style in the organization is characterized by teamwork, consensus, and participation.		
B - The management style in the organization is characterized by individual risk taking, innovation, freedom, and uniqueness.		
C - The management style in the organization is characterized by hard-driving competitiveness, high demands, and achievement.		
D - The management style in the organization is characterized by security of employment, conformity, predictability, and stability in relationships.		
Total	100	100

4. Organization Glue	Before *kata*	Now
A – The glue that holds the organization together is loyalty and mutual trust. Commitment to this organization is high.		
B – The glue that holds the organization together is commitment to innovation and development. There is an emphasis on being on the cutting edge.		
C – The glue that holds the organization together is the emphasis on achievement and goal accomplishment.		
D – The glue that holds the organization together is formal rules and policies. Maintaining a smooth-running organization is important.		
Total	100	100

HEC MONTRÉAL

5. Strategic Emphasis	Before *kata*	Now
A – The organization emphasizes human development. High trust, openness, and participation persist.		
B – The organization emphasizes acquiring new resources and creating new challenges. Trying new things and prospecting for opportunities are valued.		
C – The organization emphasizes competitive actions and achievement. Hitting stretch targets and winning in the marketplace are dominant.		
D – The organization emphasizes permanence and stability. Efficiency, control, and smooth operations are important.		
Total	100	100

4. Criteria of Success	Before *kata*	Now
A - The organization defines success on the basis of the development of human resources, teamwork, employee commitment, and concern for people.		
B - The organization defines success on the basis of having the most unique or newest products. It is a product leader and innovator.		
C - The organization defines success on the basis of winning in the marketplace and outpacing the competition. Competitive market leadership is key.		
D – The organization defines success on the basis of efficiency. Dependable delivery, smooth scheduling, and low-cost production are critical.		
Total	100	100

Thank you for your participation!

References

Anderson, Donald L. (2015). Organization development: the process of leading organizational change, vol. 3, Los Angeles, Sage, 468 p.

Becker, MC (2004). "Organizational routines: a review of the literature", *Industrial and Corporate Change*, vol. 13, no. 4, p. 643-678.

Berger, Anders (1997). "Continuous improvement and kaizen: standardization and organizational design" [Electronic version], *Integrated Manufacturing Systems*, vol. 8, no. 2, p. 110-117.

Bessant, J., S. Caffyn, J. Gilbert, R. Harding and S. Webb (1994). "Rediscovering continuous improvement" [Electronic version], *Technovation*, vol. 14, no. 1, p. 17-29.

Bessant, John, Sarah Caffyn and Maeve Gallagher (2001). "An evolutionary model of continuous improvement behavior" [Electronic version], *Technovation*, vol. 21, no. 2, p. 67-77.

Bhuiyan, Nadia and Amit Baghel (2005). "An overview of continuous improvement: from the past to the present" [Electronic version], *Management Decision*, vol. 43, no. 5, p. 761-771.

Calmettes, Eric (2013). *Le PDCA.* Retrieved August 10, 2016 from http://www.aufildulean.fr/le-pdca-12/

Cameron, Kim S. and Robert E. Quinn (2011). *Diagnosing and Changing Organizational Culture based on the Competing Values Framework*, 3^e ed., San Francisco, Jossey-Bass, 268 p.

Campenhoudt, Luc van Quivy and Raymond (2011). *Manuel de recherche en sciences sociales*, vol. 4, Paris, Dunod, 262 p.

Cheng Liu CW and A. M (2007). "The relationship of organizational culture and the implementation of total quality management in manufacturing firms" *Surveying & Built Environment*, vol. 18, no. 1, p. 7-16. Retrieved from http://hdl.handle.net/10722/135458

Dellana Scott A. and Richard D. Hauser (1999). "Toward Defining the Quality Culture" [Electronic version], *Engineering Management Journal*, vol. 11, no. 2, p. 11-15.

Denison, Daniel Levi Nieminen and Lindsey Kotrba (2014). "Diagnosing organizational cultures: A conceptual and empirical review of cultural effectiveness surveys" [Electronic version], *European Journal of Work and Organizational Psychology*, vol. 23, no. 1, p. 145-161.

Denning, Steve (2011, February 5). "Why Lean Programs Fail - Where Toyota Succeeds: A New Culture of Learning "[Electronic version], *Forbes*.

