

THE DEVELOPMENT OF TOOLS DIAGNOSING RESPONSIVE LEADERSHIP

by

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PREFACE

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Thanking you,
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ABSTRACT

Leadership is one of the most critical success factors within the implementation of organisational improvement. Due to the fast changing organisational environment, responsiveness of organisations has become necessary to survive. Moreover, responsive leadership has become critical. Literature defines five variables for responsive leadership, namely entrainment, polychronicity, pace/speed, punctuality and temporal depth; but lacks to define measures for these variables. This research determines how these variables should be measured and analysed based on observations in a multiple-case study. Based on the findings from the observations, this research develops a prototype of diagnostic tools for responsive leadership, using mobile application technology. Results of this study are based on rich data, gathered by observing four directors of Quick Response Manufacturing and Lean companies. The results indicate that the prototype of the mobile application developed can provide a diagnosis about leadership, based on the variables entrainment, pace/speed and punctuality. Polychronicity and temporal depth are personal bound variables and therefore not included in the design of a diagnostic leadership tool, but should be measured otherwise.

Keywords: Responsive leadership, Diagnostic tool, Leadership measurement, Mobile application development

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1. INTRODUCTION

Leadership turns out, in both theory and practice, to be one of the most critical success factors of the implementation of improvement approaches like Lean, Six Sigma, Total Quality Manufacturing and Quick Response Manufacturing (QRM). Leaders should be visually supportive, committed and involved (Ghobadian & Gallear 1996; Antony et al. 2005; Achanga et al. 2006; Suri 1998; Kumar et al. 2011). However, this conclusion does not provide any details about which decision-elements and activities are involved and how these activities should be performed.

While those papers that write about leadership in the Operations Management field all include providing a vision and support initiatives in their definition of leadership, their view is limited in that they forget the time aspect of leadership. However, this time aspect, reflected in the responsiveness of leaders, is important, since, during the last decades, the organisational environment has become increasingly competitive, complex and volatile. Mainly due to faster technology changes and globalisation, responsive leadership has become more important (Kotter 2001).

Time is a complex attribute and can be related to leadership from different perspectives. Leadership in relation to time is explored by Ancona et al. (2001), Thoms (2003), Bluedorn & Jaussi (2008), and Shamir (2011). From their perspectives on time can be concluded that leaders should take timing into account when making their decisions. Responsive leadership involves facing time-related leadership decisions, e.g. decisions about when to act and how fast to act. The challenge is to align the internal organisational pace and cycles of improvement with the external technological and competitive pace and cycles of change (Ancona et al. 2001). Since, as stated before, responsive leadership is a critical element, it is important to gain insight into the leadership capacities and the leadership behaviour of the person who is in the position to lead a company. Those insights can be used to improve leadership and therefore improve organisational performance. Besides, it turns out that in practice there is a need for the diagnosis and development of responsive leadership (QRM Centre Europe 2012).

Different tools are provided in literature that aim for improving leadership, e.g. leadership development programs (Fulmer et al. 2001), action learning (Smith 2001) and coaching (Blackman 2010; Kazmi & Kinnunen 2012). However, before one can actually improve its

leadership, a diagnosis should be performed about what aspects of a person's leadership can be improved. Until now, no tool exists that diagnoses the actual execution of responsive leadership, i.e. provide insights for the leaders what to improve. The need for those tools has been identified by QRM centre Europe, during workshops at companies that are implementing QRM initiatives. During those workshops, leaders and change champions provided the need for getting insight in their leadership, i.e. to get a diagnosis of what should be improved to develop their leadership.

The first part of this research, the multiple-case study, aims to determine how responsive leadership should be measured and analysed based on observations. The second part of this research, the design study, aims to develop diagnostic tools to measure and analyse actual responsive leadership, based on the insights of the multiple-case study, to support the successful implementation of improvement approaches. With the outcomes of the diagnostic tools, i.e. an objective diagnosis of the responsiveness of a leader, leaders should be able to know on what aspects their responsive leadership needs improvement. Eventually, improved leadership should lead to a better implementation of improvement initiatives and an increase in organisational performance.

In the next chapter a literature review will provide a more in-depth analysis of responsive leadership and the tools that are available according to literature. Next, in chapter 3, the methods that will be used to answer the research questions are explained. The findings resulting from the methods used will be given and analysed in chapter 4. Based on the findings a discussion will be held in chapter 5 to decide what aspects/variables to include in the design of the tool. The design and the validation of the design will be presented in chapter 6. Finally, in the conclusion the overall results will be presented and the limitations and aspects for further research will be given.

2. LITERATURE REVIEW

In this chapter, a literature review will be provided of the concepts concerning responsive leadership and leadership development tools. The first aim of this review is to provide in-depth analyses of responsive leadership. The second aim is to provide a complete overview of tools that provide insight into leadership that currently are available according to literature. Therefore, first, the aspects of responsive leadership will be discussed in more detail. Second, literature will be reviewed on tools that deal with leadership and responsiveness. Third, focus will be on diagnostic leadership tools.

2.1. Responsive leadership

The success of leadership is generally dependent on three attributes, namely (1) the personal characteristics, capabilities and skills of the leader, (2) the behaviour of the leader and (3) the environment/situation where the leader acts in (Sternberg 2008). The perfect situation would be where the personality and behaviour of the leader exactly meets the needs of every situation. Whereas personality is hard to change (on the short term), behaviour can be changed. Based on this, responsive leadership includes continuously adjusting behaviour to the needs of the situation. Overall, the behaviour of the leader should be in line with the vision he or she tries to share with his or her followers.

Responsive leadership, also known as temporal leadership (Bluedorn & Jaussi 2008; Erve 2004), is a relatively new concept. It gained more importance in the last decade, which can be related to the increasingly competitive, complex and volatile organisational environment, due to faster technology changes and globalisation (Kotter 2001). Different perspectives on responsive leadership have been explored by Ancona et al. (2001), discussing the alignment of internal with external time paces and cycles (entrainment); Thoms (2003), examining the time orientation of leaders, i.e. past, present and future; Bluedorn & Jaussi (2008), describing the implications for leaders of entrainment, polychronicity, pace/speed, temporal depth, and punctuality; and Shamir (2011), focusing on how to understand leadership processes over time and the effects of time on leadership phenomena. From the different perspectives on time can be concluded that leaders should take timing into account in their leadership behaviour. In sum, responsive leadership involves the behaviour of leaders while facing time-related leadership decisions, e.g. decisions about when to act, how to act and how fast to act.

The strategic aspect of responsive leadership is to align the internal organisational pace and cycles of improvement with the external technological and competitive pace and cycles of change (Ancona et al. 2001). Two main challenges can be recognised. The first challenge is to find an appropriate balance between exploration and exploitation of the organisation (He & Wong 2004; March 1991). On the one hand, leaders should engage in exploration, i.e. look for ways to incorporate environmental changes by experimenting with new alternatives to ensure future viability of the organisation. On the other hand, leaders should engage in exploitation, i.e. look for ways to refine and extend competences, technologies and paradigms to ensure current viability of the organisation (Gupta et al. 2006; Levinthal & March 1993; March 1991). Within this explorative versus exploitative focus, leaders should not only look for quick wins when solving problems, but also look for the cause of the problem and try to prevent it. The second challenge is to focus both on the organisation itself and on the supply chain of the organisation. On the one hand, leaders should focus on optimising internal operations. On the other hand, leaders should focus on optimising external operations, i.e. the supply chain.

Bluedorn and Jaussi (2008) identified five time-related variables that are related to leadership at an operational level, namely:

1. *Entrainment* defined as ‘the adjustment of the pace or cycle of an activity to match or synchronise with that of another activity’ (Ancona & Chong 1996: 253);
2. *Polychronicity* defined as ‘the extent to which people (1) prefer to be engaged in two or more tasks or events simultaneously and are actually so engaged and (2) believe their preference is the best way to do things’ (Bluedorn 2002: 51);
3. *Pace/speed* defined as ‘the frequency of activities in some unit of social time’ (Lauer 1981: 31);
4. *Punctuality* defined as being on time, whether one is on time depends on the social definition of being on time, which differs per event and per country (Bluedorn & Jaussi, 2008); and
5. *Temporal depth* defined as ‘the temporal distances into the past and future that individuals and collectivities typically consider when contemplating events that have happened, may have happened, or may happen’ (Bluedorn 2002: 114).

Since all five variables are related to time, the combination of these variables provides insight into the responsiveness of leadership. How those variables should be measured is not clear from literature and will, therefore, be investigated in this research. Besides, it will be

investigated if there are more variables involved in responsive leadership and how variables are related.

2.2. Leadership development tools

To get more insight in what tools are available that deal with leadership, a literature search is performed. The databases EBSCO and Scopus are used in the search for relevant papers. The search terms ‘leadership tool’, ‘leadership instrument’, ‘leadership device’, ‘leadership assess*’, ‘leadership measur*’, ‘leadership improv*’, ‘leadership develop*’ and ‘leadership evaluat*’ were used in the title, abstract and keywords searches. This is less efficient than just focusing on keywords, but ensured that as much relevant papers as possible were captured. Those searches were performed in the subject areas that were regarded most relevant, namely ‘business, management and accounting’, ‘computer science’, ‘decision science’, ‘psychology’, and ‘social science’. From the outcomes of the searches the most relevant papers were selected, namely those that describe tools that provide insight in leadership. This resulted in a total of 116 papers and 54 tools and 6 categories, see table 2.1. A more extended version of this table is given in appendix I, table I.1.

Category	Amount of Tools	Amount of Papers
Action learning	1	5
Coaching/mentoring	3	15
Daily practice log	2	4
Leadership program	17	29
Location aware devices	2	3
Questionnaires	29	60
Total	54	116

Table 2.1: Categorisation of tools and papers

The tools shown in table 2.1 will be further categorised based on (1) the DMAIC cycle and (2) the attributes of successful leadership, i.e. personality, behaviour and environment, see table 2.2. First, the DMAIC cycle, see figure 2.1, will be used, since different tools are used in different phases of improvement. In other words, tools used for measurement could not be used for improvement, see table 2.2. Diagnosing responsive leadership is a part of an improvement cycle involving the steps ‘measure’ and ‘analyse’. The remaining of the DMAIC cycle involves improving responsive leadership by the steps ‘improve’ and ‘control’.

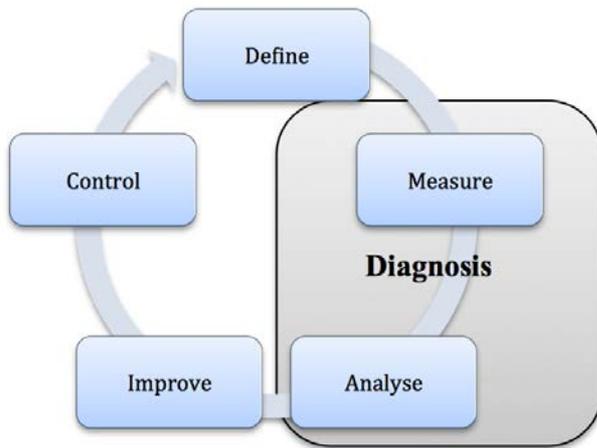


Figure 2.1: DMAIC cycle

Second, the tools are categorised based on the attributes of successful leadership, since responsive leadership involves the alignment of the leader’s behaviour with the leader’s environment. Therefore, tools concerning personality are not relevant for diagnosing responsive leadership, see table 2.2.

	Personality	Behaviour	Environment
Define		Location aware Devices	
Measure	Leadership questionnaires/scales	Daily practice log	
Analyse	Peer review/ multi-source feedback		
Improve	Leadership development programs	Action Learning	
Control	Coaching/Mentoring		

Table 2.2: Leadership development tools classification

From the literature search performed can be concluded that most initiatives concerning leadership are focused on the measurement, analysis, and improvement of the personality, capabilities and skills of the leader. In general, two types of leadership assessments are available, namely self-assessment and 360-degree assessment. The 360-degree assessments, also known as multi-source assessments, are not only filled in by the leaders themselves, but also by the followers and others concerned (Drew 2009). This self and 360-degree assessment is used in leadership questionnaires, feedback sessions, leadership development programs and coaching/mentoring. Eventually, the combination of self- and 360-degree assessment ensures a more objective assessment. The remainder of this paragraph will provide more detail about the different types of leadership tools, followed by the proposed contribution of this paper to literature.

Peer review and multi-source/360-degree feedback is used to provide leaders more insight in their competencies, capabilities and skills as perceived by others (Hafford-Letchfield & Bourn 2011). The disadvantage of this method is the subjectivity of the peers, supervisors and subordinates about the leader, mostly influenced by their opinion about the general behaviour of the leader (Darr & Catano 2008). However, it provides insights from different perspectives (Gentry & Leslie 2007). Therefore, combination of opinions of various people can bring useful insights to improve leadership.

Self-assessment aims at identifying one's own strengths and weaknesses to explore where improvement is needed. The advantage of self-assessment is the increase of self-awareness, which enables taking a closer look at behaviour and improves personal interaction. On the other hand, the main disadvantage of self-assessment is its subjectivity (White et al. 2002; Papa 2012), caused by the fact that one is assess from one perspective and by the fact that leaders could manipulate the outcomes by filling in socially desired answers.

Leadership questionnaires are used as a tool to measure and analyse:

- *The personality of the leader*, e.g. with the big five personality test (Stricker & Rock 1998; Goodstein & Lanyon 1999; Bartone et al. 2009);
- *The leadership style of the leader*, e.g. with the multi-factor leadership questionnaire (Tejeda et al. 2001; Heinitz et al. 2005; Hinkin & Schriesheim 2008; Schriesheim et al. 2009); and

- *The competencies of the leader*, e.g. with the leadership competency scale (Alban-Metcalf & Alimo-Metcalf 2013) the leadership effectiveness questionnaire (Demask et al. 2009), and the authentic leadership questionnaire (Neider & Schriesheim 2011).

