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## **WORKING PAPER**

### **THE CHANGE CLIMATE QUESTIONNAIRE : SCALE DEVELOPMENT**

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## **THE CHANGE CLIMATE QUESTIONNAIRE: SCALE DEVELOPMENT**

### **ABSTRACT**

On the basis of a step-by-step procedure (see Hinkin, 1998), this article discusses the design and evaluation of a self-report questionnaire (Change Climate Questionnaire) that can be used to gauge the internal context of change, the process factors of change, and readiness for change. The authors describe four studies used to develop a psychometric sound 42-item assessment tool that can be administered in organizational settings. In all, more than 3,000 organizational members from public and private sector companies participated in the validation procedure of the CCQ. The information obtained from the analyses yielded five internal context dimensions, three change process dimensions, and three facets of readiness for change.

Key words: change climate assessment, scale development, readiness for change

# THE CHANGE CLIMATE QUESTIONNAIRE: SCALE DEVELOPMENT

## Introduction

In today's global business environment there is a growing awareness of organizational change as a crucial vehicle to deal with increasing internal and external pressures. In this situation of continuous pressure to change, an organization's absorptive capacity in terms of readiness for change has become more important than ever before (Iverson, 1996). Both practitioners and scholars agree on that it is the human system (i.e. people and climate) is what breaks or makes the change initiative. In that respect, one of the most cited barriers to change is a dysfunctional corporate culture (Beer & Nohria, 2000; Heracleous, 2001; Sashkin & Burke, 1987; Schneider, Brief, & Guzzo, 1996). In addition, the key focus in many change implementation models is the perception of the work environment (i.e. climate) as a driver of employees' readiness for change (Armenakis, Harris, & Feild, 1999; Kotter, 1995; Mento, Jones, & Dirndorfer, 2002; Sashkin & Burke, 1987). Sashkin and Burke (1987; 406) formulated nicely the centrality of culture in accomplishing change successfully: *"The concept of culture has become clearer and has attained general acceptance due to its importance for understanding how to manage, lead, and change large and complex systems. Senior managers in many corporations are aware that significant changes in mission and strategy will produce great frustration, if not outright failure, unless concomitant consideration is given to modifying the organization's culture."*

Despite the general consensus about the salient role of organizational climate in understanding the processes that lead to successful change implementation, the relationship between change climate and readiness for change has been rarely examined (Jones, Jimmieson, & Griffiths, 2005). Another observation is that the construct of organizational climate has been ill-defined (Glick, 1985; James & Jones, 1974; Koys & Decotiis, 1991). The limited research in combination with the conceptual diversity helps explain why so few well-validated measures have been designed with the purpose of diagnosing and measuring the crucial levers of employees' readiness for change. In this paper, we describe the development of a new measure of change climate that is both theoretically grounded and empirically sound. But before we start explaining this instrument in depth, we first define the conceptual boundaries of climate and delineate the dimensions of change climate.

### **The climate concept: Definition and dimensions**

The study of organizational climate has a long history in organizational sciences (Forehand & Gilmer, 1964; Glick, 1985; James & Jones, 1974; Patterson et al., 2005; Schneider, 1990; Schneider & Reichers, 1983). Despite its popularity, the construct has suffered from conflicting definitions and inconsistencies in operationalization (Patterson et al., 2005). This conceptual diversity prompted Guion (1973) to conclude that organizational climate is a 'fuzzy' concept. Although this conceptual ambiguity made the study of climates in organizations difficult (Glick, 1985), considerable advance has been made over the years with respect to defining the conceptual boundaries (Schneider & Reichers, 1983). One of the more general accepted definitions we adhere, views organizational climate as a set of summary or global perceptions held by individuals about their organizational environment (Moran & Volkwein, 1992).

Two issues emerged from this conceptual fuzziness. Firstly, there has been a lot of discussion among scholars about the measurement approach, and more specifically the rules for aggregation (Glick, 1985; James & Jones, 1974; Moran & Volkwein, 1992). Secondly, those same scholars did not concur on the dimensions that should represent organizational climate (Glick, 1985).

#### *Measurement of organizational climate*

With respect to the measurement issue we noticed that the majority of empirical studies have used aggregate units of analysis. In other words, climates have been operationally constructed by aggregating individual scores to the appropriate level (organization, department and team) and using that mean to represent climate at that level (Schneider, Bowen, Ehrhart, & Holcombe, 2000). The rationale behind aggregation of individual level data to unit level is the assumption that organizational collectives have their own climate and these can be identified through the demonstration of significant differences in climate between units and significant agreement in perceptions within units (Patterson et al., 2005). We concur with this rationale by adopting the interactive approach to the formation of organizational climate (Moran & Volkwein, 1992). Basic contention is that the interaction of individuals in responding to their situation brings forth the shared agreement which is the source of organizational climate. It can be seen as an abstract representation of shared psychological meanings created by the interaction of group members.

Basically this implies that the items of our questionnaire are developed to measure individual perceptions but with the possibility of aggregation at a higher unit of analysis.

#### *Climate dimensions: Rules of selection*

Due to the conceptual diversity, in combination with the uncertainty that exists as to the level of analysis, some studies have identified up to 80 dimensions (Koys & Decotiis, 1991). Of course, this plethora of dimensions has led to questioning the value-added by the concept to organization science in general. Because climate seems to overlap with most constructs of organizational behavior, one can ask whether the study of climate contributes anything to organizational behavior (Glick, 1985; Patterson et al., 2005)? Therefore a first challenge in order to delineate the scientific boundaries of our 'Change Climate Questionnaire' (CCQ) and limit the overlap with related OB constructs, was defining a set of decision rules for the selection of our climate dimensions.

We borrowed from Koys and Decotiis following three inclusion rules: each dimension (1) has to be a measure of perception; (2) has to be a measure describing (not evaluating) activities; and (3) cannot be an aspect of organizational structure or job design. Although we agree with rules 1 and 3, more recent work contradicts the view that climate perceptions summarize an individual's *description* of his or her organizational experiences rather than his or her *affective or evaluative reaction* to what has been experienced (Patterson, Warr, & West, 2004). Broader psychological research has pointed to the inseparability of descriptive and evaluative perceptions (Osgood, Suci, & Tannenbaum, 1957). Therefore our measurement instrument will not only incorporate descriptive items of the conditions under which and how change is implemented, but also items with a more attitudinal content referring to people's thoughts, feelings and intentions towards change.

Apart from those three rules, a fourth condition to warrant the scientific parsimony of our selection procedure was the criterion related choice (Glick, 1985). In summary, the four decision rules of inclusion were: each dimension (1) is a measure of perception, (2) includes both describing and evaluating activities, (3) is not a measure of structure nor job design, and (4) and is criterion relevant to readiness for change. In choosing a criterion relevant framework, we found that the human

relations perspective offered a strong and historically rich model from which our climate dimensions could be tapped as relevant sources of readiness for change.

### *The human relations perspective*

The human relations approach is derived from the seminal works of McGregor (1960) and Emery and Trist (1965), both strongly valuing the internal organizational focus with a flexible orientation in relation to the environment. This model rests on a number of assumptions about people and relationships in organizations. Firstly, people desire growth and development and can be creative when they have these opportunities. Secondly, people value interpersonal interaction, both with peers and with superiors, making the formal and informal nature of such relationships a salient feature of organizational life. Thirdly, people need trust, support and cooperation to function effectively. These assumptions make that the major task of management is to empower employees and facilitate their participation, commitment and loyalty (Schneider et al., 1996).

Cameron and Quinn (1999; 82) described the human relations or clan type climate as: *“A friendly place to work where people share a lot of themselves. It is like an extended family. The leaders, or the heads of the organization, are considered to be mentors and perhaps even parent figures. The organization is held together by loyalty or tradition. Commitment is high. The organization emphasizes the long term benefit of human resource development and attaches great importance to cohesion and morale. Success is defined in terms of sensitivity to customers and concern for people. The organization places a premium on teamwork, participation, and consensus.”* In summary, the human relations movement assumes that organizational effectiveness can be achieved by successfully managing the interpersonal relationships within organizations. More specifically, building supportive, cooperative and trusting relationships are crucial to create commitment.

In the context of dealing effectively with organizational change, we believe that the human relations climate provides an excellent matrix in which readiness for change can grow. Indeed a human relations orientation with its emphasis on belonging, trust, and cohesion, achieved through participation, support and open communication, may relate to an employee's confidence and capability to undertake new workplace challenges and changes (Jones et al., 2005). This assumption is consistent with a growing body of research evidence. For instance, Zammuto and

O'Connor (1992) and more recently Jones and colleagues (2005) found that organizational cultures with flexible structures and supportive climates were conducive to establishing a positive attitude towards change. In addition, Burnes and James (1995) observed that change resistance was low when a supportive and participative culture was present, characteristics that are consistent with the human relations philosophy.

#### *The ten dimensions of change climate*

Applying the four inclusion rules to the human relations climate model led us to infer following ten dimensions: (1) quality of change communication; (2) participation; (3) attitude of top management towards organizational change; (4) support by supervisors; (5) trust in leadership; (6) cohesion; (7) politicking; (8) emotional readiness for change; (9) cognitive readiness for change; and (10) intentional readiness for change. A description for each dimension is listed in the Appendix. These definitions were also used as a part of the content adequacy test for the items constructed to represent those ten dimensions.