Déry, Richard (2008). *Diagnostic de la culture organisationnelle*, 1e ed., Montreal, Publishing JFD, 60 p.

Déry, Richard (2012). *Diagnostic de l'identité organisationnelle*, 2e ed., Montreal, Publishing JFD, 62 p.

Detert, James R. Roger G. Schroeder and John J. Mauriel (2000). "A Framework for Linking Culture and Improvement Initiatives in Organizations" [Electronic version], *The Academy of Management Review*, vol. 25, no. 4, p. 850-863.

Duhigg, Charles (2012). *The Power of Habit: Why We Do What We Do in Life and Business*, New York, Random House Publishing Group, 383 p.

Eisenhardt, Kathleen M. (1989). "Building Theories from Case Study Research", *The Academy of Management Review*, vol. 14, no. 4, p. 532-550.

Feldman, Martha S. (2000). "Organizational Routines as a Source of Continuous Change" [Electronic version], *Organization Science*, vol. 11, no. 6, p. 611-629.

Fitzgerald, Thomas H. (1988). "Can changes in organizational culture, really be managed?" *Organizational Dynamics*, vol. 17, no. 2, p. 5-15.

Geertz, Clifford (1973). *The Interpretation of Cultures: selected essays*, New York, Basic Books, 470 p.

Hatch, Mary Jo (1993). "The Dynamics of Organizational Culture" [Electronic version], *The Academy of Management Review*, vol. 18, no. 4, p. 657-693.

Huberman, AM and Matthew B. Miles (1991). *Analyse des données qualitatives: recueil de nouvelles méthodes*, Brussels, Oxford University Press, 480 p.

Imai, Masaaki (1989). *Kaizen: La clé de la compétitivité japonaise*, 3e ed., Paris, Eyrolles, 248 p.

Jackson, Thomas L. (2006). Hoshin kanri for the lean enterprise: Developing competitive capabilities and managing profit, New York, Productivity Press, 224 p.

Krafcik, John F. (1988). "Triumph of the lean production system" [Electronic version], *Sloan Management Review*, vol. 30, no. 1, p. 41.

Landry and Sylvain Martin Beaulieu (2016). Lean, *kata* et système de gestion au quotidien: réflexions, observations et récits d'organisations, Montreal, Editions JFD, 257 p.

Landry, Sylvain Mike Rother and Francis Halin (2016). " Cinq étapes pour mettre en oeuvre la méthode *Kata* dans votre entreprise" [Electronic version] Management, no. 1, p. 88-91.

Legentil, Jean-Marc (2016). " Le dilemme de l'amélioration continue : quelle approche choisir?" communication présentée au *Écoles des dirigeants*, Montréal, 14 mars, HEC Montréal

Liker, Jeffrey K. (2012). The Toyota Way: 14 Management principles from the world's greatest manufacturer, New York, McGraw-Hill.

Liker, Jeffrey K. and Michael Hoseus (2008). *Toyota Culture: the heart and soul of the Toyota Way*, New York, McGraw-Hill, 562 p.

Liker, Jeffrey and Mike Rother (2011). "Why Lean Programs Fail" *Lean Enterprise Institute*. Retrieved from http://www.lean.org/Search/Documents/352.pdf

Lillian Do Nascimento, Gambi, Boer Harry, Gerolamo Mateus Cecilio, Frances Jørgensen Carpinetti Luiz Cesar Ribeiro (2015). "The relationship between organizational culture and quality techniques, and its impact on operational performance" [Electronic version], *International Journal of Operations & Production Management*, vol. 35, no. 10, p. 1460-1484.

Mann, David (2009). "The missing link: Lean Leadership" [Electronic version], *Frontiers of health management services*, vol. 26, no. 1, p. 15.

Mann, David (2010). *Creating a Lean Culture: tools to Sustain Lean Conversions* [Electronic version], vol. 2, New York, Productivity Press.

Neese, Marty and Kong Siew Mui (2007). "Establishing a Kaizen Culture" [Electronic version], *Circuits Assembly*, vol. 18, no. 11, p. 57-58.

Netland, Torbjorn and Kasra Ferdows (2014). "What to expect from a corporate Lean program" [Electronic version], *MIT Sloan Management Review*, vol. 55, no. 4, p. 83-89.