The advantage of questionnaires is that it is an easy and little time consuming method to collect data. Besides, the analysis of the answers gathered is straight forward, due to beforehand-established standards. One of the disadvantages of those questionnaires is that they are self-assessments, where leaders could manipulate the outcomes by filling in socially desired answers. However, most questionnaires are designed in such a way that manipulation has little effect. Another disadvantage is that it measures one moment in time, which can be influenced by recent events.

Mentoring and coaching is used to improve the competencies, capabilities and skills of leaders (Ann & Carr 2011). Senior leaders of the company mainly perform the coaching and mentoring of leaders (Longenecker & Neubert 2005). This is on the one hand an advantage, since senior leaders are experienced with leadership. However, the disadvantage is that it might well be that those leaders are not the most successful or do not have the knowledge of excellent leadership. Besides, it is possible that their leadership was successful, due to their personality, which is different for every person and therefore does not have to be successful for someone else.

Leadership development programs combine questionnaires, feedback sessions and coaching/mentoring to measure, analyse and improve a leader's leadership style, competencies, capabilities and skills. Some elements of the leadership development programs were particularly focussed on leadership improvement, e.g. simulation (Lee et al. 2012) and role plays (Gagnon et al. 2012). Leadership development programs are applied over a long time period, i.e. during the career of a leader. However, they are mostly used in large enterprises and are less suitable for Small and Medium-sized Enterprises (SMEs) (Fulmer et al. 2001; Allio 2005), due to limited time, skills and resources available in SMEs (Welsh & White 1981). In respect of this research, this finding should be taken into account. It would be relevant for SMEs that tools will be developed that are suitable for leadership development within SMEs, i.e. that require little time, skills and resources.

López, Ahumada, Galdames, & Madrid (2012) and Spillane & Zuberi (2009) experimented with logging daily practice in the educational context to get insight in the activities performed by the participants. Another tool that provides insight in real-time behaviour patterns of

leaders is a 'location aware device' (GPS). Previously, such devices are used to detect and analyse patterns among trajectories of leaders in a group (Andersson et al. 2007; Andersson et al. 2008). However, these tools provide no analysis of the activities performed and the patterns of leaders. Besides, it is not clear how the data gathered provides insight in actual leadership performance.

Action learning is used for building leadership skills and improving leadership behaviour. People work together in small groups and tackle real-life problems and reflect on the actions taken (Leonard & Lang 2010). It turns out that action learning is most effective when it is combined with coaching (Hoe 2011). When more people simultaneously are in the position to lead a company, e.g. a management team or company board of directors, action learning is useful. However, in SMEs mostly one person is in the position to lead the company (Ghobadian & Gallea 1996), and therefore action learning would not be possible.

As can be concluded from the literature search, little research is performed about the measurement and analysis of real-time leadership behaviour. The purpose of this research is to fill this gap, by developing diagnostic responsive leadership tools. The contribution of this research to literature about leadership tools is marked within table 2.3 as 'diagnostic responsive leadership tools', covering the measurement and analysis of behaviour, taking the environment into account.

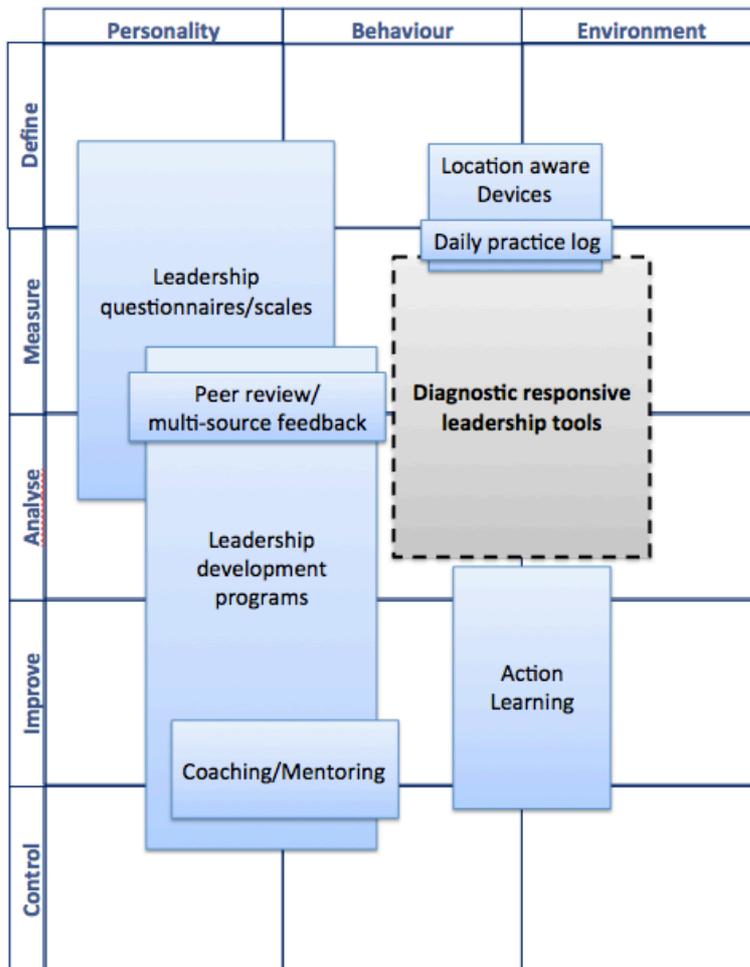


Table 2.3: Contribution of this research

2.3. Diagnostic responsive leadership tools

The aim of diagnostic tools, as also specified in table 2.3, is to measure and analyse the behaviour of a leader and his or her responsiveness to the environment. The tools described in academic literature lack this ability. Next, based on the shortcomings of the current tools, requirements for the diagnostic tools will be set.

Responsiveness includes two aspects that should be measured and analysed; (1) the environment, i.e. what events occur and (2) the behaviour of the leaders, i.e. what actions does the leader take and how fast. To measure this, a longitudinal measurement is necessary, which can measure responsiveness over a certain period of time. This longitudinal measurement is able to provide insights in events and actions over time (Karlsson 2009). The measurement should be performed in the leader's working environment, because each environment differs and is hard to simulate.

The data about the responsiveness of leaders should be collected real-time, preferably continuous, but minimal at different points in time. The tools should mainly be based on factual data and not be based on self-assessment, since the tools need to provide insight in the actual responsiveness of the leader, and not his/her own perception of his/her responsiveness. In summary, the idea is that the diagnostic tools that will be developed within this research, are able to measure responsive leadership real-time and the analysis of those measurements should easily result in a diagnosis.

The technologies to be used for the tools should support measuring responsiveness and collecting data at the same time. Preferably, the tools should exist of technologies that are already used by leaders, in that there is no need to spend time on learning to work with the technology. Besides, it is preferred that using the tools does not interfere activities of the leaders, but is perceived as part of the job.

2.4. Conclusion

The end-goal of this research is to develop diagnostic tools for responsive leadership, with the objective to provide leaders a diagnosis about their responsiveness.

The variables that are critical for responsiveness of leaders, based on literature, are entrainment, polychronicity, pace/speed, punctuality and temporal depth. The first objective of this research is to investigate if these variables are also critical in practice and if there are other variables that need to be taken into account. Besides, the relationship between the variables and the importance of these variables will be investigated. The second objective is to investigate how these variables should be measured to be able to analyse the measurements and turn it into a diagnosis. The third and last objective is investigating which technologies should support the measurement and analysis of responsive leadership to eventually be able to develop the tools.

3. RESEARCH DESIGN

This section will first describe the overall research methodology; containing both multiple case study and design study. Next, the multiple-case study will be discussed in more detail. The design study will be discussed in more detail in chapter 6 ‘design’.

3.1. Research methodology

Since little research is done about the variables that define and measure responsive leadership, a multiple-case study, which provides the opportunity to explore concepts in real-life cases, is most suitable. The method has been used to both verifying the variables given in literature and identifying new variables related to responsive leadership (Edmonson & McManus 2007) to examine how those variables should be measured. Based on the outcomes of the multiple-case study, a design study, using the regulative cycles of Van Strien (1997), is performed to develop tools that provide diagnoses about the extend of responsive leadership, see also figure 3.1. More details about the multiple-case study will be discussed in the next paragraph.

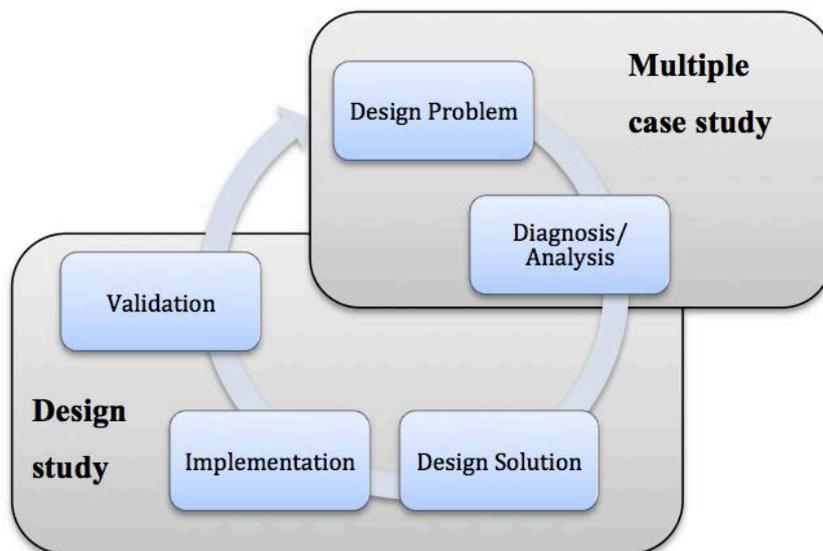


Figure 3.1: Regulative cycle of Van Strien (1997)

3.2. Multiple-case study

The multiple-case study has been focused on SMEs, since those enterprises have distinctive advantages regarding leadership in comparison with large organisations. Due to the flat hierarchy and therefore few layers of management, SMEs have a short decision-making chain and top management is close to the delivery point, i.e. the shop floor. Consequently, directors of SMEs have without much effort a high degree of visibility both vertically and horizontally,

which makes it readily to provide effective leadership (Ghobadian & Gallear 1996). The research process completed during the multiple-case study is shown in figure 3.2 and will be explained further in paragraph 3.2.2 ‘data collection’.

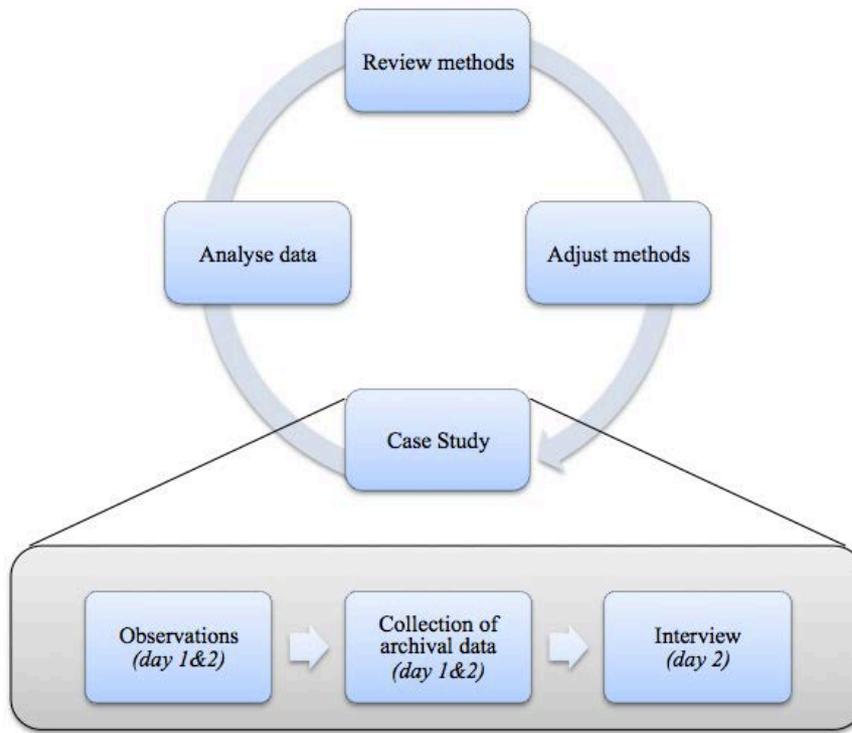


Figure 3.2: Iterative research process

3.2.1. Case Selection

Four cases were selected to participate in the multiple-case study, see table 3.1, two from a Quick Response Manufacturing program and two from a Lean Manufacturing program. Those companies lent itself for this research, since they already recognised the importance of being responsive. Within the cases, the director (owner) was defined as the unit of analysis.

During the observations of case 4, both the change champion and the director were involved. The change champion was observed when the director was performing non-leadership activities, the change champion was observed; 20% of the time the director was observed and 80% of the time the change champion.

Before the observations took place the participants were informed during a phone call. Besides, information about (1) the content, goal and relevance of the research; (2) the input, effort and time needed from the participants for the research; (3) the relevance of their participation; and (4) what they could expect to get as result from the research was provided

by e-mail. During the observation extra information was provided where needed. It was explicitly not told beforehand to the people observed to what aspects specific attention was given during the observations, to prevent people would act differently on these aspects (as far this could be prevented). Afterwards, the participants were told which aspects had specific attention during the observations.

Observations started approximately 8 a.m. and finished around 5 p.m. Each visit started with a short acquaintance. The participant was asked to provide a short introduction about the himself and the company. Besides, he was asked to specify particularities relevant to take into account during observations. After this acquaintance, which took approximately one hour, the observations were started.