Assuming that the practical soundness of useful research on change requires the appreciation of conditions (input variables) and ending results (output variables), together with an analysis of the process variables (Pettigrew, 1990), our selection of climate dimensions did an excellent job at covering all three aspects of change. In particular, quality of change communication, participation, attitude of top management towards organizational change, and support by supervisors all refer to how change is dealt with (i.e. process). The context part, also the internal environment under which change occurs, involves trust in leadership, cohesion, and politicking. Finally, with regards to the criterion variables we distinguished three dimensions of readiness for change: emotional readiness for change, cognitive readiness for change, and intentional readiness for change (see Figure 1).

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Insert Figure 1 about here

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In the CCQ readiness for change is conceived as a multi-faceted concept which incorporates an emotional, a cognitive, and an intentional dimension of change.

We believe that such a multidimensional view of readiness for change instead of a unified conceptualization will be better able to capture the complexity of the phenomenon and lead to a better understanding of relationships between readiness and its antecedents. Thus, it is assumed that behavioural, cognitive and affective reactions towards change come into play at different stages in the change process, and in consequence do not always coincide (George & Jones, 2001; Piderit, 2000).

The choice of the ten dimensions is justified because firstly they are rooted into a theoretical framework (i.e. human relations climate model), and secondly none of these dimensions breached the four inclusion rules. Despite the deductively driven selection, one could argue that we omitted the crucial dimension of autonomy. Indeed, Patterson et al. (2005) identified autonomy as an important feature of the human relations model. Yet, we think there are several reasons that allow the omission of this factor. First of all, in literature autonomy is described as designing jobs in ways which give employees a wide scope to enact work (e.g., Cherns, 1976; Klein, 1991). From this definition it is clear that the third rule of inclusion (i.e., not a measure of organizational structure or job design) is not respected. Apart from that, literature is unclear about the role of autonomy as a predictor of readiness for change. In some inquiries autonomy has been found to have an indirect effect on readiness (Cunningham et al., 2002), whereas in other studies no effect has been noted (Iverson, 1996). Of course, due this ambiguity doubts have been raised about the relevance and meaningfulness of autonomy as an antecedent of readiness for change (i.e., fourth rule of inclusion). In the next paragraphs, we elaborate on the studies conducted as part of the validation process of the CCQ.

### **Validation studies**

Traditional ‘psychometric theory’ asserts that a quantitative survey instrument should meet three standards of validity: (1) content validity, (2) construct validity, and (3) criterion related validity (Anastasi, 1982; Nunnally, 1978). Hinkin (1998) provided a procedure to construct a measurement instrument that meets all three criteria, by describing a step-by-step approach towards design: (1) item development, (2) content validation and questionnaire administration, (3) item analysis (factor analyses and interitem analyses) (4) scale evaluation, and (5) replication.

The validation procedure encompassed four studies. *Study 1* was designed to examine the content validity of the items developed. *Study 2* involved a first test of



the factor structure and the construct validity of the items. *Study 3* examined whether the scales that emerged from study 2 could be replicated in a different sample. Simultaneously, the scales were evaluated for convergent validity, discriminant validity, known-groups validity, and shared group variance. Finally, *study 4* was a first step towards the development of an English version of the original Dutch CCQ.

#### *Item development: Pilot study*

In accordance to previous validation studies, we followed Hinkin's (1998) guidelines suggesting that survey items should be developed by first specifying the domain, then developing items to assess that domain, and finally determining the extent to which items measure the specified domain. We consulted literature on climate dimensions (Patterson et al., 2005) and readiness for change (Holt et al., 2007a,b) to inductively generate our items. Two of the authors independently wrote items for each of the 10 dimensions. This process yielded a large set of items. Then items were rewritten or eliminated when poorly worded, duplicated other items, or seemed inconsistent with the dimension descriptions (see Appendix). Finally, the third author reviewed the items for clarity and redundancy. This whole item generation process yielded a final selection of 63 items.

#### *Content validity: Study 1*

**Procedure.** Following the procedure described by Chen, Gully and Eden (2001), a panel of ten judges examined the content validity of the 63 items along the dimensions described in Appendix 1. Each of the ten panel judges were academic staff at the organizational behavior department of a prominent business school in Belgium. We gave these judges the descriptions of the ten dimensions and asked them to base their designations on the definitions provided. Apart from the 63 items we added nine filler items respectively referring to goal orientation and risk-taking reward orientation. None of these filler items were classified in one of the ten specified dimensions, providing a first indication of the content adequacy and discriminant validity of the 63 items.

**Results.** The percentage of interrater agreement was calculated as a measure of content adequacy (Chen et al., 2001). Table 1 displays the ten dimensions, the initial number of items that were developed before the content adequacy test, item

designation according to the expert panel, the percentage of interrater agreement, and the scale to which our items were initially assigned.

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Insert Table 1 about here

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A first remark is that some items that were initially developed for a particular scale were assigned to another dimension. This was the case for our process variables *quality of change communication*, *support by supervisors*, and *attitude of top management towards change*, the context variable *trust in leadership*, and the outcome variables *emotional readiness for change*, and *cognitive readiness for change*. After assessing this grouping, we concur with our panel experts that the content of these items (Q65, Q76, Q20, Q15, Q31, Q40, Q60, Q55, Q73, Q39, Q56) allowed a re-designation.

Although the content adequacy test is a viable way to determine whether the items that were generated represent the underlying latent constructs, an important point raised by two of the panel judges is that they classified all 63 items from a general change point of perspective, whereas several items in the questionnaire actually have a change specific character. In other words, our item pool is comprised of items with a more general content, and items that are specifically designed towards measuring the perception of an ongoing company or department specific change. Indeed a re-evaluation of those items (see final column Table 1) reveals that a part can be grouped as more general and a part as change specific. In following this classification, we notice that our context factors (i.e. trust in leadership, politicking and cohesion) have a general content, whereas the process factors (i.e. quality of change communication, participation, support by supervisors) and the outcome variables (emotional and cognitive readiness for change) are a mixture of general and change specific items. Not taking this arrangement of general and change specific items into consideration would serious flaw the further validation of our questionnaire. In particular, factor analyses may yield biased findings if one is not aware of this distinction.

**Implications.** Looking at the mixed dimensions (quality of change communication, participation, support by supervisors, emotional readiness for change and cognitive readiness for change), we believe that the items Q65 and Q76 will lack high factor loadings on their targeted dimension *quality of change communication* because of their general content compared to the other more change specific items identified for this dimension.

Examining the general and change specific part of *participation* we expect that two sub dimensions will emerge from the factor analyses. The items with a more general content (Q5, Q25, Q34, Q50, Q51 and Q71) are in fact items that gauge *participatory management*, in contrast to the process of being involved in a particular change project (Q11, Q35, Q42, Q74, Q77). To put it differently, the first set of items refer to the more general context part of participation, whereas the second set of items deals with the process aspect of participation for a specific change project. Similarly two sub dimensions based upon this general content versus change specific designation were identified for *support by supervisors*. The first set of items (Q1, Q37 and Q38) involves the perception that leaders have the ability to lead their staff through a specific change project. Secondly, Q15, Q31, Q40 and Q60 are items that refer to support by supervisors independent from a specific change. Therefore we may consider the latter set of items as an internal context factor instead of a process factor of change.

With respect to our outcome variables we observed that some items from the *emotional readiness for change* scale were grouped under *cognitive readiness for change* (Q55 and Q73) and vice versa (Q39 and Q56). Although we admit that it is difficult to study cognitive and emotional responses independently, the content adequacy test suggests that these four items are problematic ones. The experts' judgments suggest that these items are both emotionally and cognitively laden. Therefore, we assume that Q55, Q73, Q39 and Q56 will have high cross loadings, and therefore should be omitted from the scale development process.

In summary, based upon above discussion, we anticipate that following dimensions will emerge from our item and factor analyses in study 2: (1) quality of change communication (process), (2) participation in change project (process), (3) attitude top management towards change project (process), (4) ability of management to lead a change project (process), (5) participatory management (context), politicking (context), (6) cohesion (context), (7) general support by supervision (context), (8)

trust in leadership (context), (9) cognitive readiness for change (outcome), (10) emotional readiness for change (outcome), and (11) intentional readiness for change (outcome).

#### *Questionnaire administration*

A questionnaire was designed which incorporated all items from the pilot study (i.e. 63 items). The questionnaire was specifically developed taking into account the considerations from the panel that some items have a more general character than others. In the first part of the survey, respondents were asked to indicate how strongly they agreed/disagreed with statements on change in general. The second part of the questionnaire dealt with the more change specific items and was introduced by the following instruction: *“This part contains questions about [specific change within department or organization X]. We are interested in finding out about people’s attitudes to change. In answering the following questions, please have [the specific change project] in mind. Especially try to remember those things that particularly affected you and your immediate colleagues.”* The general part (internal context variables, and cognitive readiness for change) contained 28 items, whereas that change specific part (process variables, and emotional and intentional readiness for change) was comprised of 35 items. Data gathered based on this questionnaire were used for item analyses and exploratory factor analyses in study 2. All items in the questionnaire were phrased in such a way that participants expressed their level of agreement with each item using a five-point response format ranging from 1 = strongly disagree to 5 = strongly agree.

#### *Item analysis: Study 2*

In the second step of the validation process the authors computed the variability in the items, explored the intercorrelations between items and their scales, and conducted exploratory factor analyses as a means for further refining and evaluating the construct validity of the measures (Conway & Huffcutt, 2003). Finally, Cronbach alpha coefficients were computed to examine the internal consistency of these measures.