Pay, Rick (2008, March 1). " Everybody's Jumping on the Lean Bandwagon, But Many Are Being Taken for a Ride, " *Industry Week*. Retrieved from

http://www.industryweek.com/articles/everybodys_jumping_on_the_lean_bandwagon_but_many_are_being_taken_for_a_ride_15881.aspx

Picard Amelie (2013). Développement d'un cadre de mesure de performance d'une transformation de culture organisationnelle: le cas de la migration vers le modèle de soins "Planetree" au CHU Sainte-Justine [master thesis], Montreal, HEC Montreal, 275 p.

Prajogo, Daniel and Christopher I. McDermott (2005). "The relationship entre total quality management practices and organizational culture" [Electronic Version] International Journal of Operations & Production Management, flight. 25, no. 11, p. 1101-1122.

Quinn, Robert E. and John Rohrbaugh (1983). "A Spatial Model of Effectiveness criteria: Towards a competing values approach to organizational analysis "[Electronic version], *Management Science*, vol. 29, no. 3, p. 363-377.

Recht, Ricardo Wilderom and Celeste (1998). "Kaizen and culture: on the transferability of Japanese suggestion systems" [Electronic version], *International Business Review*, vol. 7, no. 1, p. 7-22.

Rother, Mike (2010). Toyota *Kata*: Managing people for continuous improvement, adaptiveness, and superior results, New York, McGraw-Hill, 306 p.

Rother, Mike (2015). *Improvement Kata and Coaching Practice Guide*. Retrieved May 22, 2016 from http://www-personal.umich.edu/~mrother/Handbook/Practice_Guide.pdf

Schein, Edgar H. (2004). *Organizational Culture and Leadership*, 3^e ed., San Francisco, Jossey-Bass, 437 p.

Schroeder, Mr. Dean and Alan G. Robinson (1991). "America's Most Successful Export to Japan: Continuous Improvement Programs" [Electronic version], *Sloan Management Review*, vol. 32, no. 3, p. 67-81.

Scott, Tim Russell Mannion, Huw Davies and Martin Marshall (2003). "The Quantitative Measurement of Organizational Culture in Health Care: A Review of the Available Instruments," *Health Services Research*, vol. 38, no. 3, p. 923-945.

Shook, John (2010). "How to Change a Culture: lessons from NUMMI" [Electronic version], *MIT Sloan Management Review*, vol. 51, no. 2, p. 63-68.

Sims, Ronald R. (2000). "Changing an Organization's Culture Under New Leadership" [Electronic version], *Journal of Business Ethics*, vol. 25, no. 1, p. 65-78.

Singh, Jagdeep and Harwinder Singh (2015). "Continuous improvement philosophy - literature review and directions," *Benchmarking,* vol. 22, no. 1, p. 75.

Sobek Durward K. and Art Smalley (2008). *Understanding A3 thinking: a critical component of Toyota's PDCA management system*, New York, Taylor and Francis Group, 165 p.

Spear, Steven and H. Kent Bowen (1999). "Decoding the DNA of the Toyota Production System," *Harvard Business Review*, vol. 77, no. 5, p. 96-106.

Spear, Steven J. (2004). "Learning to Lead at Toyota" [Electronic version], *Harvard Business School Press*, vol. 82, no. 5, p. 78-86.

Villers, Marie-Eva René Saint-Pierre Francine Létourneau and Claude R. Duguay (1993). *Dictionnaire de la gestion de la production et des stocks: Dictionary of production and inventory management*, vol. 2, Montreal, Éditions Québec / America, 271 p.

Womack, James P. (2002). "Lean thinking: Where have we-been and where are we going? "[Electronic version], vol. 129, no. 3, p. L2-L6.

Womack, James P., Daniel T. Jones and Daniel Roos (1990). *The Machine That Changed The World*, New York, Rawson Associates, 323 p.

Yin, Robert K. (2014). *Case study research: design and methods*, 5th ed., Thousand Oaks: Sage Publications, 282 p.

Zu Xingxing, Tina L. Robbins and Lawrence D. Fredendall (2010). "Mapping the critical links entre organizational culture, and TQM / Six Sigma practices" [Electronic version], *International Journal of Production Economics*, vol. 123, no. 1, p. 86-106.