	Case 1	Case 2	Case 3	Case 4
Person observed	Director/ Owner	Director/ Owner	Director/ Owner	Director/Owner & Change Champion
Improvement program	Lean	Lean	QRM	QRM
Company size (employees)	12	120	20	100
Leadership experience (years)	11	13	>15	13
Current position (Years)	7	4	8	5
Days of observation	2	2	2	2

Table 3.1: Case description

3.2.2. Data collection

In each case study, observations were performed, archival data was collected and an interview was held, see figure 3.2. Observations were used as the major method to gather data during the case studies. The archival data was used to support the data gathered during observations and interviews were used to verify the data gathered from both observations and archival data.

Each director was observed for two working days within the same week, assuming those working days were representative for regular working days. To verify this assumption, directors were asked to indicate differences and the degree of difference afterwards, during the interview.

The method of observation used is called shadowing or continuous observation, which ‘involves a researcher closely following a member of an organisation over an extended period of time ... the researcher shadows the target individual from the moment they begin their

working day until they leave for home’ (McDonald 2005: 456). The advantages of shadowing are (1) the ability to collect rich, first-hand and multidimensional data, which is more detailed than other approaches; and (2) both the opinion/perception and the behaviour of the leader will be examined simultaneously (McDonald 2005). However, the richness of the data could be overwhelming and could lead to a dataset that would be hard to analyse. To prevent this, the observations and methods used, were focussed on collecting data about responsiveness.

During the period of shadowing different, complementary, tools were used to collect data, see table 3.2. More details and examples of the tools are provided in appendix II.

Tools	Variables	Entrainment	Polychronicity	Pace/ Speed	Punctuality	Temporal depth
Activity log (including stopwatch)		X	X	X	X	
Recording conversations		X		X		X
Event-response scheme		X		X	X	
Activity scheme		X				

Table 3.2: Tools for observation

During the observation a writing pad was used to continuously write down notes of the data that cannot be collected using the described tools. Archival data was gathered during the two days of observation to support the data gathered from the observations with factual data. Examples of archival data are: calendars, to-do lists, schedules, meeting agendas et cetera. The purpose of the archival data was to collect factual data that supports the data gathered during the observations. The purpose of the interview was mainly to verify the data gathered during the days of observation. The interviews were recorded after permission of the interviewee.

After each case study the used methods and tools were critically reviewed and adapted based on new insights from the analysis of the observations. Therefore, it was an iterative, explorative process, see figure 3.2.

3.2.3. Measurement of variables

The five variables, i.e. entrainment, polychronicity, pace/speed, punctuality and temporal depth, represent responsiveness. However, academic literature lacks to define appropriate measures for these variables. The aim of this paragraph is to describe in detail how each variable was measured during the observations. The measures of the variables were developed

based on the observations combined with knowledge from Lean and QRM non-academic/practice literature.

Entrainment. Entrainment, defined as ‘the adjustment of the pace or cycle of an activity to match or synchronise with that of another activity’ (Ancona & Chong 1996: 253), involves both the dependence between an event and activity, and the dependence between two activities. Therefore, each activity was categorised either proactive or reactive, where proactive is defined as actively initiating actions and preventing problems from happening; reactive as responding to events or actions of others and solving problems or fire fighting (Imai 2012). Besides, when interacting with subordinates, the type of interaction was analysed, in terms of preventing or problem solving, being either process focussed (coaching) or result focussed (directive). The type of interaction was measured by looking at the type of answers and advice that is given during conversations. Result focussed leadership focuses on providing direct answers, solving the problems and telling others what to do. Process focussed leadership focuses on helping others to learn how to face and solve problems to become more independent (Goleman 2000).

Complementary, entrainment involves the timing of activities. To decide on the timing of the activities their urgency and importance was assessed, where urgency is defined as the impact of postponing the activity; and importance as the impact of not performing the activity (Covey 1989). The assessment about importance and urgency of activities was performed by the

	URGENT	NOT URGENT
IMPORTANT	<ul style="list-style-type: none"> • Crises • Pressing problems • Deadline-driven projects, meetings, preparations 	<ul style="list-style-type: none"> • Preparation • Prevention • Values clarification • Planning • Relationship building • True re-creation • Empowerment
NOT IMPORTANT	<ul style="list-style-type: none"> • Interruptions, some phone calls • Some mail, some reports • Some meetings • Many proximate, pressing matters • Many popular activities 	<ul style="list-style-type: none"> • Trivia, busywork • Some phone calls • Time wasters • Escape activities • Irrelevant mail

Figure 3.3: Covey quadrant (adopted from Covey et al. 2003)

researcher, without asking the observed person. Nevertheless, the results were verified afterwards, during the interview. The urgency and importance of activities was categorised, based on the type of activity performed, according to the Covey quadrant, see figure 3.3.

Polychronicity. Polychronicity, defined as ‘the extent to which people (1) prefer to be engaged in two or more tasks or events simultaneously and are actually so engaged and (2) believe their preference is the best way to do things’ (Bluedorn 2002: 51), was measured by recording how often two or more activities were performed simultaneously. Besides, each director was asked to give their preference: performing either one activity or more activities simultaneously.

Pace/Speed. Pace/speed, defined as ‘the frequency of activities in some unit of social time’ (Lauer 1981: 31), was measured in practice by recording the duration of activities and the amount of activities that were performed in a certain time of a working day. Besides, the speed of response on an event was measured by recording the time space between an event and the related activity.

Punctuality. Punctuality, defined as being on time, whether one is on time depends on the social definition of being on time, which differs per event and per country (Bluedorn & Jaussi 2008), was measured based on the planned activities, deadlines and general appointments like working hours, breaks, etc. For each planned activity and appointment it was registered if it started and finished in time and if not, the difference between the actual start/finish time and the planned start/finish time was recorded.

Temporal depth. Temporal depth, defined as ‘the temporal distances into the past and future that individuals and collectivities typically consider when contemplating events that have happened, may have happened, or may happen’ (Bluedorn 2002: 114), was measured by asking to what extent the past and the future was taken into account when making a decision.

4. ANALYSIS

The goal of this chapter is to provide an indication of the quality and richness of the data gathered. Besides, the data will be analysed and result in an assessment of the methods used during the observations. The results will be discussed in the next chapter.

4.1. Data collected

For every case the activities performed by the director, see table 4.1, and the events happened were registered. To cover all activities, including those that were not observed, the directors were asked what activities they generally perform.

Activities	Case 1	Case 2	Case 3	Case 4
Leadership:				
- Staff development	V	V	V	V
- Improvement initiatives	V	V	V	V
- Innovation initiatives	V	V	V	V
- Day-to-day management of people	V	V	V	V
- Day-to-day problem solving	V	V	V	V
<hr/>				
Management:				
- Budget and finance management	V	V	V	V
- Strategic relationship management	V	V	V	V
- Suppliers				
- Customers	V	V	V	
- Planning	V	V		V
<hr/>				
Other:				
- Handling emails and post	V	V	V	V
- Phone calls	V	V	V	V

Table 4.1: Leader's activities

The activities were categorised by leadership activities, management activities and other activities. Leadership activities are defined as activities, which involve the director to change and improve its organisation and the behaviour of people. Management activities are defined as activities, which involve the director to create stability in its organisation. The category 'other activities' includes all activities that cannot be categorised in the former two categories. This research focuses on responsive leadership and therefore the leadership activities and events related to these activities will be analysed further in paragraph 4.5.

Leadership activities consisted of staff development, improvement initiatives, innovation initiatives, day-to-day management activities and day-to-day problem solving and were found

in all cases. The first three activities are focussed on strategy level, the latter two are activities focussed on operational level. Each leadership activity will be described in more detail below.

Staff development was found in all cases on the small level, i.e. the director providing feedback to 'sub-ordinates' to improve their behaviour and develop new skills. For example, in one of the cases there was the situation that an employee did not know how to handle day-to-day problems in general, like a breakdown of a machine. The director taught him what to do and how to handle those situations. In another case staff development was on a broader level, where a whole project team was brought together in a meeting and was taught how to handle problems within the team.

Improvement initiatives were found in all cases. In one case, for example, an improvement initiative was the rearrangement of an office to improve communication between employees, i.e. long-term focus. In another case the improvement initiative was based on the fact that a machine broke down and consequently a short-term solution was found to get the machine running.

Innovation initiatives were performed in all cases, as could be concluded from the interviews. During the observations, innovation initiatives were identified within three of the four cases. For example, in one of the cases the director was involved with the R&D activities, where the goal was to find new combinations of materials, to be able to develop new products. The role of the director was to provide innovation ideas and to support the R&D department to develop new products. Another example of an innovation initiative by a director was setting up a new business, based on a new service and new products.

Day-to-day management activities were found in all cases and can be characterised by activities that support the business to keep running, e.g. weekly meetings to keep track of performance, walk around through the organisation and shop floor and talking to employees to track performance.

Day-to-day problem solving activities were also found in all cases, e.g. solving problems initiated by employees calling by phone or walking by to ask for help, solving problems identified by the director during a walk over the shop floor and solving problems that were brought to the attention during daily meetings.

Each leadership activity was assessed on the different variables of responsiveness, i.e. entrainment, polychronicity, speed/pace, punctuality and temporal depth. Before presenting the results of the four case studies, an indication of the quality and richness of the data gathered, based on the methods and measures used described in the previous chapter and summarised in table 4.5, will be presented per variable. Parts of the data gathered will be shown in the next paragraphs, nevertheless, the total set of data can be requested from the author.

4.1.1. Entrainment

The action-response scheme, the activity scheme and records of conversations provided data about entrainment. For each activity it was noted (1) if the activity was proactive/reactive; (2) if the director was process or result focussed; (3) if the activity was urgent or not; and (4) if the activity was important or not. A sample of the data is provided in table 4.2. Besides, for each activity data was gathered about the location of the event/activity and the people involved, to be able to assess the responsiveness in terms of location and people involved.

Proactivity/reactivity and process/result-focussed were variables that could not always be measured on activity level, e.g. during meetings different actions are taken and different styles are used, and therefore need to be measured and analysed on interaction level. Interaction level refers to an interaction between two people, e.g. between the leader and the ‘sub-ordinate’.

Activity	Response type	Importance	Urgency	Activity type	Focus
1	Reactive/Proactive	Important	Urgent	Maintaining	Result/Process focussed
2	Reactive	Important	Urgent	Maintaining	Result focussed
3	Reactive	Important	Non-urgent	Maintaining	Result focussed
4	Proactive	Important	Non-urgent	Improving	Result focussed
5	Proactive	Important	Urgent	Improving	Result focussed
6	Proactive	Important	Non-urgent	Maintaining	Result focussed
7	Reactive	Important	Urgent	Maintaining	Result focussed
8	Reactive	Important	Non-urgent	Maintaining	Result focussed
9	Proactive	Important	Non-urgent	Maintaining	Result focussed
10	Proactive	Important	Non-urgent	Improving	Process focussed

Table 4.2: Sample of data about entrainment

4.1.2. Polychronicity

Polychronicity was measured by registering the amount of activities that are performed simultaneously, reciprocally or sequentially. Most activities were not suitable for performing

simultaneously with another activity. Still, it was noted when activities were interrupted by other activities and if the director saw this as disturbance.

4.1.3. Pace/Speed

Pace/Speed provides information about how many activities are performed per time period, how much time was used per activity and per interaction. Besides, the response time, i.e. the time between event and response, is known. In one case, for example, the director performed ten leadership activities: four activities responding to scheduled events, four activities responding to unscheduled events and two activities initiated by the director. For each activity the duration was measured, besides the response time was recorded, see table 4.3. Response time involves the time between an event and the corresponding activity.

Event			Response					
Event	Time	(Un)scheduled	Activity	Start Time	End Time	Duration	Response time	
1	09:00	Scheduled	1	09:00	09:42	0:42:00	0:00:00	
2	09:31	Unscheduled	2	09:45	09:54	0:09:00	0:14:00	
3	10:00	Scheduled	3	09:54	10:20	0:26:00	0:06:00	
4	10:30	Scheduled	4	10:38	11:07	0:29:00	0:08:00	
			5	11:17	11:28	0:11:00	-	
5	11:30	Scheduled	6	11:45	12:24	0:39:00	0:15:00	
6	12:45	Unscheduled	7	12:46	13:01	0:15:00	0:01:00	
			8	13:01	14:10	1:09:00	-	
7	14:15	Unscheduled	9	14:20	14:35	0:15:00	0:05:00	
8	14:30	Unscheduled	10	14:41	15:03	0:22:00	0:11:00	
						Average	0:27:42	0:08:34

Table 4.3: Sample of data about speed/pace

4.1.4. Punctuality

Punctuality provides information on how many times one was on time and in the case of being too late, how much time someone was too late. For example, in one case there were, in one day, four planned meetings, where three of the four meetings started later, respectively 3, 6, 6, and 16 minutes too late, see table 4.4. For another case, there were two planned meetings on one day, where the director was in time. However, the formal meeting started both times after 15 minutes talking about other (informal) things than was planned for. Therefore, in the end, both times the actual meeting started 15 minutes too late.

Activity	Planned start time	Planned end time	Planned duration	Start time	End time	Duration	Minutes over time	Duration over time
1	08:15	09:15	01:00	08:18	09:19	01:01	00:03	00:01
4	10:30	11:30	01:00	10:36	11:36	01:00	00:06	00:00
5	11:30	12:00	00:30	11:36	12:15	00:39	00:06	00:09
7	14:00	15:00	01:00	14:16	15:30	01:14	00:16	00:14
Average							00:07	00:06

Table 4.4: Sample of data about punctuality

4.1.5. Temporal depth

Temporal depth was measured based on conversation records and asking the director to what extend the past and future was taken into account when making a decision. However, this turned out not to be straightforward. One could measure if one did or did not take into account past or future activities/events/experience. However, the distance into the past considered was hard to measure. During the interviews, there was discussion about what should be taken into account; past activities or events related to the organisational, or also personal experiences. Besides, it was hard to exactly measure what distance into the past was considered when making decisions.