**Organizational context.** In this study data were collected from both profit (n = 18) and non-profit sector companies (n = 24). All 42 Belgian organizations were in the process of change (i.e., downsizing, reengineering, total quality management,

culture change, technological innovation, etc.). The 42 companies represented several sectors including IT, petrochemicals, telecommunications, fast-moving consumer products, finance and insurance, consultancy, healthcare and medical services, but also government services (i.e., police departments, schools).

Data on 1,358 individuals were acquired and included in the analyses. On average 32 people of each organization answered the questionnaire. As was the case for all studies reported throughout this paper, people filled out the survey on voluntary and anonymous basis. Therefore, not all the demographic information was collected from the respondents. The number of participants from both profit and non-profit sector companies was almost equally distributed (profit: 54% (n = 738); non-profit: 46% (n = 620). In addition, the sample consisted of more male (64%, n = 244) than female participants (36%, n = 138), and more people holding a non-managerial (54%, n = 479) than a managerial position (46%, n = 406). Finally the age of the people in this study was quite heterogeneous (< 25 years: 3% (n = 11); 25 – 34 years: 33% (n = 121); 35 – 44 years: 35% (n = 127); > 44 years: 29% (n = 103). In short, this sample involved a varied set of companies and respondents to examine the validity of the CCQ.

In each organization there was a contact person to collect the data. This person, often part of the organization's senior management, was asked to distribute the questionnaire to members affected by the identified change project. Each potential participant was contacted by this person either face-to-face or by written communication. Respondents were explained the purpose of the study and asked to keep the specific change project in mind when completing the survey. The participants had the possibility to hand over the survey in a sealed envelope to the contact person in the company, or to one of the researchers that visited the company one or two weeks after the survey was administered.

***Procedure factor analyses.*** Very few validation studies in organizational sciences emphasize on constructs with dimensions that are manifested at both the antecedent and outcome level. In our case, however, our different climate dimensions can be grouped into internal context, process and outcome variables of change. Similar to our case, we found that the 'Occupational Stress Indicator', a popular instrument developed for the diagnosis of stress, also involved an antecedent-outcome setup. To determine the factor structure of the OSI, both sets of antecedent variables and outcome variables were factor analyzed separately (Evers, Frese, & Cooper,

2000). In this inquiry a similar strategy was adopted and therefore treated context, process and outcome items as three sets of items. In fact, our CCQ is a change climate diagnosis tool that incorporates three separate questionnaires aimed at measuring: (1) the internal context, (2) the process of change, and (3) the readiness for change. Respectively 22 (internal context), 26 (process) and 15 (outcome) items were factor analyzed using principal axis factoring and direct oblimin rotation (cases to item ratio is more than 20:1) (Conway & Huffcutt, 2003). In study 3 we replicated the factor structure found in study 2 by conducting CFA's on new data (Hurley et al., 1997).

**Results exploratory factor analyses.** In exploratory factor analyses, several rules of thumb are combined to decide on the number of factors that should be retained. The extraction of factors resulted from the following two procedures: (a) the scree plot examination (Cattell, 1966) and (b) the eigenvalues-greater-than-one-criterion check (Kaiser, 1960).

In general, the preliminary findings of our pilot and content validity studies were confirmed. Four items of the 22 internal context items were eliminated because their primary loadings were below .40 on their targeted factor, and/or had high secondary loadings on other factors. The remaining 18 items yielded five dimensions explaining 50.45 per cent of the total variance. With respect to our 26 change process items, we retained 15 items representing three factors that explained together 52.6 per cent of the variance. Finally, of 15 items that were developed originally for measuring the outcome variables 9 were retained. These 9 items have a 3-factorial structure that explained 58.1 per cent of the total variance. Tables 2 through 4 display the factors and items that were retained after an overall evaluation of the findings collected from exploratory factor analyses, inter item analyses, and content adequacy evaluation.

**Context factors.** Factor 1, termed *general support by supervision*, contained four items (Q15, Q31, Q40, Q60) that were initially classified by the panel judges as support by supervision. This factor, however, is not the original process variable that represents the experienced support and understanding during a change project, but an internal context factor referring to the overall support provided by management independent of a specific change. Factor 2, termed *trust in leadership* (Q19, Q44, Q65 and Q76), incorporates four items that were developed by the authors as items representative of the context factor trust in leadership. Since six items dropped out, we notice that the participants have a more specific conceptualization of trust in

leadership. In fact an examination of the content of these items suggests that factor 2 measures the trustworthy communication by senior management in general. Factor 3, termed *cohesion*, included five items originally designed to assess the perception of togetherness or sharing within the organization, and cooperation and trust in the competence of team members. Four items were retained (Q14, Q24, Q48, Q61) causing no significant change in the content of this dimension. The fourth factor, was a factor that emerged from the process factor participation. Three items were kept (Q5, Q25, Q50) referring to *participatory management* instead of actual involvement in the implementation of change. Finally, our fifth internal context factor, labeled *politicking*, perfectly mirrored the results of the content adequacy test. Items Q8, Q9 and Q 30 had high factor loadings measuring the perceived level of political games.

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Insert Table 2 about here

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***Process factors.*** The result of the first change specific factor was more complicated than expected. In all, six items loaded on this factor. Four of the items were intended to measure quality of change communication (Q3, Q12, Q22, Q 47). Two items (Q35, Q42) were designed to gauge the extent to which organizational members participate in the change process. The idea that these items tended to cluster in one factor should not come as a complete surprise, since the quality of change communication in combination with participation in the change project can create a sense of ownership or control of the change process. Thus, factor 1 is labeled as *involvement in the change process*. The second factor that emerged from the factor analysis included six items (Q1, Q37, Q38, Q13, Q46, Q49) and measures the process factor *support by supervision*. Although the items Q1, Q37 and Q38 were classified by the expert panel as items representing support by supervision, the second set of items (Q13, Q46, Q49) were assigned across two dimensions (i.e. support by supervisors and trust in leadership). The ambiguity that arises from the expert panel classification in combination with the data driven findings compelled us to revise the content of this dimension. All six items actually refer to the perceived ability of management to deal with the change project. Therefore, we called this dimension *ability of management to lead the change*. Finally, the third factor that was retained

from the analysis counts three items (Q17, Q66, Q69) and involves the stance taken by top management with regard to a specific change project. In other words, *attitude of top management towards the change project* is about the active involvement and support of top management during the change process.

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Insert Table 3 about here

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**Outcome factors.** The first factor *intentional readiness for change* was a perfect reflection of the content adequacy test. Items Q18, Q57 and Q67 loaded high on this first factor indicating that intentional readiness for change is about the effort and energy organizational members are willing to invest in the change process. With respect to the second and the third factor, items Q55, Q73, Q39 and Q56 did not yield the expected pattern of loadings. Because of the high secondary loadings of these items and the fact that the loading pattern contradicted the evaluation made by the judgment panel, these items were omitted in the further development of the CCQ. The second factor initially labeled *cognitive readiness for change* is comprised of three items (Q41, Q59, Q62) and measures the beliefs and thoughts organizational members hold about the outcomes of change. Because all three items are formulated in a negative sense they seem to somewhat overlap with what literature calls cynicism about organizational change (Wanous, Reichers, & Austin, 1997). The third factor *emotional readiness for change* consists of three items and attempts to capture the feelings about a specific change project being introduced (Q4, Q33, Q75). To conclude, a final note with respect to these three readiness for change components is that cognitive readiness for change involves more of an attitude towards change in general, whereas emotional and intentional readiness for change are both reactions headed towards a specific change.

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Insert Table 4 about here

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**Interitem analyses.** In addition to the exploratory factor analyses, the next step was evaluating whether the items and scales retained in Tables 2 through 4 had adequate variability. Although there is no absolute cutoff score what's high and low variability in items, standard deviations around the means of at least .5 on traditional five-point Likert scales can be considered as acceptable variability. All 42 items displayed in Tables 2 through 4 had standard deviations higher than .5 with values that ranged between .71 (Q57) and 1.45 (Q75). The means of item variances for the 11 scales was also acceptable with values ranging between .53 (i.e. intentional readiness for change) and 1.24 (i.e. emotional readiness for change). Although none of the 42 items were excluded, we note that the scale *intentional readiness for change* had a lower level of variability (SD = .53) and higher mean (M = 4.09) compared to the other scales in the CCQ.

The following step in analyzing these 42 items was an examination of the intercorrelation matrix between the items and their scales. The items had intercorrelations higher than .4 with all other items in their scales (Hinkin, 1998). Because all items reached this recommended minimum level, none were eliminated.

**Internal consistency reliability.** Based upon the promising results from the exploratory factor analyses and interitem analyses, one could expect that the 11 scales that emerged from the prior analyses will show acceptable internal consistency. This was the case with Cronbach alpha's ranging between .68 (i.e. politicking) and .89 (i.e. intentional readiness for change).

**Conclusion.** A comparison of the results from study 2 to the assumptions posited after the content adequacy test, one may conclude that the data driven dimensions are a good representation of the expected structure that was assumed to emerge from the items generated in the pilot study. Indeed, we found strong evidence for the unidimensional structure of the context factors *cohesion* and *politicking*. *Trust in leadership* was refined leading to a revision of the meaning of this scale. Actually this new scale captures the trustworthiness of communication by management in general. Furthermore, as was anticipated the process factors *participation* and *support by supervision* also had a more internal context part that is independent of any specific involvement in the change process. Subsequently, these new context dimensions were called *general support by supervision* and *participatory management*.