More could be said about the distance with respect to the future that was taken into account. Some activities were performed to ‘survive the day’, i.e. day-to-day management and day-to-day problem solving, others were based on a long-term vision, i.e. staff development, improvement initiatives and innovation initiatives. Therefore, the data gathered could provide insight in how many times a short, day-to-day, time frame and how many times a long time frame was considered. For example, in one case, from the six leadership activities performed on one day, for four activities the leader considered a long time frame, i.e. a time frame of more than a year, and for two activities the leader considered a short time frame. Still, this result is based on the perception of the director and the perception of the observer; consequently it is not objective.

4.2. Results

The previous described variables and measures were assessed based on the measurability and analysability. These criteria are based on the goal of this research: the development of a tool, which measures and analysis responsiveness in a short time frame, real-time, to get more insight in the responsiveness of the leader. First, the assessment criteria that are used to assess the variables are described; second, the variables are assessed based on these criteria.

4.2.1. Assessment criteria

The main criteria were already determined in the literature review, namely the measurability and the analysability of the variables. These criteria are divided in sub-criteria, which will be described below. These sub-criteria are set based on the requirements of the tool, set in the literature review.

The measurability represents a couple of sub-criteria, which are:

- *Real-time measurement.* Real-time measurement tells if it is possible to measure the variables while the leader is doing his or her work. A variable is not measurable real-time when data can only be collected before and/or after an activity or event is performed. The outcome of this criterion can either be yes or no.
- *Time frame.* Time frame provides information about the minimal duration of the measurement to get the data. The outcome of this criterion will be a certain period of time, e.g. the duration of an activity, a day, a week, a month, etc.
- *Objectivity.* Objectivity represents if the data can or cannot be biased by the person who collected the data. The outcome of this criterion can either be yes or no.
- *Reproducibility.* Reproducibility refers to the ability to reproduce the data gathered by someone else, independently. If one can interpret the measures in several ways, the reproducibility will be low. The outcome is based on a 5-point scale ranging from low reproducibility (1) to high reproducibility (5).

The analysability represents a couple of sub-criteria, which are:

- *Complexity.* Complexity represents both the time and effort needed to analyse the data, relatively. The outcome is based on a 5-point scale ranging from low complexity (1) to high complexity (5).
- *Ambiguity.* Ambiguity refers to how many different ways data can be interpreted and the amount of discussion that can be held about this interpretation. The outcome is based on a 5-point scale ranging from low ambiguity (1) to high ambiguity (5).

The results are summarised in table 4.5 and will be explained in more detail in the paragraphs below.

4.2.2. Entrainment

Both activity dependence and proactivity/reactivity can be measured real-time and are objective. To be able to measure activity dependence, multiple activities should be measured

and analysed to find a relationship between activities. Therefore, the complexity of analysing the data is relatively high.

The urgency and importance of activities, and the process/result focus of leadership are measures that are subjective, i.e. influenced by the bias of the one that inserts the data, since it is the perception of importance, urgency and focus that influences the outcome. However, the data can be collected in a short time frame and after each performance, close to real-time measurement.

The reproducibility of analysis is for all aspects of entrainment high, except for the aspect about process/result-focussed leadership measured by audio recordings. The reproducibility is relatively low; two different people could interpret the audio records differently and therefore come to different outcomes. Besides, the audio recordings take a lot of time and effort to analyse, since it needs to be transcribed, coded et cetera, and therefore the complexity of analysis is high.

4.2.3. Polychronicity

Polychronicity is measured using activity log. In this way, the polychronicity, i.e. if or if not more than one activity is performed simultaneously, could be measured real time. The data gathered is objective, due to the fact that two independent persons will come to the same outcome. Besides, the complexity of the analysis is low and the reproducibility is high. The minimal measurement period for polychronicity is found to be approximately a day.

4.2.4. Pace/Speed

Pace and speed are measured by activity logs and event-response schemes. The results from these methods are objective, i.e. one could not perform a discussion about the result, and the data, i.e. time, can be measured real-time. The response time could be measured when setting a measurement period wherein an event and related activity take place. The measurement period of the amount of activities performed depends on what the user would like to know, however, based on the observations, this period should be at least a morning or afternoon, i.e. half a working day. The analysability of pace/speed is high, due to the fact that for each aspect of pace/speed the complexity is low and the reproducibility high.

4.2.5. Punctuality

During the observations, there was no discussion about if one was on time or not on time. Therefore, the data gathered is objective, the complexity of analysis is low and the reproducibility high. The measurement period depends on the amount of planned activities per day, week, et cetera. More than one planned activity should be measured to provide a judgement about the punctuality of someone.

4.2.6. Temporal depth

Temporal depth was not measurable real-time, and also not objective, since temporal depth can be interpreted in several ways.

Besides, the complexity of analysis is high and the reproducibility is low, because of the lack of clarity about what should be taken into account. As already mentioned in paragraph 5.1.5, discussion arose during the observations about what should be taken into account when deciding on the distance into past and future that should be considered. Based on this discussion, the measurement period should be longer than one day, week or month, since temporal depth also includes past experiences.

Variable	Method	Measurability			Analysability	
		Real Time Measurement	Measurement period	Objective	Complexity	Reproducibility
Entrainment						
- Activity dependence	Activity log	Yes	Duration of multiple activities	Yes	3	5
- Proactive/Reactive/Neglect	Event-Response scheme	Yes	Time space between Event and Activity	Yes	1	5
	Activity scheme	No*	Duration of interaction	No	1	5
- Process/Result focus	Audio recording	No	Duration of interaction	Yes	4	3
	Activity scheme	No*	Duration of interaction	No	1	5
- Urgency of activity	Activity scheme	No*	Duration of activity	No	1	5
- Importance of activity	Activity scheme	No*	Duration of activity	No	1	5
Polychronicity						
- Amount of activities performed simultaneously	Activity log	Yes	Day	Yes	1	5
Pace/Speed						
- Response time	Event-Response scheme	Yes	Time space between Event and Activity	Yes	1	5
- Amount of activities performed	Activity log	Yes	Half a working day	Yes	1	5
- Time per activity	Activity log/Stopwatch	Yes	Duration of activity	Yes	1	5
Punctuality						
- Being on time	Activity log	Yes	Working day	Yes	1	5
	Event-Response scheme	Yes	Working day	Yes	1	5
Temporal depth						
- Extend of past, future taken into account	Recording conversations/ask	No	Duration of multiple activities and past experiences	No	4	2

Table 4.5: Measurability and analysability of variables

(No* = measurable after each performed activity, not real-time)

5. DISCUSSION

Leadership is one of the most critical success factors within the implementation of organisational improvement (Ghobadian & Gallear 1996; Antony et al. 2005; Achanga et al. 2006; Suri 1998; Kumar et al. 2011). Due to the fast changing organisational environment, responsiveness of organisations has become necessary to survive. Therefore, there is a need to get more insight in the responsiveness of leaders.

Various studies have sought to identify the variables that are concerned with time-related aspects of leadership. Bluedorn and Jaussi (2008) put those together to five variables of responsive leadership, i.e. entrainment, polychronicity, pace/speed, punctuality and temporal depth. However, how those variables should be measured is not clear from literature and was investigated in this research. Concluded from the literature search, little research is performed about the measurement and analysis of real-time leadership behaviour. Consequently, the purpose of this research, based on a multiple-case and design study, is to develop diagnostic tools to measure and analyse actual responsive leadership to support the successful implementation of improvement approaches.

The aim of this discussion is to decide which variables should be included in the design of the tool. Therefore, each of the variables described in the previous chapters will be critically discussed. The main objective is to select those methods, which relatively do not take a lot of effort and time, while delivering relatively rich insights in the responsiveness of a leader.

5.1. Entrainment

Entrainment was one of the aspects that could be measured in a short time frame, and could be measured close to real-time. Besides, the analysability is not complex and is reproducible. The main disadvantage of entrainment is the subjectivity of the variable. The objectivity is lower compared to the other variables, since the definition of importance, urgency, proactive/reactive and process/result focussed is different for everyone, confirmed during the observations by the directors, therefore, the variables could be interpreted in different ways. Besides, if one would self-assess on these variables, it is easy to manipulate results. One could easily choose for what he or she thinks would be the desired outcome instead of what would be the actual outcome. Taking this into account, it might not be relevant to measure the variables. On the other hand, entrainment is not personal bound, but situation and context bound. Consequently, this variable should be measured real-time. Therefore, the entrainment

is included in the design, knowing the results on entrainment for the user of the tool depend on the quality of the input by the user.

To be more specific, the aspects importance, urgency and proactive/reactive are included in the design; process/result focused is excluded, since this does not only involve the director, but also the recipient of the response. It is not only about how the leader thinks he is perceived by his or her 'sub-ordinates', it is also about how his or her 'sub-ordinates' experience it. Either way, both the self-assessment by the leader and the assessment of the 'sub-ordinate' about the leader should be included in the diagnosis, which is too complex to include in the design of the tool.

5.2. Polychronicity

Polychronicity has all desirable outcomes, i.e. high measurability and high analysability. Based on these results, it is quite obvious to include this variable in the design of the tool. However, it turned out, based on the results gathered during the observations, that if someone prefers to either perform multiple activities simultaneously or one thing at the time, this preference will apply to any activity or situation. There were situations where one did not perform more than one activity simultaneously; nevertheless, the preference was still there. Therefore, these results should be interpreted as a particular person being either polychronic or monochronic, i.e. preferring to be engaged in one task or event simultaneously.

This finding is in line with the findings of Kaufman-Scarborough and Lindquist (1999). Their conclusion from their research is that polychronicity is not only person dependent, but also gender dependent; women generally are polychronic and men monochronic. It is not necessary to measure polychronicity real-time, since it will be the same in every moment of time. However, since polychronicity does influence responsiveness, it should not be eliminated from the measurement. An appropriate tool to measure polychronicity is the Inventory of Polychronic Values (IPV), which is approved as a valid and reliable measure of polychronicity by Bluedorn, Kalliath, Strube, and Martin (1999).

5.3. Pace/Speed

Pace/Speed is a variable, which is quite straightforward to use. For each activity and event, the start time and the duration is measured to provide insight in the speed of response and speed of performing activities. These measures are objective, have a short minimal measurement period, can be measured real-time, have a low complexity and a high

reproducibility. It should be taken into account that speed focuses on the efficiency; still it does not provide insights in the effectiveness. Hence, increasing speed by increasing efficiency does not automatically increase the quality and effectiveness of the activity.

5.4. Punctuality

For punctuality, the interpretation of the data is similar to pace/speed, see paragraph 5.3. Therefore, this variable will also be included in the design of the tool. Still, one should be aware of the fact that being on time at a planned activity still not refers to being punctual. To provide an example; during one of the observations of a meeting everyone was present at the agreed time. The meeting was predefined by an agenda of the meeting. Nevertheless, discussing the agenda items started after a quarter talking about non-business matters. As a result, the actual punctuality is not optimal. Therefore, it is important to be aware that the actual time someone is present is different from the actual time someone starts with the scheduled event.

During the four case studies no discussion was held about the social definition of being on time, while according to the definition, punctuality depends on the social definition of being on time, which differs per event and per country (Bluedorn & Jaussi 2008). This could be explained by the fact that the four companies are all located in the same country, the Netherlands. Besides, they are all concerned with implementing Lean and QRM, which require similar cultures and therefore it can be expected they have similar definitions of being on time.

5.5. Temporal depth

Temporal depth was relatively hard to measure during the time frame, two days, of observation. Based on the results of this research, this is caused by the fact that temporal depth cannot be measured real-time. This is result of temporal depth needing a relatively long measurement period, covering personal and business experience and activities of the leader.

Temporal depth tends to be complex, due to the fact that executives turn out to work with multiple temporal depths rather than one (Judge & Spitzfaden 1995). Furthermore, it is found that the context of a leader, including factors from both inside and outside the organisation of a leader, might significantly affect the leader's temporal depth (Bluedorn & Jaussi 2008; Bluedorn & Ferris 2004). The measurement period is not feasible with regard to the short period aimed for in the diagnostic tool. Consequently, the analysis of the data is complex and

hard to reproduce. Based on these findings, temporal depth will not be included in the design of the diagnostic tool.

5.6. Complementary aspects to consider

Till this point, all variables were described being independent from each other. Nevertheless, based on the interpretation of the data from the observations, some of the variables are expected to influence each other. Entrainment, in particular the sub-variables importance and urgency of activities, might influence the speed and punctuality. Besides, the location of the director per activity was registered and the people involved per activity. It occurred in one of the cases that the leader was more proactive and improving during meetings in the office, while more reactive and maintaining during visiting the job floor. Nevertheless, no explicit conclusions could be drawn about these two aspects, since there is no statistical proof regarding the relationships between variables. It would be useful to keep these expected relations in mind, to gather data about these variables using the tool and to analyse these data statistically. It should be taken into account that the sample should be big enough to draw conclusions.

5.7. Conclusion

The variables that should be measured by real-time measurement are entrainment (excluding process/result focussed), speed/pace and punctuality, see table 5.1. These variables will be included in the design of the tool in the next chapter. Besides, the next chapter will select the technology and platform to be used for the tool.

Variable	Method
Entrainment	
- Activity dependence	Activity log
- Proactive/Reactive/Neglect	Event-Response scheme
	Activity scheme
- Urgency of activity	Activity scheme
- Importance of activity	Activity scheme
Pace/Speed	
- Response time	Event-Response scheme
- Amount of activities performed	Activity log
- Time per activity	Activity log/Stopwatch
Punctuality	
- Being on time	Activity log
	Event-Response scheme

Table 5.1: Variables and methods to be included in the design

6. DESIGN

The outcomes of the multiple-case study, discussed in the previous chapter, were used in the design study to develop tools to diagnose responsive leadership in practice. The design study normally contains three phases: design solution, implementation and validation, see figure 3.1. Due to time limitations the design solution was validated without implementing the tools in practice. Instead, a demonstration was given, see figure 6.1. These stages will be described in this chapter, followed with a paragraph about the future data analysis possibilities.

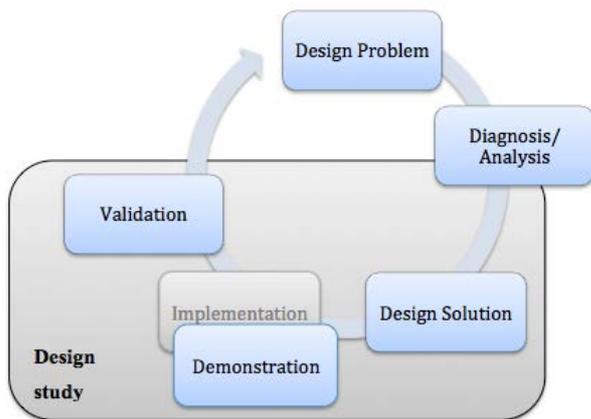


Figure 6.1. Performed steps during the design study (based on Van Strien, 1997)

6.1. Design solution

As stated in the literature review, the technologies to be used for the tools should support measuring responsiveness and collecting data at the same time. The tools should be made of technologies already used by the leaders to support their leadership. Based on the technologies that were used by the directors during the multiple-case study, see table 6.1, it was decided to design a native application, which can be used both on a mobile device and a personal computer.

Device/Technology	Case 1	Case 2	Case 3	Case 4
Smartphone	V	V	V	V
- Calendar	V	V	V	V
- E-mail	V	V	V	V
- ERP-system		V		
Personal computer	V	V	V	V
- Calendar	V	V	V	V
- E-mail	V	V	V	V
- ERP-system		V	V	V
Ipad/Tablet	V	V		V
- Calendar	V	V		V
- E-mail	V	V		V

Table 6.1: Devices and technologies to support leadership

A native application was chosen over a mobile website, since a native application is more suitable for real-time data collection, interactive usage, regular usage, complex calculations and reporting. Besides, for the usage of a native application no connection with the Internet is needed (Fling 2009).

The first design of the native application is visually represented in figure 6.1, showing the clickstream within the application. This design will be explained in more detail below.

Basically, the application has three basic functions, collect data real-time, store data and represent data in graphs and models. The interface of the native application consists of five tabs, namely (1) getting started; (2) primary data insert; (3) monitor; (4) results; and (5) background information, see figure 6.2 (a). Getting started provides the user instructions and has a direct link to the primary data insert. The primary data insert requires the user to insert the activities he or she generally performs, the people who are involved in these activities and the events that normally happen during work, see figure 6.2 (b) and (c). The inserted data will be saved in a database. Besides, the user is asked to put GPS on and to insert his or her digital calendar.

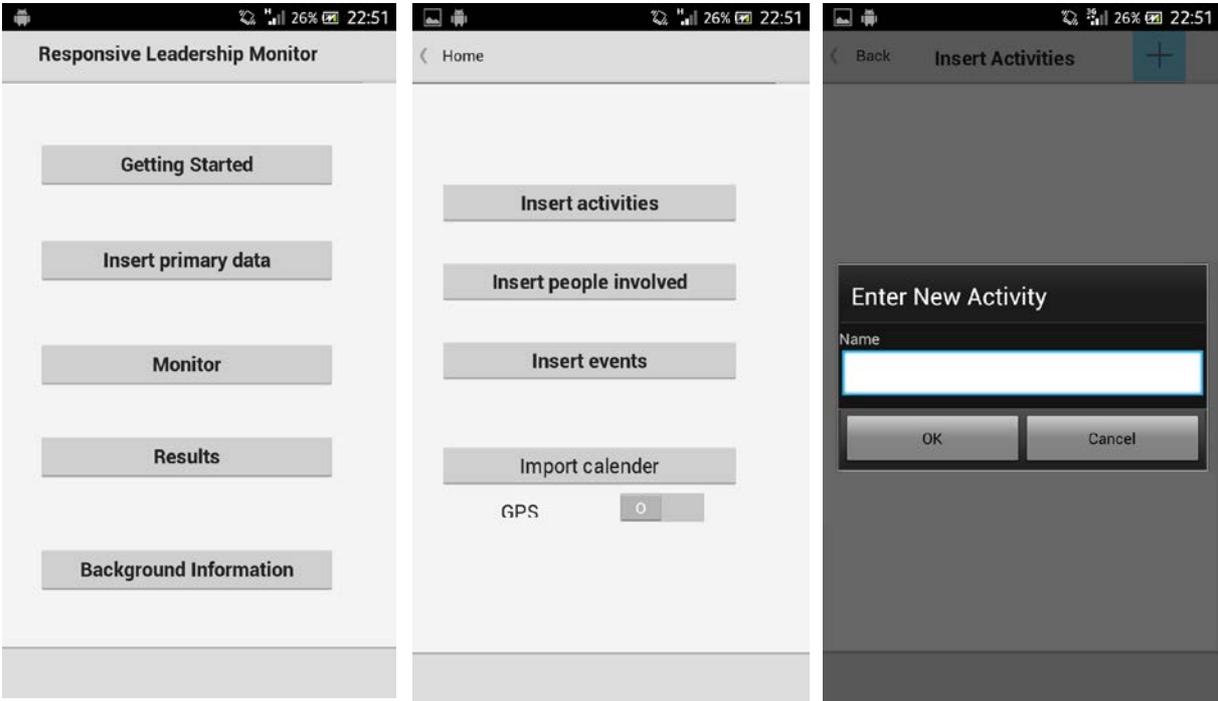


Figure 6.2 (a) Home page (b) Insert primary data overview (c) Insert page

The monitor is the actual measurement tool, which asks the user to register both events and activities, see figure 6.3. For each event that happens is asked to select the event, select who was involved and the time of the event. For each activity is asked to select the activity, the

related event and the people that are involved. Besides, for each activity the start and end time is registered, duration is recorded (speed/pace) and this is compared to planned activities (punctuality). After the activity is performed, the user is asked to finish the data collection about that particular activity by filling in the type of response, the type of activity and the importance and urgency of the activity (entrainment). The gathered data will be stored in a database.

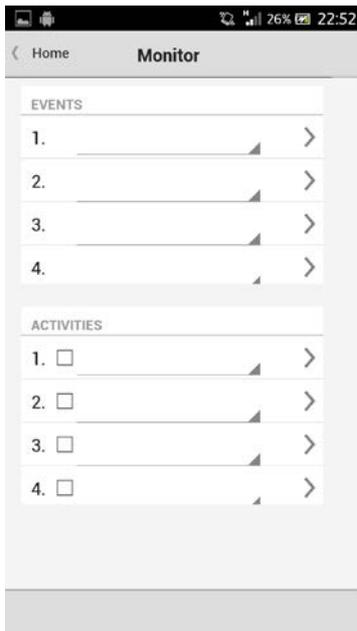


Figure 6.3: Monitor

The results tab represents the data gathered. Based on the data gathered, a diagnosis will be given about the entrainment, speed/pace and punctuality of the user. The background information tab provides the user with information about what to do when something does not work, who to ask for help, etc.

The above-described design is the first step in validating a native application. This shows the type of input needed and the user interface, but does not yet provide the functionality of measuring, analysing, and providing feedback. This concept of design allows the user to get a feeling with what is required for him or her to do, how much time it would take, how convenient the steps are that need to be accomplished, et cetera. It provides insight in the usability, user friendliness, functionality and how the variables will be monitored. These aspects will be analysed in the next paragraph based on a performed validation.

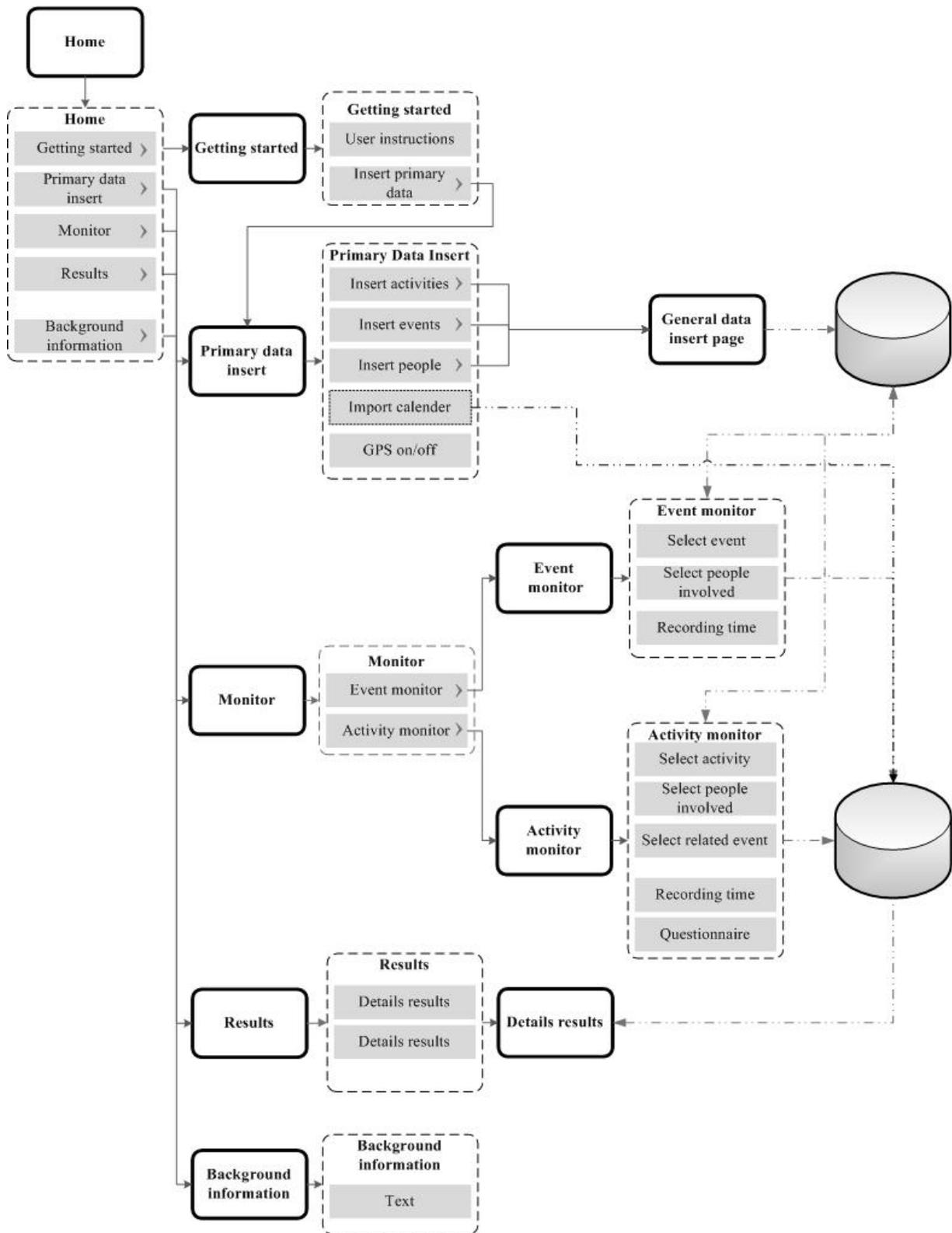


Figure 6.4: Design of the native application before validation

6.2. Validation

To validate the design, the tool was demonstrated to three people, separately, and assessed from three perspectives: (1) by a director who was involved in the multiple-case study; (2) by a director who was not involved in the multiple-case study; and (3) by an expert in measurement instruments. The first perspective was chosen to validate if the tool works in a context, which is already observed and taken into account in the tool (internal validity). The second perspective was chosen to validate the tool in a context, which has not been observed (external validity), and therefore could lead to new insights (Karlsson 2009). The expert perspective was chosen to get a critical view on all aspects of the diagnostic tool. The three perspectives together are expected to provide a thorough evaluation of the diagnostic tool.

The design was demonstrated to the validators, besides they were able to use the application themselves, to get the feeling how the application works and what should be improved (Pfeffers et al. 2007). The goal of validation was to get insight in how well the instrument supports the measurement and analysis of the variables of responsive leadership. Each variable was assessed on its functionality, accuracy and reliability. Besides, the overall expected performance, functionality, usability/relevance, fit with the user environment and time usage was assessed. These criteria were appropriate for this research, since they are validated for the evaluation of information systems by Hevner, March, Park and Ram (2004).

The two aspects evaluated, (1) the diagnostic tool in general, see table 6.2; and (2) the variables used in the tool, see table 6.3, will be discussed in detail below. The outcomes of both evaluations are based on a 5-point scale ranging from low (1) to high (5).

Assessment criteria	Evaluator 1	Evaluator 2	Evaluator 3	Average
Functionality	5	5	5	5
Fit with user environment	5	3	4	4
Usability	4	3	3	3
Time usage	3	3	3	3

Table 6.2: Assessment of the diagnostic tool

The functionality of the tool was assessed being high. The evaluators judged the tool being useful to get more insights, in the form of a diagnosis, in responsive leadership, as well as supporting the development of leadership responsiveness over time. The type of insights gathered is evaluated being relevant to the user. The tool would only be functional for people

who are willing to assess their own responsive leadership and want to improve it. Using the tool for other purposes would not be useful.

The tool fits in the environment based on the fact that the tool was designed for multiple devices, i.e. the mobile phone and the personal computer. One of the evaluators saw this as a requirement, since he uses both in performing his work and the one could not supplement the other. The evaluators were able to use native applications and were used to use native applications. It is not possible to generalise this finding to the broader user-audience, never the less, this assumption is validated until now.