With respect to the change process factors the factorial structure of *attitude of top management towards change* was corroborated. However, for both process factors

*quality of change communication* and *participation* we noticed that a more general loading pattern appeared covering both dimensions. This new factor produced from the combination of both factors was labeled *involvement in the change process*. Finally, we noticed that the process part of *support by supervision* was referring to supervision's ability to deal with a specific change project. Thus, we called this factor *ability of management to lead change*.

To conclude, the anticipated three factorial structure of our outcomes was also confirmed: *emotional readiness for change*, *cognitive readiness for change* and *intentional readiness for change*. Although the results from studies 1 and 2 provided fairly strong evidence for the content and construct validity of these 11 scales, in study 3 this structure will be replicated by means of confirmatory factor analyses.

#### *Confirmatory factor analyses: Study 3*

**Organizational context.** To replicate the items, scales, and factors that emerged from study 2, data were collected from 47 different organizations covering several activities and sectors. This sample included more profit than non-profit sector companies (profit:  $n = 35$ ; non-profit:  $n = 12$ ). Similar to study 2 each organization was undergoing a change project.

The procedure for collecting data in each organization was similar to the one described in study 2. A total of 1285 individuals filled out the survey, meaning that on average 27 employees for each organization agreed to participate. This sample included more participants from the profit sector ( $n = 797$ , 62%) than the non-profit sector ( $n = 488$ , 38%). In addition, we observed that there were slightly more people holding a non-managerial ( $n = 491$ , 53%) than a managerial job position ( $n = 433$ , 47%), more male ( $n = 594$ , 62.5%) than female respondents ( $n = 357$ , 37.5%), and that the age of the participants followed a heterogeneous distribution (< 25 years: 5% ( $n = 48$ ); 25 – 34 years: 28.5% ( $n = 261$ ); 35 – 44 years: 36.5% ( $n = 334$ ); > 44 years: 30% ( $n = 273$ ). In short, this replication study included a heterogeneous sample of participants.

**Results.** Confirmatory factor analyses was performed to further analyze the factor structure of the CCQ and provided additional evidence of the construct validity of the eleven scales. The results of these analyses are summarized in Table 5. According to Hair et al. (1998) the adequacy of a model should be determined based on an examination of a set of fit indices. Apart from reporting the traditional absolute

measures of fit (likelihood ratio  $\chi^2$ , normed  $\chi^2$ , GFI, RMR and RMSEA), ‘incremental fit indices’ were computed to determine the adequacy of our models. For this inquiry the normed fit index (NFI), the Tucker-Lewis index (NNFI) and comparative fit index (CFI) were deemed appropriate measures of incremental fit (Kline, 2004; MacCallum & Austin, 2000).

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Insert Table 5 about here

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The results indicated that the fit of the internal context (i.e., cohesion, politicking, trust in leadership, participatory management and general support by supervision), the process (i.e., attitude of management towards change, involvement in the change process, ability of management to lead change) and the outcome variables (i.e., emotional readiness for change, cognitive readiness for change and intentional readiness for change) were acceptable. The values for the normed  $\chi^2$  index of the three first-order factor models (mod1, mod6, and mod11) were well within the boundaries of 2.0 and 5.0 (Kline, 2004). The goodness-of-fit index (GFI) exceeded the .9 cutoff value, indicating adequate fit of these models. Also the RMR index was satisfying with values below .05. Accompanying RMSEA values were also good with values below the .08 criterion. In addition to the absolute measures of fit, the incremental fit indices (NFI, NNFI and CFI) reached the recommended criterion levels (.9). Overall, based on these indices one may conclude that the ‘first order 5-factor model of internal context (mod1)’, the ‘first order 3-factor model of process (mod6)’, and the ‘first order 3-factor model of readiness for change (mod11)’ fitted the data very well.

**Model misspecification.** Although we feel safe to say that our hypothesized models (mod1, mod6, mod11) fitted the data well, Mulaik et al. (1989) suggested that good fitting models may suffer from misspecification, suggesting that alternative models should be considered. Before comparing alternative models we first examined model misspecification by evaluating modification indices (MI’s) for variances, covariances and regression weights.

The modification index of the error covariance between the *trust in leadership* items Q65 (i.e., Corporate management team keeps all departments informed about its

decisions) and Q76 (i.e., Two way communication between corporate management team and departments is very good), suggested a reparameterization of the ‘first order 5-factor model of internal context (mod1)’ by re-estimation of a new model that incorporates this error covariance (mod2). The decision, however, to reparameterize a model based on MI specification only is not acceptable. Therefore MI specification should have a sound substantive sense (Joreskog, 1993). The specification of the error covariance between Q65 and Q76 has substantive meaning, because the error correlation between both items indicates possible redundancy in the item content. A chi-square difference test ( $\Delta\chi^2$ ) between the model without the error specification (mod1) and with error specification (mod2) demonstrated that the latter model had significantly better fit ( $\Delta\chi^2_{\text{mod1-mod2}} = 98.97$ ,  $df = 1$ ,  $p < .001$ ). With respect to the ‘first order 3-factor process model (mod6)’ we observed that a reparameterization with the free estimation of the error covariance (mod7) between items Q38 (i.e., Our department’s senior managers have trouble in adapting their leadership styles to the changes) and Q46 (i.e., Our department’s executives focus too much on current problems and too little on their possible remedies) yielded a better fit ( $\Delta\chi^2_{\text{mod6-mod7}} = 34.93$ ,  $df = 1$ ,  $p < .001$ ). Again specifying the error covariance between both items was justified because it may indicate redundancy in item content. Finally, with respect to the ‘first order 3-factor outcome model (mod11)’ no reparameterization on the basis of MI specification was acceptable.

**Model comparison.** Apart from respecification based on MI’s, we made a comparison of the hypothesized models (mod1, mod6, mod11) against at least three alternative models (null model, first order single-factor model, and second order factor model). In direct comparisons between ‘model 1’ and the ‘null model’ (i.e. model in which no variables are related, mod3) and the ‘single factor model’ (i.e. model in which all 18 items represent a single factor that could be labeled internal context, mod4), the chi-square differences demonstrated the superiority of the first order 5-factor model ( $\Delta\chi^2_{\text{mod3-mod1}} = 7584.22$ ,  $df = 28$ ,  $p < .001$ ;  $\Delta\chi^2_{\text{mod4-mod1}} = 2797.68$ ,  $df = 10$ ,  $p < .001$ ). Similarly, we found that the hypothesized ‘first order 3-factor models’ for both process ( $\Delta\chi^2_{\text{mod8-mod6}} = 7372.05$ ,  $df = 18$ ,  $p < .001$ ;  $\Delta\chi^2_{\text{mod9-mod6}} = 753.19$ ,  $df = 3$ ,  $p < .001$ ) and outcome models ( $\Delta\chi^2_{\text{mod12-mod11}} = 4889.12$ ,  $df = 8$ ,  $p < .001$ ;  $\Delta\chi^2_{\text{mod13-mod11}} = 1263.66$ ,  $df = 3$ ,  $p < .001$ ) yielded better fit than the more restricted models (i.e. null model and single factor model).

Another alternative to the hypothesized first order models was to specify a structure which accounts for the variances and covariances between the first order latent factors. These models also labeled second order factor models (Rindskopf & Rose, 1988), put structure onto the first order factors by introducing a general latent factor. A word of caution, however, is the identification problem of second order models that only incorporate three or less first order factors. This implies that the overall test of goodness-of-fit cannot test the second order structure of these models.

However, to make it possible to examine this second order structure of the outcome and process models we checked whether additional degrees of freedom could be gained by making equality restrictions on factor loadings or error variances. Applying the critical ratio difference method (Byrne, 2001) indicated that the variances of the residuals of the three first order process factors (i.e., involvement in the change process; ability of management to lead change; attitude of management towards change) could be constrained to equality. Similarly for the three factor outcome model, error variances for both dimensions *cognitive readiness for change* and *intentional readiness for change* were set to equality. These imposed restrictions made it possible to test both second order factor models that were overidentified (mod10 and mod15). Because the number of data points exceeded the number of parameters to be estimated, no such parameter restrictions were necessary for testing the second order structure of the ‘5-factor internal context model (mod5)’.

A comparison of the goodness-of-fit indices for the hypothesized first order internal context model (mod1) against the second order internal context model (mod5), showed that the absolute fit measures (GFI, RMR and RMSEA) and incremental fit measures (NFI, NNFI and CFI) were lower in the second order model. Although the fit was still acceptable with values that exceeded the required cutoff criteria, the chi-square difference test between both models indicated a significant lower fit for the second order model ( $\Delta\chi^2_{\text{mod5-mod1}} = 119.70$ ,  $df = 5$ ,  $p < .001$ ). Although this second order model is more parsimonious, the lower fit indicated it is better to rely on the first order model. The second order structure for the process and outcome models (mod10 and mod15) did not yield worse nor better fit, as indicated by the chi-square difference tests ( $\Delta\chi^2_{\text{mod10-mod6}} = 0.18$ ,  $df = 2$ , n.s.;  $\Delta\chi^2_{\text{mod15-mod11}} = 3.49$ ,  $df = 1$ , n.s.). The only difference between the first order 3-factor models and the second order models, is that in the second order models a structure was imposed onto the correlational pattern among the first order factors (Rindskopf & Rose, 1988).