Each of the evaluators struggled with the amount of actions that have to be taken to collect the data needed. They were aware of the fact that it would need some time to collect the data about activities and events performed. The main cause of their struggle was the missing overview of events and activities already performed and how these were related to each other. The evaluators, independently, came to the idea to include a time line to provide the overview they needed to reduce the usage complexity and time needed to fill in. Therefore, the usability and the time usage of the tool could be improved.

Overall, the tool was assessed being useful, functional and fitting into the user environment. One aspect that should be improved is the amount of actions that should be performed by the user, by simplifying the monitor function. Based on the input from the evaluators, the design of the tool is adjusted, see figure 6.3. The main difference is the link between the calendar and inserting the data. Besides, instead of background information, a help function was included, which should provide a Q&A to give the user basic help. An improvement that should be made is linking the events with the activities physically, for example by using a time line or using tags. In this way, it is easier for the user to get insights in which events and activities are related and how these are distributed over time. At the moment, the user sees a list of events and activities and is not able to see how these are connected and how the working day looked like, in terms of a calendar or timeline.

The second part of the evaluation is about the variables included in the design. All variables were assessed having high functionality and therefore relevant to measure and for the user useful to get feedback on. Consequently, none of the variables will be excluded from the tool.

Assessment Criteria per Variable	Assessment
Entrainment	
- Functionality	5
- Accuracy	3
- Reliability	4
Speed/Pace	
- Functionality	5
- Accuracy	4
- Reliability	5
Punctuality	
- Functionality	5
- Accuracy	4
- Reliability	5

Table 6.3: Assessment of the responsiveness variables

As already discussed in the previous chapter, entrainment is included in the design of the tool, knowing the objectivity of the measures is low. The evaluators also confirmed this disadvantage as well as the relevance of measuring and analysing entrainment. Therefore, the conclusion remains the same: entrainment is not an objective measure, but it is relevant and therefore should not be excluded from the tool.

Not only measuring entrainment per activity, but also measuring it per interaction could improve the diagnosis about entrainment. For some activities, e.g. meetings, different responses are required, since more than one event occurs, e.g. during a meeting different topics are discussed. For this type of activities, where multiple interactions occur in one activity, it would be relevant to zoom in on interactions and measure entrainment on interaction level.

Both punctuality and speed/pace are assessed being functional, accurate and reliable. The accuracy depends on the usage of the tool. If the start and end time of every event and activity is inserted correctly, then the data gathered is accurate automatically. One of the functionalities of speed/pace is to provide insight in how much time is spent on particular types of activities.

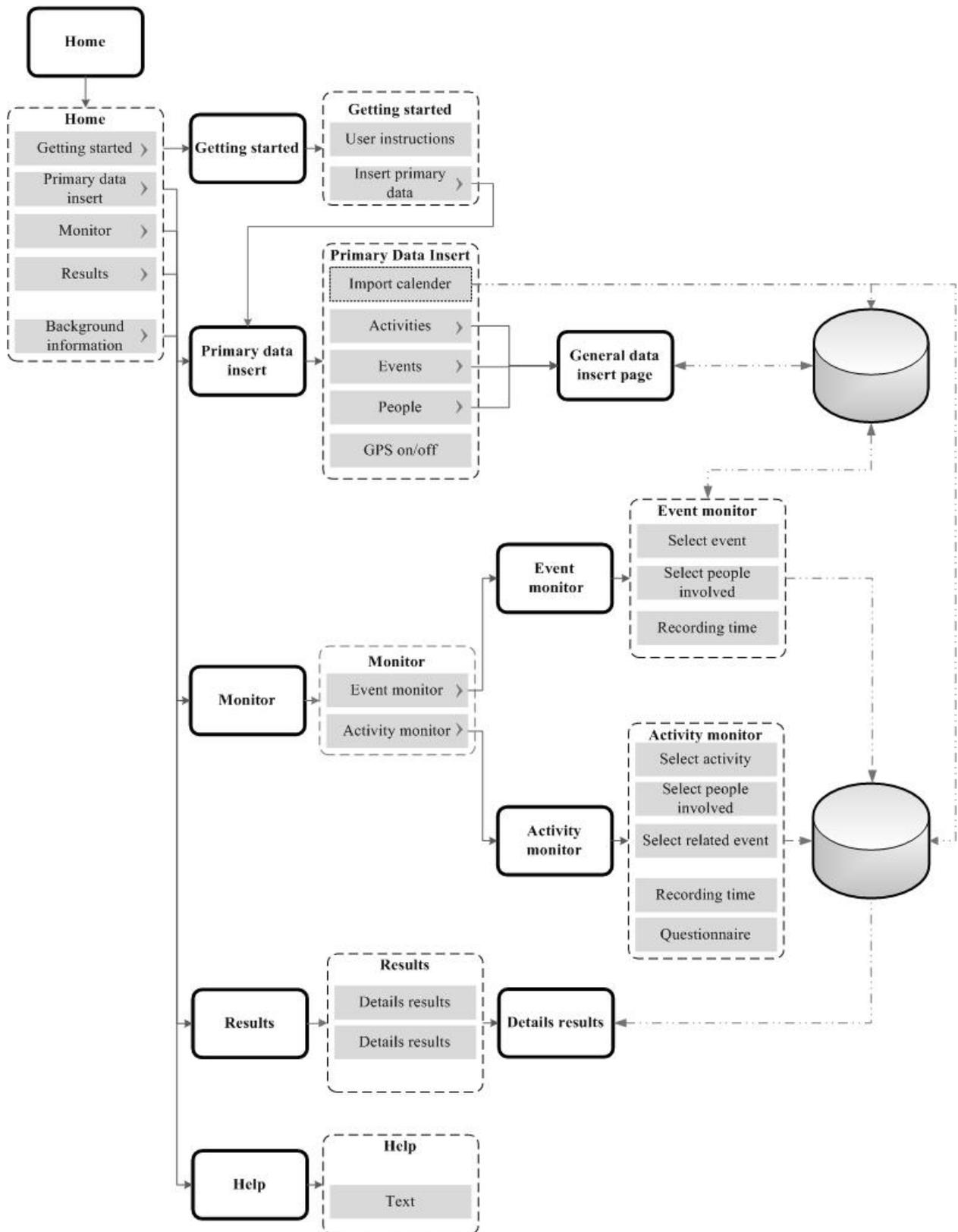


Figure 6.5: Design of the native application after validation

6.3. Design of data analysis

This paragraph will describe what analysis should be performed with the data that could be collected with the native application. As described before, the tool measures three out of the five variables of responsiveness, namely entrainment, pace/speed and punctuality. One main requirement that applies for all variables is that enough data should be collected to perform an analysis and to draw relevant conclusions from this analysis. For each of the three variables the analysis that could be performed and the conclusion that could be drawn from the analysis will be described. Based on the conclusions of these three variables a final conclusion could be drawn about the responsiveness of a leader.

6.3.1. Entrainment

Entrainment is measured by categorising activities based on their importance, urgency and their proactivity/reactivity. Besides, patterns might be detected based on the dependence between activities. Based on the categorisation, insights are gathered about how much of his or her time a leader is improving or maintaining processes, is proactive or reactive, performs urgent/important, non-urgent/non-important activities. It might be concluded that this is unbalanced or not according to the goals of the leader’s company. These results could be visually represented in quadrants, demonstrating this balance/unbalance, see figure 6.6.

	URGENT	NOT URGENT		REACTIVE	PROACTIVE
IMPORTANT			MAINTAINING		
NOT IMPORTANT			IMPROVING		

Figure 6.6: (a) Covey quadrant (b) reactive/proactive vs improving/maintaining quadrant

Moreover, a relation might be found between the type of activities and the importance, urgency and proactivity/reactivity of activities. Based on these patterns and relationships, conclusions could be drawn about entrainment.

6.3.2. Pace/Speed

Pace/speed is divided in (1) response time; (2) the amount of activities performed; and (3) the time spent per activity. Based on these three elements a conclusion about speed/pace could be drawn. Response time should be analysed based on distracting the start time of the activity from the start time of the event related to the activity. The amount of activities performed and the time spent per activity speak for themselves. The time per activity could also be combined with the information on punctuality and entrainment per activity, as discussed in the paragraph 6.3.1 and 6.3.3. From this analysis can be concluded how fast someone reacts, how much time is spent per activity and how much activities are performed per day. Moreover, this might give insights in how time could be saved and which activities could be performed faster.

6.3.3. Punctuality

For punctuality, data is collected based on the timing of activities compared with their planned start time and end time. Based on the data gathered, an analysis could be performed that describes how many times someone was to late with starting planned activities and how much time he or she started to late. Moreover, one should be aware of the fact that being on time at a planned activity still not directly refers to being punctual, as discussed in paragraph 5.5. This could be represented using the original calendar, which includes all planned activities and deadlines. The actual activities should be included in this original calendar to show how much activities do overlap and to show when activities do or do not overlap.

Punctuality could differ per type of activity or depending on people involved, i.e. one might be always in time when meeting external relations, while not being on time when meeting his or her own employees. These patterns should be analysed. From this analysis it could be concluded (1) if in general the leader is punctual or not; (2) when he or she is punctual; and (3) if he or she needs to improve punctuality.

7. CONCLUSION

Returning to the main objective of this research, the most important result of this research is the fact that it is possible to provide a diagnosis about the responsiveness of leaders using the designed tool.

In answer to the first objective of this research, there are several critical elements found in practice, concerning responsive leadership. The five variables, i.e. entrainment, polychronicity, speed/pace, punctuality and temporal depth, found in literature are all present in practice. Besides, two other aspects were found that might have indirect influence on responsiveness, namely the location of performing activities and people involved. The variables are related to each other, since the sum of variables provides insight in responsiveness of leaders. Furthermore, those elements are expected to be interdependent. This interdependence can be shown for a couple of cases and is internally validated; nevertheless, it lacks external validity.

To answer the second research objective on how to measure and analyse the critical elements, this paragraph refers to table 4.5, which provides an overview of variables and methods used. In the end, the designed tool is able to measure and analyse three out of five variables found in literature, i.e. entrainment, speed/pace and punctuality, and two found in practice, i.e. location and people involved. The two variables excluded from the tool, polychronicity and temporal depth, turned out to be more personal bound and can not be measured in a short period of time. Thus, those variables, especially temporal depth, were not feasible to measure during the short time period the diagnostic tool is supposed to measure. An alternative for measuring polychronicity would be to Inventory of Polychronic Values (IPV), which is approved as a valid and reliable measure of polychronicity by Bluedorn et al. (1999). An alternative for temporal depth still needs to be found.

The actual time frame of measurement by the tool cannot be stated based on the findings of this research. Nevertheless, it is known that those variables can be measured on activity level and therefore it is expected that one week of measurement would provide a realistic dataset.

In answer to the last research objective, the technology used for the diagnostic tool is a native application to be used on a mobile device or personal computer. The native application is able to use technologies like GPS, stopwatch, data storage, etc.

7.1. Theoretical and managerial implications

This research was initiated by both a theoretical and practical need. Respectively, the need for the operationalisation of the variables of responsiveness defined by Bluedorn and Jaussi (2008) and the need for the diagnosis and development of responsive leadership (QRM Centre, 2012). One of the theoretical implications of this research is the insight this research provides in how the variables of responsiveness should be measured and analysed. Furthermore, the use of the diagnostic tool designed and the collection of data could lead to new insights about responsive leadership and therefore expand the knowledge about this subject. The main managerial implication of this research is that, with the use of the design tool, leaders in practice would be able to get a diagnosis about their leadership, requiring little time, skills and resources. Consequently, this provides a better starting point for leadership development, suitable for SMEs.

7.2. Limitations

Although a diagnostic tool could be designed as a result of this research, there are several limitations to the research. The first limitation is the sample of the observations. Four cases were each observed for two days. This sample is too small to statistically test the quality of the variables. This impacts the construct validity, since it is not statistically proven that the correct operation measures for the concepts were used. Besides, due to the small sample, the results from the individual cases could not be generalised and therefore this impacts the external validity of the case research. The second limitation is related to the time frame in which the observations were performed. All took place within one month. Therefore, it might be that some aspects of responsiveness were not observed, while they are actually there. During the interviews, the data gathered from the observations were verified, including the aspects of responsiveness. Still, there might be aspects of responsiveness that are less easy to detect and therefore less obvious elements of responsiveness might be overlooked during the observations and the interviews.

The third limitation is related to the design study performed. Due to the time limitations, the design was not implemented, but demonstrated. Consequently, the tool did not collect data; therefore, no conclusions can be made about the quality of the output of the diagnostic tool. Moreover, the quality output of the multiple-case study influenced the quality of the input of the design study and consequently the output of the design study.

7.3. Recommendations for further research

Based on the results and conclusions of this research, two main recommendations can be provided for further research. First, the main limitation of this research was the inability to statistically prove the relationship between variables and the effect on responsiveness. Besides, this research assumed all variables representing responsiveness to have equal weights of influence. A statistical validation of the measures would strengthen the conclusions about responsiveness of leaders. Consequently, this might improve the quality of diagnosis about responsive leadership. Second, this research could be expanded by not only putting emphasis on quantity related measures (as done in this research), but also on measuring the quality of actions, i.e. taking the quality and impact of decisions made into account. Based on these measures, a diagnosis could be given about both the responsiveness and the quality of response. The Cynefin Framework of Snowden and Boone (2007) might be useful here. Both expansions to this research would improve our understanding about responsive leadership and would contribute to theory and practice.