Thus, making a choice between first order and second order models rests purely on theoretical reasoning. In sum, adopting the second order factor structure of the process and the outcome model (mod10 and mod15) can be meaningful, because literature distinguishes similar categories in change research (Armenakis & Bedeian, 1999).

In the process of further comparing alternative models, we also tested a ‘first order 2-factor outcome model (mod14)’ where both the cognitive and emotional components of readiness for change were combined into a single factor. This collapse into two instead of three factors is supported by the Theory of Planned Behavior (Ajzen, 1991), which states that both affect and cognition are attitudinal precursors of people’s intention to act. Results from our analyses demonstrated that the 2-factor model in terms of fit was no improvement over the three-factor model ( $\Delta\chi^2_{\text{mod14-mod11}} = 265.97, df = 1, p < .001$ ).

To conclude, all 42 items were incorporated in a ‘first order 11-factor model (mod16)’, allowing all eleven latent factors to be mutually correlated. In addition, we tested a ‘second order 3-factor model’ with internal context, process and outcome as second order factors (mod17). The first order model with 11 factors fitted our data substantially better than the second order model ( $\Delta\chi^2_{\text{mod17-mod16}} = 780.58, df = 41, p < .001$ ). Furthermore, all fit indices exceeded the recommended cutoff values.

**Conclusion.** Although other potential models could be tested, we felt the models summarized in Table 5 were the only ones that had substantive meaningfulness. In consequence, we did not compare the numerous combinations of two, three and four-factor models. In sum, the analyses suggested that the 42 items constituted an acceptable version of internal context variables, process factors of change, and readiness for change.

#### *Scale Evaluation and Replication: Studies 3 & 4*

Beyond the construct validity evidence provided by factor analysis, we further checked for convergent validity, discriminant validity, known-groups validity, concurrent validity, and shared variance validity. Data from study 3 was used to explore the convergent validity, discriminant validity, known-groups validity, and shared variance of constructs at the unit level. To examine both convergent and discriminant validity of the CCQ, we explored the correlations between the context (5), process (3), and outcome scales (3) (Table 6). With regard to known-groups validity we performed ANOVA’s with sector (profit versus non-profit) and job level

(managerial versus non-managerial) as fixed factors to detect subgroup differences in the 11 dimensions. To assess concurrent validity, we conducted multiple regression analyses with the three readiness for change variables as DV's and context and process factors as IV's. Finally, three measures of interrater-reliability (Lebreton & Senter, 2007) were computed to determine the reliability of these individual level constructs at the work unit or organization level. To conclude, in study 4, we examined whether the factor structure of the Dutch version of the CCQ would also be replicated for the translated version administered to a sample of native English speakers.

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Insert Table 6 about here

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***Convergent and discriminant validity.*** Measures that assess related things should correlate more highly (i.e., convergent validity), than measures that assess distinct phenomena (i.e., discriminant validity). This implies that the correlations of context with context scales, process with process scales and outcome with outcome scales should be stronger, than the correlations between outcome-process, outcome-context, and process-context. Because the computed correlations are dependent correlations from one sample, we used the formula suggested by Cohen and Cohen (1983) to check for significant differences. In total, 22 tests were performed (Table 7).

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Insert Table 7 about here

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Tests 1 through 6 showed whether within process scale correlations ( $r_{(\text{process-ATC})}$ ,  $r_{(\text{process-INV})}$ ,  $r_{(\text{process-ABMC})}$ ) were significantly stronger than the correlations of these process dimensions with the context ( $r_{(\text{context-ATC})}$ ,  $r_{(\text{context-INV})}$ ,  $r_{(\text{context-ABMC})}$ ) and outcome variables ( $r_{(\text{outcome-ATC})}$ ,  $r_{(\text{outcome-INV})}$ ,  $r_{(\text{outcome-ABMC})}$ ). All six tests yielded positive and significant differences, indicating that the correlations between the process scales (INV, ABMC, ATC) were stronger than the correlations of these same process variables with scales measuring different constructs (context and outcome).

Subsequently, tests 7 through 12 indicated the differences between the within-outcome variable correlations ( $r_{(\text{outcome-INRE})}$ ,  $r_{(\text{outcome-COGRE})}$ ,  $r_{(\text{outcome-EMRE})}$ ) and the process-outcome ( $r_{(\text{process-INRE})}$ ,  $r_{(\text{process-COGRE})}$ ,  $r_{(\text{process-EMRE})}$ ) and context-outcome correlations ( $r_{(\text{context-INRE})}$ ,  $r_{(\text{context-COGRE})}$ ,  $r_{(\text{context-EMRE})}$ ). In four of the six tests we found that the within-outcome variable correlations were significantly stronger, and as such provided evidence for the convergent and discriminant validity of these scales. Only for the scale cognitive readiness for change we found a somewhat different correlation pattern.

Finally, we examined whether the within-context variable correlations ( $r_{(\text{context-GENSUP})}$ ,  $r_{(\text{context-TLE})}$ ,  $r_{(\text{context-COH})}$ ,  $r_{(\text{context-PARMA})}$ ,  $r_{(\text{context-POL})}$ ) were stronger than the outcome-context ( $r_{(\text{outcome-GENSUP})}$ ,  $r_{(\text{outcome-TLE})}$ ,  $r_{(\text{outcome-COH})}$ ,  $r_{(\text{outcome-PARMA})}$ ,  $r_{(\text{outcome-POL})}$ ) and process-context correlations ( $r_{(\text{process-GENSUP})}$ ,  $r_{(\text{process-TLE})}$ ,  $r_{(\text{process-COH})}$ ,  $r_{(\text{process-PARMA})}$ ,  $r_{(\text{process-POL})}$ ). In alignment with the expectations we observed that in four of the five cases (tests 13, 15, 16 and 17), the within-context correlations were stronger than the outcome-context correlations. Furthermore, we noticed that only one within context correlation ( $r_{(\text{context-COH})}$ ) was significantly stronger than its correlation with the process factors. In summary, based upon these tests (15 out of 22 tests were confirmed) we conclude that the scales of the CCQ have demonstrated adequate convergent and discriminant validity.

**Known-groups validity.** Known-groups validity is based on hypotheses that certain groups of respondents will score differently on a scale than others (Spector, 1994). A first important group difference to be investigated is the perceived difference in change climate scores between profit and non-profit sector employees. Literature suggested that generic context features of both the profit and non-profit-sector can elicit differences of how people think about, experience and perceive change (Boyne, 2002; Pettigrew et al., 2001). For instance, it has been noted that the public and private sector are distinct in terms of vision, ownership, markets, values, performance expectations or strategic constraints (Hull & Lio, 2006), and that these differences in generic characteristics shape employees' perceptions of change.

Apart from profit versus non-profit group membership, a second important group membership to be considered is the job level held by respondents. According to the 'hierarchical differentiation theory' managerial – non-managerial membership affects the attitudes, beliefs, intentions and behaviours of members (Van Maanen & Barley 1985). Strebel (1998), for instance, noticed that management and employees perceive change differently, with managers seeing change as an opportunity, for both



the business and themselves, and employees typically seeing change as disruptive, intrusive and likely to involve loss.

Analysis of variance was performed to assess the main effects and interaction effects of both job level and sector on the context, process and readiness for change dimensions. The means for each group combination are displayed in Table 8. Because participation to this study was on a voluntary basis, and the fact that anonymity was maximized, not all respondents completed the demographic information with regard to job level. Thus, for job level only 924 completed questionnaires were included for analysis.

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Insert Table 8 about here

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We observed significant main effects of sector for *trust in leadership* ( $F(1, 1283) = 35.04, p < .001$ ), *participatory management* ( $F(1, 1283) = 41.79, p < .001$ ) *involvement in the change process* ( $F(1, 1283) = 14.57, p < .001$ ), *attitude of top management towards change* ( $F(1, 1283) = 66.71, p < .001$ ), *intentional readiness for change* ( $F(1, 1283) = 7.92, p < .01$ ), and *emotional readiness for change* ( $F(1, 1283) = 12.70, p < .001$ ). On a five-point Likert scale (1 = strongly disagree and 5 = strongly agree), respondents from the profit sector on average scored higher on *trust in leadership*, *involvement in the change process*, *attitude of top management towards change*, *intentional readiness for change*, and *emotional readiness for change*. A lower score was noted for *participatory management*. Regarding job level, we found significant main effects for all context (GENSUP  $F(1, 922) = 15.27, p < .001$ ; TLE  $F(1, 922) = 35.41, p < .001$ ; COH  $F(1, 922) = 18.27, p < .001$ ; PARMA  $F(1, 922) = 60.15, p < .001$ ; POL  $F(1, 922) = 50.55, p < .001$ ), process (INV  $F(1, 922) = 59.23, p < .001$ ; ABMC  $F(1, 922) = 47.48, p < .001$ ; ATC  $F(1, 922) = 36.80, p < .001$ ), and readiness for change variables (INRE  $F(1, 922) = 23.81, p < .001$ ; COGRE  $F(1, 922) = 71.28, p < .001$ ; EMRE  $F(1, 922) = 40.38, p < .001$ ). With exception for *politicking*, respondents holding a managerial position reported higher scores on all change climate scales. To conclude significant interaction effects were noted for *general support by supervision* ( $F(1, 920) = 4.40, p < .05$ ), *cohesion* ( $F(1, 920) = 8.65, p < .01$ ), *ability of management to lead change* ( $F(1, 920) = 6.62, p < .05$ ), and *intentional*

*readiness for change* ( $F(1, 920) = 5.59, p < .05$ ). In short, as expected our scales effectively discriminated between sector and job position.

**Concurrent validity.** As an alternative to prospective validation, researchers often obtain test scores and criterion measures at the same point in time and see how strongly the two correlate. In the CCQ both context and process factors of change are considered as enablers of readiness for change (Holt et al., 2007a; Eby, Adams, Russell, & Gaby, 2000). Using regression, after controlling for the effects of sector and job position, these eight predictors explained respectively 13 per cent of the variance in *intentional readiness for change*, 35 per cent of the variance in *cognitive readiness for change*, and 25 per cent of the variance in *emotional readiness for change*. Not all eight context and process factors were related with the three readiness for change variables (Table 9). The fact that these antecedents yielded different effect patterns supported the assumption for measuring readiness for change as a three-facetted concept. Positive significant relationships were noted between *intentional readiness for change* and *participatory management* ( $\beta = .12, p < .001$ ), *intentional readiness for change* and *involvement in the change process* ( $\beta = .09, p < .05$ ), and *intentional readiness for change* and *attitude of top management towards change* ( $\beta = .25, p < .001$ ). The relationships that did emerge between *cognitive readiness for change* and *trust in leadership* ( $\beta = .19, p < .001$ ), *cognitive readiness for change* and *politicking* ( $\beta = -.18, p < .001$ ), and *cognitive readiness for change* and *ability of management to lead change* ( $\beta = .28, p < .001$ ) were in the expected directions. To conclude positive relationships were found between *emotional readiness for change* and *participatory management* ( $\beta = .08, p < .05$ ), *emotional readiness for change* and *involvement in the change process* ( $\beta = .29, p < .001$ ), *emotional readiness for change* and *ability of management to lead change* ( $\beta = .18, p < .001$ ), and *emotional readiness for change* and *attitude of top management towards change* ( $\beta = .10, p < .01$ ). In summary, these results indicated that both internal context factors and process factors of change are related with readiness for change in the expected direction.

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Insert Table 9 about here

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**Shared variance validity.** Earlier in this paper we assumed that in situations where individual perceptions and/or meanings are sufficiently shared, one can use the aggregated individual perceptions to describe organizational climate in psychologically meaningful terms (James, James, & Ashe, 1990). This implies that the individual perceived climate scales become dimensions of organizational change climate when they are shared and agreed upon (James & Jones, 1974). Thus within-group agreement and reliability should be computed before our measures can be used at the organizational or work-unit level. In that respect we computed three measures of interrater agreement (Lebreton & Senter, 2007):  $R_{wg(J)}$ , ICC(1), and ICC(2). In Table 10 all three indices are displayed for each change climate dimension separately.

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Insert Table 10 about here

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Common practice is to conclude that aggregation of lower level scales to a higher level is appropriate when the mean  $R_{wg(J)}$  or median  $R_{wg(J)}$  equals or exceeds .70. All eleven scales of our instrument exceeded the recommended level. Also the reliability of the group means was adequate (ICC(2)). Only the reliability score for *general support by supervision* was below the .70 level. Eight out of eleven ICC(1) values were medium effect sizes with scores ranging between .13 and .24. Three ICC(1) values were small effect sizes (.10 or lower), indicating that only a small part of the variation in the measure resided at the organizational level. In summary, these three indices suggested that the scales of our questionnaire, with exception for *general support by supervision*, can be aggregated at the organizational level of analysis.

**English version of CCQ: Study 4.** Although the Dutch version of the change climate questionnaire has demonstrated adequate validity, the purpose of study 4 was to replicate the factor structure of this questionnaire with a sample of native English speaking respondents. A common procedure for guarding against language bias in measurement scales is back translation. A Dutch-English interpreter translated the Dutch CCQ into English and then the authors translated this version back into Dutch. Because the meaning of the translated version was still the same as the first version, we decided that our scales had translation equivalence.

The English version of the CCQ was administered in a public sector agency in Suffolk County (Great Britain). Changes were made to the political structures of the Council and a range of initiatives had been taken to promote a more corporate approach, to encourage partnership working and develop locality arrangements. A total of 799 individuals participated on a voluntary basis. Because absolute anonymity was promised, respondents had the choice not to fill out demographic information. On the basis of those who did complete this information, we note that the majority of the respondents had a management position in their company (managerial: 72% (n = 539); non-managerial: 28% (n = 210), and were 45 years or older (< 25 years: 5.5% (n = 42); 25 – 34 years: 16.5% (n = 128); 35 – 44 years: 25% (n = 195); > 44 years: 53% (n = 417)). Approximately as many male as female employees completed the CCQ (male respondents: 49% (n = 384); female respondents: 51% (n = 403)).

In this replication study, a confirmatory factor analysis of the context, process and outcome scales was conducted to further analyze the factor structure and provide additional evidence of the construct validity of our questionnaire. Results from these analyses indicated that the 18 internal context items were adequately represented by the 5-factor model (with error specification between items Q65 and Q76). The values reported for GFI (.94) and CFI (.91) all exceeded the recommended cutoff score. The values for NFI (.88) and NNFI (.89) approximated the .9 criterion. The  $\chi^2/df$  value (3.79) was well within the recommended range of values. This was also the case for the RMR (.05) and RMSEA (.06) values. A factor structure test of the 15 process items demonstrated that a 3-factorial model (INV, ABMC, and ATC) yielded the best fit when the items Q35 (i.e., Departments are consulted about the change sufficiently) and Q47 (i.e., We are sufficiently informed of the progress of change) were excluded from the *involvement in the change process* scale ( $\chi^2/df = 4.85$ ; RMR = .04; RMSEA = .07; GFI = .94; CFI = .91; NFI = .89; NNFI = .89). Finally, to achieve adequate fit for the 3-factor outcome model, item Q75 (i.e. I find change refreshing) was omitted from the analysis. All fit indices for the hypothesized 3-factor model (8 items) were good, indicating that this model was well represented by the data ( $\chi^2/df = 3.98$ ; RMR = .02; RMSEA = .06; GFI = .98; CFI = .96; NFI = .95; NNFI = .93).

In conclusion, the English version of the Dutch CCQ constituted an acceptable version of the context, process and outcome factors when three items Q35 (INV), Q47 (INV), and Q75 (EMRE) were omitted. Although the fit indices were not as high as in study 3, they were in generally acceptable. These lower fit indices are not totally

unexpected since our original Dutch version was tested on a much broader sample of companies (more than 80 companies), whereas the translated version was based on data acquired from a single company. Despite the limitations of four studies we believe that there is strong agreement in the factor structure of the original and translated version of the questionnaire. Thus, these findings offer support to the construct validity of the CCQ.

## **Discussion**

This inquiry was designed to construct a new instrument that measures the circumstances under which change embarks (context), the way a specific change is implemented (process), and assess the level of readiness at the individual level. Independent of the content of change (what change is about) and the individual attributes of those undergoing change, this instrument allows a thorough diagnostic investigation of the change climate or internal organizational sources that are available to deal more effectively with change. Despite the general consensus about the salient role of organizational climate in understanding the processes that lead to successful change implementation (Beer & Nohria, 2000; Heracleous, 2001; Schneider et al., 1996), the alignment between change climate (sources of readiness, i.e. context and process) and readiness for change has been rarely examined (Jones et al., 2005). In consequence, a first step towards a more successful implementation of change projects starts with a reliable and valid assessment of the crucial levers of readiness for change. Therefore a psychometric sound instrument was designed that measures the context, the process and readiness for change, which then can serve as a guide for developing a strategy for the effective implementation of change. To fulfil this objective, we followed several steps described by Hinkin (1998): (a) to specify the content dimensions of change climate by integrating organizational climate theory, and organizational development theory; (b) to develop items that measure the domain; and (c) to determine the extent to which items measure that domain. Finally, this tool was tested in multiple field settings to increase the ecological validity.

A first challenge in developing the instrument was specifying a theoretically meaningful universe that represented the context, process factors of change, and readiness for change, but also explained the dynamics between those sets of variables. On the basis of a growing body of literature, the human relations perspective (Emery & Trist, 1965; McGregor, 1960) offered a framework from which the climate

dimensions (i.e. context and process factors) were tapped as relevant sources of readiness for change (Burnes & James, 1995; Jones et al., 2005, Zammuto & O'Connor, 1992). In short, the human relations framework provided a conceptual sound model from which the CCQ was developed. In total, ten dimensions were deduced from literature: three context variables (i.e., trust in leadership, politicking and cohesion), four process variables (i.e., participation, support by supervisors, quality of change communication, and attitude of top management towards change), and three readiness for change variables (i.e. cognitive, intentional, and emotional readiness for change). The item generation process for those ten dimensions resulted in 63 items.