REFERENCES

- Achanga, P. et al., 2006. Critical success factors for lean implementation within SMEs. *Journal of Manufacturing Technology Management*, 17(4), pp.460–471.
- Alban-Metcalfe, J.. & Alimo-Metcalfe, B., 2013. Reliability and validity of the “leadership competencies and engaging leadership scale.” *International Journal of Public Sector Management*, 26(1), pp.56–73.
- Allio, R.J., 2005. Leadership development: Teaching versus learning. *Management Decision*, 43(7-8), pp.1071–1077.
- Ancona, D. & Chong, C.L., 1996. Entrainment: Pace, cycle, and rhythm in organizational behavior. *Research in Organizational Behavior*, 18, pp.251–284.
- Ancona, D.G. et al., 2001. Time: A New Research Lens. *The Academy of Management Review*, 26(4), pp.645–663.
- Andersson, M. a. et al., 2008. Reporting leaders and followers among trajectories of moving point objects. *GeoInformatica*, 12(4), pp.497–528.
- Andersson, M. a. et al., 2007. Reporting leadership patterns among trajectories. In *Proceedings of the ACM Symposium on Applied Computing*. Seoul, pp. 3–7.
- Ann, C.. & Carr, A.N., 2011. Inside outside leadership development: Coaching and storytelling potential. *Journal of Management Development*, 30(3), pp.297–310.
- Antony, J., Kumar, M. & Madu, C.N., 2005. Six sigma in small- and medium-sized UK manufacturing enterprises: Some empirical observations. *International Journal of Quality & Reliability Management*, 22(8), pp.860–874.
- Bartone, P.T.. et al., 2009. Big five personality factors, hardiness, and social judgment as predictors of leader performance. *Leadership and Organization Development Journal*, 30(6), pp.498–521.
- Blackman, A., 2010. Coaching as a leadership development tool for teachers. *Professional Development in Education*, 36(3), pp.421–441.

- Bluedorn, A.C. et al., 1999. Polychronicity and the Inventory of Polychronic Values (IPV): The development of an instrument to measure a fundamental dimension of organizational culture. *Journal of Managerial Psychology*, 14(3), pp.205–230.
- Bluedorn, A.C., 2002. *The human organization of time: Temporal realities and experience*, Stanford, CA: Stanford University Press.
- Bluedorn, A.C. & Ferris, S.P., 2004. Temporal depth, age, and organizational performance. In C. F. Epstein & A. L. Kalleberg, eds. *Fighting for time: Shifting boundaries of work and social life*. New York: Russell Sage Foundation, pp. 113–149.
- Bluedorn, A.C. & Jaussi, K.S., 2008. Leaders, followers, and time. *The Leadership Quarterly*, 19(6), pp.654–668.
- Covey, S.R., 1989. *The seven habits of highly effective people*, New York: Simon and Schuster.
- Covey, S.R., Merrill, A.R. & Merrill, R.R., 2003. *First things first*, New York: Free Press.
- Darr, W.. & Catano, V.M., 2008. Multisource assessments of behavioral competencies and selection interview performance. *International Journal of Selection and Assessment*, 16(1), pp.68–72.
- Demask, M.P., O'Mara, E.M. & Walker, C., 2009. Validity and reliability of the group leadership effectiveness scale assessing group leader skills. *Journal of Teaching in the Addictions*, 8(1-2), pp.3–9.
- Drew, G., 2009. A “360” degree view for individual leadership development. *Journal of Management Development*, 28(7), pp.581–592.
- Edmonson, A.C. & McManus, S.E., 2007. Methodological fit in management field study. *Academy of Management Review*, 32(4), pp.1155–1179.
- Erve, M. van der, 2004. Temporal leadership. *European Business Review*, 16(6), pp.605–617.
- Fling, B., 2009. *Mobile design and development: Practical concepts and techniques for creating mobile sites and Web apps.*, O'Reilly Media, Inc.

- Fulmer, R.M., Gibbs, P.A. & Goldsmith, M., 2001. Developing leaders: How winning companies keep on winning. *IEEE Engineering Management Review*, 29(2), pp.67–75.
- Gagnon, S., Vough, H.C.. & Nickerson, R., 2012. Learning to Lead, Unscripted: Developing Affiliative Leadership Through Improvisational Theatre. *Human Resource Development Review*, 11(3), pp.299–325.
- Gentry, W.A. & Leslie, J.B., 2007. Competencies for leadership development: What’s hot and what's not when assessing leadership-implications for organization development. *Organization Development Journal*, 25(1), pp.37–46.
- Ghobadian, A. & Gallear, D.N., 1996. Total Quality Management in SMEs. *Omega*, 24(1), pp.83–106.
- Goleman, D., 2000. Leadership that gets results. *Harvard Business Review*, 12(5), pp.78–90.
- Goodstein, L.D. & Lanyon, R.I., 1999. Applications of personality assessment to the workplace: A review. *Journal of Business and Psychology*, 13(3), pp.291–322.
- Gupta, a. K., Smith, K.G. & Shalley, C.E., 2006. The Interplay Between Exploration and Exploitation. *Academy of Management Journal*, 49(4), pp.693–706.
- Hafford-Letchfield, T.. b & Bourn, D., 2011. “How am i doing?”: Advancing management skills through the use of a multi-source feedback tool to enhance work-based learning on a post-qualifying post-graduate leadership and management programme. *Social Work Education*, 30(5), pp.497–511.
- He, Z.-L. & Wong, P.-K., 2004. Exploration vs. Exploitation: An Empirical Test of the Ambidexterity Hypothesis. *Organization Science*, 15(4), pp.481–494.
- Heinitz, K.. c, Liepmann, D.. & Felfe, J., 2005. Examining the factor structure of the MLQ: Recommendation for a reduced set of factors. *European Journal of Psychological Assessment*, 21(3), pp.182–190.
- Hevner, A.R. et al., 2004. Design Science in Information Systems Research. *MIS Quarterly*, 28(1), pp.75–105.

- Hinkin, T.R. & Schriesheim, C.A., 2008. A theoretical and empirical examination of the transactional and non-leadership dimensions of the Multifactor Leadership Questionnaire (MLQ). *Leadership Quarterly*, 19(5), pp.501–513.
- Hoe, S.L., 2011. Action learning: Reflections of a first-time coach. *Development and Learning in Organisations*, 25(3), pp.12–14.
- Imai, M., 2012. *Gemba Kaizen: a common sense approach to a continuous improvement strategy* second edi., USA: McGraw-Hill.
- Judge, W.Q. & Spitzfaden, M., 1995. The management of strategic time horizons within biotechnology firms: The impact of cognitive complexity on time horizon diversity. *Journal of Management Inquiry*, 4, pp.179–196.
- Karlsson, C., 2009. *Researching Operations Management*, New York: Taylor & Francis, Inc.
- Kaufman-Scarborough, C. & Lindquist, J.D., 1999. Time management and polychronicity. *Journal of Managerial Psychology*, 14(3), pp.288–312.
- Kazmi, S.A.Z. & Kinnunen, T., 2012. Deep leadership coaching effectiveness', in a corporate scenario, constitutes proactive leadership solution for 'optimal team formation': The best way to predict your future is to create it! - Abraham Lincoln. *European Journal of Social Sciences*, 31(2), pp.166–189.
- Kotter, J., 2001. What leaders really do. *IEEE Engineering Management Review*, 79(11), pp.85–98.
- Kumar, M., Antony, J. & Tiwari, M.K., 2011. Six Sigma implementation framework for SMEs – a roadmap to manage and sustain the change. *International Journal of Production Research*, 49(18), pp.5449–5467.
- Lauer, R.H., 1981. *Temporal man: The meaning and uses of social time*, New York: Praeger.
- Lee, J. et al., 2012. Development of Simulation for improving pre-principal's leadership skill. *Communications in Computer and Information Science*, 341 CCIS, pp.80–87.

- Leonard, H.S. b & Lang, F., 2010. Leadership development via action learning. *Advances in Developing Human Resources*, 12(2), pp.225–240.
- Levinthal, D.A. & March, J.G., 1993. The Myopia of Learning. *Strategic Management Journal*, 14, pp.95–112.
- Longenecker, C.O.. & Neubert, M.J., 2005. The practices of effective managerial coaches. *Business Horizons*, 48(6), pp.493–500.
- López, V. et al., 2012. School principals at their lonely work: Recording workday practices through ESM logs. *Computers and Education*, 58(1), pp.413–422.
- March, J.G., 1991. Exploration and exploitation in organizational learning. *Organization Science*, 2(1), pp.71–87.
- McDonald, S., 2005. Studying actions in context: a qualitative shadowing method for organizational research. *Qualitative Research*, 5(4), pp.455–473.
- Neider, L.L. & Schriesheim, C.A., 2011. The Authentic Leadership Inventory (ALI): Development and empirical tests. *Leadership Quarterly*, 22(6), pp.1146–1164.
- Papa, N., 2012. Advantages & Disadvantages of Self Assessment. Available at: http://www.ehow.com/list_6718905_advantages-disadvantages-self-assessment.html [Accessed November 19, 2013].
- Pfeffers, K. et al., 2007. A Design Science Research Methodology for Information Systems Research. *Journal of Management Information Systems*, 24(3), pp.45–77.
- Schriesheim, C.A., Wu, J.B. & Scandura, T.A., 2009. A meso measure? Examination of the levels of analysis of the Multifactor Leadership Questionnaire (MLQ). *Leadership Quarterly*, 20(4), pp.604–616.
- Shamir, B., 2011. Leadership takes time: Some implications of (not) taking time seriously in leadership research. *The Leadership Quarterly*, 22(2), pp.307–315.
- Smith, P.A.C.. b, 2001. Action Learning and Reflective Practice in Project Environments that are Related to Leadership Development. *Management Learning*, 32(1), pp.31–48.

- Snowden, D.J. & Boone, M.E., 2007. A Leader's Framework for Decision Making. *Harvard business review*, 85(11), pp.68–76.
- Spillane, J.P. & Zuberi, A., 2009. Designing and piloting a Leadership Daily Practice log: Using logs to study the practice of leadership. *Educational Administration Quarterly*, 45(3), pp.375–423.
- Sternberg, R.J., 2008. The WICS approach to leadership: Stories of leadership and the structures and processes that support them. *The Leadership Quarterly*, 19(3), pp.360–371.
- Stricker, L.J. & Rock, D.A., 1998. Assessing leadership potential with a biographical measure of personality traits. *International Journal of Selection and Assessment*, 6(3), pp.164–184.
- Van Strien, P.J., 1997. Towards a methodology of psychological practice: the regulative cycle. *Theory & Psychology*, 7(5), pp.683–700.
- Suri, R., 1998. Quick response manufacturing - a company wide approach to reducing lead times. *Quick Response Manufacturing*.
- Tejeda, M.J., Scandura, T.A. & Pillai, R., 2001. The MLQ revisited psychometric properties and recommendations. *Leadership Quarterly*, 12(1), pp.31–52.
- Thoms, P., 2003. *Driven by time: Time orientation and leadership*, Westport: Praeger.
- Welsh, J.A. & White, J.F., 1981. A small business is not a little big business. *Harvard Business Review*, 59(4), pp.18–32.
- White, D.R., Crooks, S.M. & Melton, J.K., 2002. Design dynamics of a leadership assessment academy: Principal self-assessment using research and technology. *Journal of Personnel Evaluation in Education*, 16(1), pp.45–61.

APPENDIX I

In the table below for each tool category the tools are given. Besides, per tool the papers are given that provided research about that tool. Per paper the names of the authors and the publication year are given.

Category	Tool	Papers
Questionnaires	Authentic Leadership Questionnaire	<i>Neider, L., Schriesheim, C. (2011)</i>
	Big Five personality test	<i>Bartone, P., Eid, J., Johnsen, B., Laberg, J., & Snook, S. (2009); Goodstein, L., & Lanyon, R. (1999); Stricker, L., & Rock D. (1998)</i>
	Character assessment	<i>Barlow, C., Jordan, M., & Hendrix, W. (2003)</i>
	Circumplex leadership scan	<i>Redeker, M., Vries, R. De, Rouckhout, D., Vermeren, P., & Fruyt, F. de (2012)</i>
	Competency assessment	<i>Richards, P. (2008); Robbins, C., Bradley, E., & Spicer, M. (2001)</i>
	Destructive leadership behaviour scale	<i>Larsson, G., Brandebo, M., & Nilsson, S. (2012)</i>
	Empowering leadership questionnaire	<i>Arnold, J., Arad, S., Rhoades, J., & Drasgow, F. (2000)</i>
	Entrepreneurship skills assessment instrument	<i>Gerhart, A., Carpenter, D., Grunow, M., & Hayes, K. (2010)</i>
	Ethical leadership evaluation	<i>Brown, M., Trevino, L., & Harrison, D. (2005); Khuntia, R., & Suar, D. (2004); Reed, L., Vidaver-Cohen D., & Colwell, S. (2011)</i>
	Global transformational/charismatic leadership scale	<i>Behling, O., & McFillen, J. (1996); Carless, S., Wearing, A., & Mann, L. (2000); Conger, J., Kanungo, R., Menon, S., & Mathur, P. (1997); Rowold, J., & Heinitz, K. (2007)</i>
	Leadership accountability scale	<i>Wood, J., & Winston, B. (2007)</i>
	Leadership dimensions questionnaire	<i>Dulewicz, V., & Higgs, M. (2005); Dulewicz, V. (2007)</i>
	Leadership Excellence measurement	<i>Kanji, G. (2008)</i>
	Leadership Judgement indicator	<i>Scholmerich, F., & Schermuli, C. (2013)</i>
Leadership virtues	<i>Riggio, R., Zhu, W., Reina, C., & Maroosis, J.</i>	