After consulting ten experts on the subject matter, these 63 items were regrouped into 12 dimensions. Three independent field studies were conducted to further examine the reliability and validity of these scales. Although the intended factor structure (12 dimensions) did not completely emerge (participation in change project and quality of change communication loaded on one factor), we feel that the eleven factors that did emerge can be useful in an organizational setting. To analyze the factor structure, the original 63 items were administered to more than 3,000 employees at various levels of hierarchy in over 85 companies. The criteria used to examine the reliability, factor validity, construct validity (i.e. convergent and discriminant validity), known-groups validity, concurrent validity, and shared variance validity were satisfied. In sum, these findings suggest that our 42-item Dutch Change Climate Questionnaire meets the standards of a psychometric sound measurement instrument (American Psychological Association, 1995; Hinkin, 1998). These 42 items represent following 11 scales: (1) general support by supervision (context), (2) trust in leadership (context), (3) cohesion (context), (4) participatory management (context), (5) politicking (context), (6) involvement in the change process (process), (7) ability of management to lead change (process), (8) attitude of top management towards change (process), cognitive readiness for change (outcome), emotional readiness for change (outcome), and intentional readiness for change (outcome).

### *The strengths of the CCQ*

There are several unique contributions made by the CCQ. First, because the authors followed an accepted step-by-step procedure in designing this instrument

(Hinkin, 1998), one may conclude that initial evidence of reliability and validity is provided. The CCQ is a welcome tool for both practitioners and scholars, because there are very few well-validated measures that assess simultaneously the context, the process of change, and readiness for change (Holt et al., 2007b). To our knowledge, the only two change climate-alike instruments are Belasco's (1990) Readiness Mini-Quiz and Stewart's (1994) Readiness for Change Quiz. Not only are these instruments organization-centered, meaning that they measure leaders' or consultants' perceptions of the organization's general atmosphere instead of drawing on change recipients' perceptions, they are also scientifically flawed.

A second value-added by this instrument is both its person-centered and organization-centered emphasis. Although measured at an individual level of analysis, study 3 demonstrated that the individual perceptions of change climate can be aggregated at the work unit or organization level. In other words, the eleven scales except for *general support by supervision* gauge both psychological and organizational change climate. So, the individual measure focus is consistent with literature that called for a more person-centered approach to organizational change (e.g. Aktouf, 1992; Judge et al., 1999), and allows an exploration of differences in readiness between individuals (i.e. psychological change climate), but also differences between groups of individuals (i.e. team, work unit, and organizations).

A third value-added is the relatively short length of the CCQ. With only 42 items, this questionnaire covers 11 dimensions. Furthermore, since the context, process, and outcome part of the questionnaire have shown adequate reliability and validity, there is no need to fully administer the questionnaire. For example, if one is only interested in the general context under which change occurs, one can administer the 18 internal context items (five scales) without jeopardizing the psychometric quality of these scales. So, due to its short length this instrument can be combined with other scales to assess change recipients' beliefs about change (Armenakis, Bernerth, Pitts, & Walker, 2007), cynicism about organizational change (Stanley, Meyer, & Topolnytsky, 2005), change recipients internal attributes (Holt et al., 2007a), and many other change related variables. In short, the CCQ not only passes the scientific requirements (i.e., reliability and validity), it also scores excellent in terms of practicality (Thorndike & Hagen, 1969). Practicality is concerned with a wide range of factors like economy and convenience. Instrument length is one of those areas where economic and time pressures dominate. Although more items in our

CCQ could have provided even higher reliability scores, in the interest of limiting the pressure on individual respondents and organizations, we kept the number of items to a minimum. In addition a measuring device passes the convenience test if it is easy to administer. Since the contact persons and participants in our samples reported no difficulties in completing the questionnaire, we can assume that the questionnaire instructions were clear enough and easy to administer.

A fourth value-added is the focus on the receiving end of the change process (Bartunek, Rousseau, Rudolph, & DePalma, 2006). Because this instrument was designed to assess the perceptions of those undergoing change, it can be a helpful tool to identify the gaps that may exist between change agents', managers', and human resource management professionals' expectations about the change effort, and those of other organizational members. If significant gaps are identified one can plan actions and design a strategy to increase readiness for change.

A fifth value-added by this instrument involves its advantages over related measurement tools such as the 'Organizational Climate Measure' (Patterson et al., 2005) and the 'Readiness for Organizational Change Measure (Holt et al., 2007a). Although the 'Organizational Climate Measure' can offer an alternative for measuring the internal context under which change embarks, it was not designed to diagnose specific events like organizational change. In consequence, a major issue when applying the OCM to a change specific context is its omnibus measurement nature. In other words, this tool incorporates a large number of dimensions that are not relevant for the diagnosis of employees' readiness for change, and as such would imply a serious breach against the scientific principle of parsimony when used. Even a more viable alternative could be the four scales developed by Holt et al. (2007a). Although this instrument (ROCM) has passed the necessary scientific requirements, it has several areas of concern that are covered by the CCQ. One of the concerns of the ROCM is that it was only tested in two organizations, both undergoing structural changes. To put it differently, the generalizability of the results of the ROCM may be limited. The CCQ, however, was based on data acquired from a wide range of participants, with different organizational backgrounds and types of change (i.e. incremental change, transformational change). In addition, since a large amount of data was collected for the CCQ, norms for appropriate reference groups are developed (hierarchical level, public versus private sector, work unit level). These norms, will offer an extra dimension to the interpretability of the results, and increase the



diagnostic value of this CCQ. Another advantage over the ROCM is that readiness in the CCQ incorporates cognitive, affective and intentional components instead of measuring it purely in cognitive terms (Piderit, 2000).

#### *Some limitations and future research directions*

Despite the many positive notes, some further validation research will be required. A first point of notice is that the number of dimensions in the CCQ (eleven) did not align with the hypothesized model (twelve). Respondents did not make the distinction between *participation in the change project* and *quality of change communication*. A second remark involves the tests conducted with respect to convergent and discriminant validity. More appropriate tests should be performed by looking at correlations with related instruments such as the ROCM. Therefore the authors planned to administer both the CCQ and the ROCM in a follow-up study. As regards to the concurrent validation, this type of validity provides weaker evidence for criterion validity than does predictive validation. Concurrent validation would be stronger when the context factors, the process factors, and the outcome variables (readiness for change) would be collected independently for the same individuals. Therefore future research should first assess the context and the process factors of change, and approximately two weeks later administer the readiness for change scales. Finally, more research is needed for the cross-validation of the CCQ. Currently, projects are set up to further validate the instrument in French and Arabic speaking regions of the world.

In conclusion, we believe that initial steps have been made towards the development of an instrument that assesses change climate as perceived through the eyes of the change recipients. Although the findings reported are encouraging, the results need to be replicated. Therefore we hope we motivated other researchers to further explore and refine the CCQ.

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## Tables

**Table 1 Results Content Adequacy Test**

	Original # of items	Items retained after content adequacy test**	% of agreement among raters	Original scale	General (G) or change specific (S) item
<i>Process</i>					
Quality of change communication (QCC)	6	Q3: I am regularly informed on how change is going	100%	QCC	S
		Q12: There is good communication between project leaders and staff members about the organization's policy towards changes	100%	QCC	S
		Q22: Information provided on change is clear	100%	QCC	S
		Q36: Information concerning the changes reaches us mostly as rumours	100%	QCC	S
		Q47: We are sufficiently informed of the progress of change	100%	QCC	S
		*Q65: Corporate management team keeps all departments informed about its decisions	100%	TLE	G
Participation (PAR)	12	*Q76: Two way communication between the corporate management team and the departments is very good.	80%	TLE	G
		*Q20: Corporate management team clearly explains the necessity of the change	80%	ATC	S
		Q5: Changes are always discussed with all people concerned	70%	PAR	G
		Q11: Those who implement change, have no say in developing the proposals	100%	PAR	S
		Q25: Decisions concerning work are taken in consultation with the staff who are affected	100%	PAR	G
		Q34: My department's management team takes account of the staff's remarks	80%	PAR	G
		Q35: Departments are consulted about the change sufficiently	100%	PAR	S
		Q42: Staff members were consulted about the reasons for change	100%	PAR	S
		Q50: Front line staff and office workers can raise topics for discussion	90%	PAR	G
		Q51: Our department provide sufficient time for consultation	70%	PAR	G
		Q71: It is possible to talk about outmoded regulations and ways of working	80%	PAR	G
		Q74: The way change is implemented leaves little room for personal input	80%	PAR	S
		Q77: Staff members are sufficiently involved in the implementation of the changes by our department's senior managers	70%	PAR	S
		Q17: Corporate management team has a positive vision of the future	70%	ATC	S
Attitude top management towards change (ATC)	4	Q66: Corporate management team are actively involved with the changes	80%	ATC	S
		Q69: Corporate management team supports the change process unconditionally	80%	ATC	S
Support by supervisors (SBS)	6	Q1: Our department's senior managers pay sufficient attention to the personal consequences that the changes could have for their staff members	90%	SBS	S
		Q37: Our department's senior managers coach us very well about implementing change	90%	SBS	S
		Q38: Our department's senior managers have trouble in adapting their leadership styles to the changes	70%	SBS	S