questionnaire	(2010)
Lind-Sitkin Multiple Domain Leadership instrument	<i>Janson, A., Levi, L., Sitkin, S., & Lind, E. (2008)</i>
Model and approach to develop transnational leaders	<i>Fisher-Yoshida, B., & Geller, K. (2008)</i>
Multi-factor leadership questionnaire	<i>Antonakis, J., Avolio, B., & Sivasubramaniam, N. (2003); Heinitz, K., Liepmann, D., & Felfe, J. (2005); Hinkin, T., & schriesheim, C. (2008); Schiersheim, C., Wu, J., & Scandura, T. (2009); Sirbu, J., Jaradat, M., & Chontorotzea, T. (2012); Tejada, M., Scandura, T., & Pillai, R. (2001)</i>
Multi-source feedback tool	<i>Alban-Metcalf, J., & Alimo-Metcalf, B. (2013); Alimo-Metcalf, B. (1998); Brotherton, P. (2012); Dai, G., Meuse, K. De, & Peterson, C. (2010); Darr, W., & Catano, V. (2008); Drew, G. (2009); Eckert, R., Ekelund, B., Gentry, W., & Dawson, J. (2010); Hafford-Letchfield, T., & Bourn, D. (2011); Gentry, W., & Leslie, J. (2007); Keenan, J. (1996); Malling, B., Mortensen, L., Bonderup, T., Scherpbier, A., & Ringsted, C. (2009); Manning, T., & Robertson, B. (2011); Solansky, S. (2010); Stumph, S. (2010)</i>
Myers-Briggs Type Instrument	<i>Culp, G., & Smith, A. (2005)</i>
Organisational leadership capability tool	<i>Kivipold, K., & Vadi, M. (2010)</i>
Principal instructional management rating scale	<i>Hallinger, P., Wang, W., & Chen, C. (2013)</i>
Psychological testing	<i>Miller, H., Watkins, R., & Webb, D. (2009)</i>
Quality Leadership Scale	<i>Sargent, T. (1986)</i>
Self-assessment	<i>Chreighton, O., & Singer, M. (2008); Kaplan, R., & Kaiser, R. (2009); White, D., Crooks, S., & Melton, J. (2002)</i>
Self-other rating	<i>Fleenor, J., Smither, J., Atwater, L., Braddy, P., & Sturm, R. (2010)</i>
Socially responsibility leadership	<i>Rosch, D., Anderson, J., & Jordan, S. (2012)</i>
Team-leadership	<i>Demask, M, O'Mara, E., & Walker, C.</i>

	effectiveness questionnaire	(2009); Gao, J., Ma, H. (2009)
	Transformational leadership questionnaire	Alban-Metcalf, R., Alimo-Metcalf, B. (2000); Alimo-Metcalf, B., & Alban-Metcalf, R. (2001)
Coaching/ mentoring	Coaching	Ann, C., & Carr, A. (2011); Berg, M., & Karlsen, J. (2012); Blackman, A. (2010); Boyce, L., Jackson, R., & Neal, L. (2010); Ely, K., Boyce, L., Nelson, J., Zaccaro, S., Hernez-Broome, G., & Whyman, W. (2010); Kazmi, S., Kinnunen, T. (2012); Longenecker, C., & Neubert, M. (2005); Perkins, R. (2009); Read, M. (2013); Steinhouse, R. (2011)
	Mentoring	Francis, L. (2009); Hicks, D. (2011); Kunish, J., & Lester, R. (1999); Solansky, S. (2010)
	Peer review	Patton, D., & Olin, S. (2006)
Daily practice log	Oriented compass model	Fallon, P. (2013)
	Daily practice log (smartphone devices)	Barnes, C., Camburn, E., Sanders, B., & Sebastian, J. (2010); Lopez, V., Ahumada, L., Galdames, S., & Madrid, R. (2012); Spillane, J., Zuberi, A. (2009)
Location aware devices	Behavioural repertoire measurement	Lawrence, K., Lenk, P., & Quinn, R. (2009)
	Location aware devices	Andersson, M., Gudmundsson, J., Laube, P., & Wolle, T. (2007); Andersson, M., Gudmundsson, J., Laube, P., & Wolle, T. (2008)
Leadership program	CEO strategic leadership evaluation	Gang, X., & RongRong, R. (2009)
	Discernment measure instrument	Trauffer, H., Bekker, C., Bocarnea, M., & Winston, B. (2010)
	Emergent leaders identification	Sanchez-Cortes, D., Aran, O., Mast, M., & Gatica-Perez, D. (2012)
	Emotional and interpersonal competencies development	Cherniss, C., Grimm, L., & Liautaud, J. (2010); Riggio, R., & Lee, J. (2007)
	G-methodology (collection tool)	Militello, M., & Benham, M. (2010)
	Hierarchical linear modeling to measure change	Gentry, W., & Martineau, J. (2010)
	Integrated design engineering assessment and learning system	Thompson, P., Davis, D., Beyerlein, S., Trevisan, M., McCormack, J., & Davis, H. (2012)
	Leader problem solving	Zaccaro, S., Mumford, M., Connelly, M.,

	capabilities	<i>Marks, M., & Gilbert, E. (2000)</i>
	Leadership assessment program	<i>Tsakeres, F. (2008)</i>
	Leadership development program	<i>Allio, R., (2005); Etuk, L., Rahe, M., Crandall, M., Sektan, M., & Bowman, S. (2013); Fulmer, R., Gibbs, P., & Goldsmith, M. (2001); Jameson, B., Soule, E. (1991); Herold, D., & Fields, D. (2004); Pinnington, A. (2011)</i>
	Managerial Behaviour instrument	<i>Zafft, C., Adams, S., & Matkin, G. (2009)</i>
	Principle Support Program	<i>Eller, J. (2010)</i>
	Reverse appraisal	<i>Taylor, G., Morgan, M. (1995)</i>
	Self-leadership	<i>Anderson, J., & Prussia, G. (1997); Furtner, M., Sachse, P., & Exenberger, S. (2012); Stewart, G., Courtright, S., & Manz, C. (2011); Williams, S. (1997)</i>
	Servant leadership assessment	<i>Dennis, R., & Bocarnea, M. (2005); Liden, R., Wayne, S., Zhao, H., & Henderson, D. (2008); Sen, S., & Cooper, B. (2011)</i>
	Simulation to improve leadership skills	<i>Lee, J., Yin, S., Part, S., & Park, J. (2012)</i>
	Theatre as representation	<i>Gagnon, S., Vough, H., & Nickerson, R. (2012); Meyer, M. (2001)</i>
Action learning	Action learning	<i>Allen, S. (2009); Ibieta, R. (2006); Hoe, S. (2011); Leonard, H., & Lang, F. (2010); Smith, P. (2001)</i>

Table I.1: Papers per tool per category

APPENDIX II

This appendix provides examples of the tools used during the observations. In total four tools were used; (1) Activity log including stopwatch; (2) Recording conversations; (3) Event-response scheme; and (4) Activity scheme. Recording conversations probably speaks for itself; a recording device, a phone, is used to record conversations. For the other three tools examples are provided below.

Activity log

The track activity log is the output of the ‘Track Activity App’ provided by iThinkdiff.net. The track activity application is a mobile application, which can be used to insert activities, record and track time of each activity inserted and get a history overview of activities, see figure II.1.

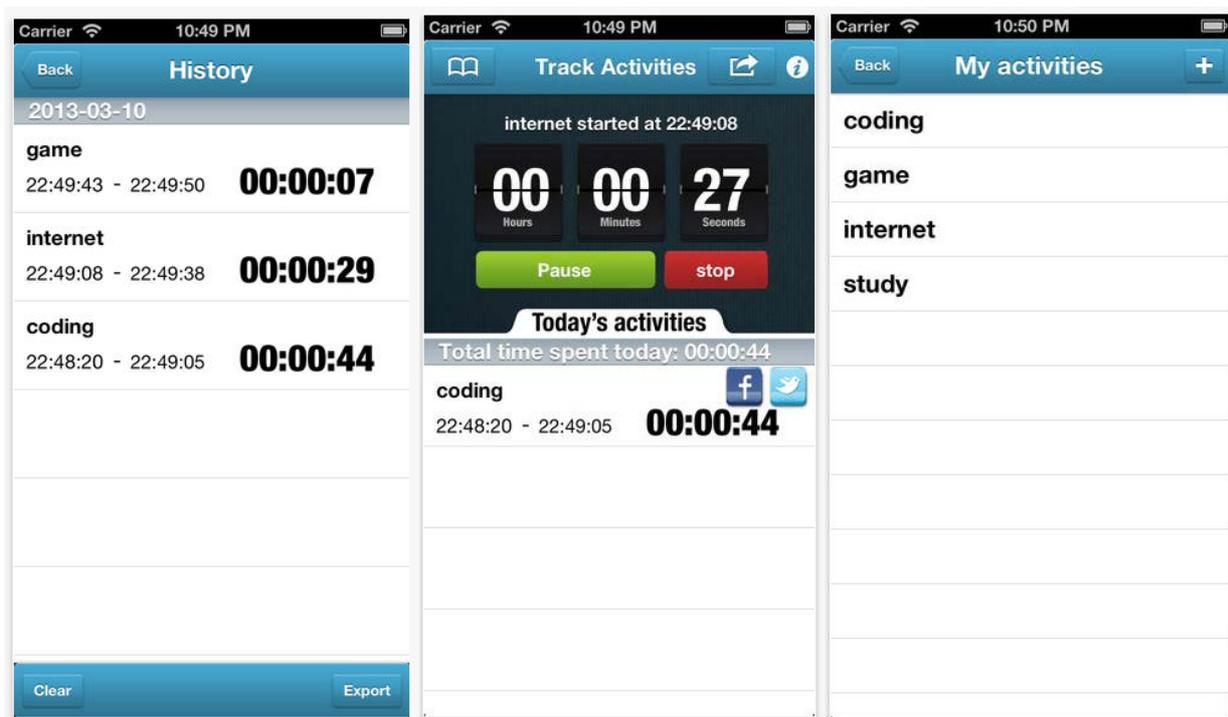


Figure II.1: iPhone screenshots of the track activity app (iTunes, 2013)¹

The activity history can be exported to a Comma-Separated Values (CSV) text file, which can be imported to an spreadsheet program, e.g. Excel, to analyse the data gathered (Ithinkdiff, 2013)².

¹ iTunes, Apple. Available at: <https://itunes.apple.com/us/app/track-activities/id617639653?mt=8> [Accessed Nov. 2th 2013]

² Ithinkdiff. Available at: <http://ithinkdiff.net/other/track-activities/> [Accessed Nov. 2th 2013]

Event-response scheme

The event-response scheme was used to record events and responses on those events in terms of activities. An example of the event-response scheme is provided in figure II.2.

Event				Response								
Event nr.	Event	Date	Time	Activity nr.	Date	Start time	End time	Duration	Location	People involved	Activity description	Responstijd
1				1				0				0
2				2				0				0
3				3				0				0
4				4				0				0
5				5				0				0
6				6				0				0
7				7				0				0
8				8				0				0
9				9				0				0
10				10				0				0
11				11				0				0
12				12				0				0
13				13				0				0
14				14				0				0
15				15				0				0
16				16				0				0
17				17				0				0
18				18				0				0
19				19				0				0
20				20				0				0
21				21				0				0
22				22				0				0
23				23				0				0
24				24				0				0
25				25				0				0

Figure II.2: Event-response scheme

Activity scheme

The activity scheme was used to collect more specific attributes of the activities. These measures are explained in paragraph 3.2.3. An example of the activity scheme is provided in figure II.3.

Categorised activities						
Activity nr.	Responsetype	Covey	Activity type		Plan type	
1	Select ...	Select ...	Select ...	Select ...	Select ...	
2	Select ...	Select ...	Select ...	Select ...	Select ...	
3	Select ...	Select ...	Select ...	Select ...	Select ...	
4	Select ...	Select ...	Select ...	Select ...	Select ...	
5	Select ...	Select ...	Select ...	Select ...	Select ...	
6	Select ...	Select ...	Select ...	Select ...	Select ...	
7	Select ...	Select ...	Select ...	Select ...	Select ...	
8	Select ...	Select ...	Select ...	Select ...	Select ...	
9	Select ...	Select ...	Select ...	Select ...	Select ...	
10	Select ...	Select ...	Select ...	Select ...	Select ...	
11	Select ...	Select ...	Select ...	Select ...	Select ...	
12	Select ...	Select ...	Select ...	Select ...	Select ...	
13	Select ...	Select ...	Select ...	Select ...	Select ...	
14	Select ...	Select ...	Select ...	Select ...	Select ...	
15	Select ...	Select ...	Select ...	Select ...	Select ...	
16	Select ...	Select ...	Select ...	Select ...	Select ...	
17	Select ...	Select ...	Select ...	Select ...	Select ...	
18	Select ...	Select ...	Select ...	Select ...	Select ...	
19	Select ...	Select ...	Select ...	Select ...	Select ...	
20	Select ...	Select ...	Select ...	Select ...	Select ...	
21	Select ...	Select ...	Select ...	Select ...	Select ...	
22	Select ...	Select ...	Select ...	Select ...	Select ...	
23	Select ...	Select ...	Select ...	Select ...	Select ...	
24	Select ...	Select ...	Select ...	Select ...	Select ...	
25	Select ...	Select ...	Select ...	Select ...	Select ...	

Figure II.3: Activity scheme

For each category (level 1) different options could be selected. Besides, some categories contain sub-categories (level 2). The choices per category (both level 1 and 2) are displayed in figure II.4.

Level 1				
Response type	Covey	Plan type	Activity type	Focus
Reactive	Important/Urgent	Scheduled	Maintaining	Result focussed
Proactive	Important/non-urgent	Unscheduled	Improving	Process focussed
Repeated	Non-important/urgent			
Neglect	Non-important/non-urgent			

Level 2	
Reactive	Scheduled type
Immediate	Takes more time than planned
Scheduled	Takes less time than planned
Unscheduled	Takes equal time as planned
Proactive	Unscheduled type
In lijn met lange termijn visie	Takes more time than needed
Niet in lijn met lange termijn visie	Takes equal time as needed

Figure II.4: categories to be chosen in the activity scheme