		*Q15: My manager does not seem very keen to help me find a solution if I have a problem	70%	TLE	G
		*Q31: If I experience any problems, I can always turn on my manager for help	70%	TLE	G
		*Q40: My manager can place herself/himself in my position	70%	TLE	G
		*Q60: My manager encourages me to do things that I have never done before	80%	TLE	G
<i>Context</i>					
Trust in leadership (TLE)	10	Q19: Corporate management team consistently implements its policies in all departments	60%	TLE	G
		Q44: Corporate management team fulfils its promises	100%	TLE	G
		Q58: If I make mistakes, my manager holds them against me	70%	TLE	G
Politicking (POL)	5	Q8: Within our organization, power games between the departments play an important role	100%	POL	G
		Q9: Staff members are sometimes taken advantage of in our organization	70%	POL	G
		Q30: In our organization favoritism is an important way to achieve something	100%	POL	G
Cohesion (COH)	5	Q2: It is difficult to ask help from my colleagues	90%	COH	G
		Q14: There is a strong rivalry between colleagues in my department	90%	COH	G
		Q24: I doubt whether all of my colleagues are sufficiently competent	90%	COH	G
		Q48: I have confidence in my colleagues	90%	COH	G
		Q61: My department is very open	90%	COH	G
<i>Outcomes</i>					
Emotional readiness for change (EMRE)	5	Q4: I have a good feeling about the change project	90%	EMRE	S
		Q33: I experience the change as a positive process	90%	EMRE	S
		Q75: I find the change refreshing	100%	EMRE	S
		*Q55: I am somewhat resistant to change	70%	COGRE	G
		*Q73: I am quite reluctant to accommodate and incorporate changes into my work	60%	COGRE	G
Cognitive readiness for change (COGRE)	6	Q41: I think that most changes will have a negative effect on the clients we serve	100%	COGRE	G
		Q59: Plans for future improvement will not come too much	60%	COGRE	G
		Q62: Most of the change projects that are supposed to solve problems around here will not do much good	70%	COGRE	G
		*Q39: The change will improve work	90%	EMRE	S
		*Q56: The change will simplify work	90%	EMRE	S
Intentional readiness for change (INRE)	4	Q18: I want to devote myself to the process of change	100%	INRE	S
		Q57: I am willing to make a significant contribution to change	100%	INRE	S
		Q67: I am willing to put energy into the process of change	90%	INRE	S

Note: \*Items that were initially developed to represent another climate dimension but received a new classification after the content adequacy test. \*\* Only items of which the percentage of inter-rater agreement was .60 or higher are displayed.

**Table 2 Exploratory Factor Analysis Internal Context Factors**

Items	Constructs				
	GENSUP $\alpha = .82$	TLE $\alpha = .79$	COH $\alpha = .74$	PARMA $\alpha = .79$	POL $\alpha = .68$
*Q15 My manager does not seem very keen to help me find a solution if I have a problem	<b>.729</b>	-.036	-.038	.008	-.119
Q31 If I experience any problems, I can always turn on my manager for help	<b>.824</b>	.007	-.040	.000	.014
Q40 My manager can place herself/himself in my position	<b>.725</b>	.044	-.007	.026	-.061
Q60 My manager encourages me to do things that I have never done before	<b>.513</b>	.074	-.006	.032	.074
Q19 Corporate management team consistently implements its policy in all departments	-.009	<b>.748</b>	-.092	-.046	.028
Q44 Corporate management team fulfills its promises	.046	<b>.688</b>	.001	.015	.036
Q65 Corporate management team keeps all departments informed about its decisions	-.036	<b>.574</b>	.033	.091	-.098
Q76 Two way communication between corporate management team and departments is very good	.078	<b>.597</b>	.049	.045	-.103
*Q14 There is strong rivalry between colleagues in my department	-.050	-.078	<b>-.581</b>	.060	-.124
*Q24 I doubt whether all of my colleagues are sufficiently competent	-.034	.101	<b>-.519</b>	-.020	-.084
Q48 I have confidence in my colleagues	.038	.005	<b>-.778</b>	.034	.083
Q61 My department is very open	.141	.025	<b>-.623</b>	-.003	.034
Q5 Changes are always discussed with all people concerned	.009	.061	-.017	<b>.806</b>	.024
Q25 Decisions concerning work are taken in consultation with the staff who are affected	-.059	-.010	-.039	<b>.901</b>	.019
Q50 Front line staff and office workers can raise topics for discussion	.171	.008	.013	<b>.412</b>	-.087
Q8 Within our organization, power games between the departments play an important role	.038	-.035	.028	.005	<b>.624</b>
Q9 Staff members are sometimes taken advantage of in our organization	-.016	-.083	.077	-.059	<b>.473</b>
Q30 In our organization favoritism is an important way to achieve something	-.100	-.002	.005	-.011	<b>.650</b>

Note: GENSUP: general support by supervision; TLE: trust in leadership; COH: cohesion; PARMA: participatory management; POL: politicking / \* reverse scored items.

**Table 3 Exploratory Factor Analyses Change Specific Process Factors**

Items	Constructs		
	INV $\alpha = .88$	ABMC $\alpha = .82$	ATC $\alpha = .73$
Q3 I am regularly informed on how change is going	<b>.699</b>	.019	.076
Q12 There is good communication between project leaders and staff members about the organization's policy towards changes	<b>.698</b>	.054	.040
Q22 Information provided on change is clear	<b>.794</b>	-.012	.022
Q47 We are sufficiently informed of the progress of change	<b>.760</b>	.000	-.012
Q35 Departments are consulted about the change sufficiently	<b>.718</b>	.061	-.009
Q42 Staff members were consulted about the reasons for change	<b>.595</b>	.006	.086
Q1 Our department's senior managers pay sufficient attention to the personal consequences that the changes could have for their staff members	.227	<b>.531</b>	-.083
Q13 Our department's executives speak up for us during the change process	.095	<b>.699</b>	-.133
Q37 Our department's senior managers coach us very well about implementing change	.197	<b>.637</b>	-.037
*Q38 Our department's senior managers have trouble in adapting their leadership styles to the changes	-.107	<b>.687</b>	-.081
*Q46 Our department's executives focus too much on current problems and too little on their possible remedies	-.019	<b>.486</b>	.143
Q49 Our department's executives are perfectly capable of fulfilling their new function	-.024	<b>.687</b>	.100
Q17 Corporate management team has a positive vision of the future	.270	.065	<b>.493</b>
Q66 Corporate management team are actively involved with the changes	.154	.053	<b>.572</b>
Q69 Corporate management team supports the change process unconditionally	-.002	.041	<b>.664</b>

Note: INV: involvement in the change process; ABMC: ability of management to lead change; ATC: attitude of top management towards change / \* reverse scored items.

**Table 4 Exploratory Factor Analysis Readiness for Change Dimensions (outcomes)**

Items	Constructs		
	INRE $\alpha = .89$	COGRE $\alpha = .69$	EMRE $A = .70$
Q18 I want to devote myself to the process of change	<b>.866</b>	.033	.005
Q57 I am willing to make a significant contribution to change	<b>.782</b>	-.036	-.091
Q67 I am willing to put energy into the process of change	<b>.895</b>	.012	.058
*Q41 I think that most changes will have a negative effect on the clients we serve	.020	<b>.433</b>	-.190
*Q59 Plans for future improvement will not come to much	.040	<b>.572</b>	.000
*Q62 Most of the change projects that are supposed to solve problems around here will not do much good	-.027	<b>.887</b>	.064
Q4 I have a good feeling about the change project	-.011	.062	<b>-.782</b>
Q33 I experience change as a positive process	.069	-.013	<b>-.818</b>
Q75 I find change refreshing	-.002	-.011	<b>-.500</b>

Note: INRE: Intentional readiness for change; COGRE: Cognitive readiness for change; EMRE: emotional readiness for change / \* reverse scored items.

**Table 5 Summary of Confirmatory Factor Analyses**

Models	<i>Absolute and incremental measures of fit</i>							
	$\chi^2$	X <sup>2</sup> /df	RMR	GFI	RMSEA	CFI	NFI	NNFI
<i>Internal context (18 items)</i>								
Mod1: 5-factor model	363.29	2.91	.03	.97	.04	.97	.95	.96
Mod2: 5-factor model, with error specification between Q65 and Q76 (first order)	264.32	2.13	.03	.98	.03	.98	.97	.98
Mod3: Null model	7947.51	51.94	.29	.41	.20	n/a	n/a	n/a
Mod4: Single factor model	3160.97	23.42	.10	.74	.13	.61	.60	.56
Mod5: Second order model	482.99	3.72	.05	.96	.05	.96	.94	.95
<i>Process (15 items)</i>								
Mod6: 3-factor model (first order)	419.94	4.83	.03	.96	.06	.96	.95	.95
Mod7: 3-factor model, with error specification between Q38 and Q46 (first order)	385.01	4.48	.03	.96	.05	.96	.95	.95
Mod8: Null model	7791.99	74.21	.32	.32	.24	n/a	n/a	n/a
Mod9: Single factor model	1173.13	13.04	.05	.87	.10	.86	.85	.84
Mod10: Second order model (with equality constraint)	420.12	4.72	.03	.96	.05	.96	.95	.95
<i>Outcome (9 items)</i>								
Mod11: 3-factor model (first order)	116.95	4.87	.03	.98	.06	.98	.98	.97
Mod12: Null model	5006.17	139.06	.25	.42	.33	n/a	n/a	n/a
Mod13: Single factor model	1380.61	51.13	.07	.77	.20	.73	.72	.64
Mod14: 2-factor model (emotional RFC and cognitive RFC as one factor)	382.91	14.73	.05	.93	.10	.93	.92	.90
Mod15: Second order model (with equality constraint)	120.46	4.82	.03	.98	.06	.98	.98	.97
<i>Total model (42 items)</i>								
Mod16: 11-factor model (first order)	1892.65	2.48	.03	.93	.03	.95	.92	.95
Mod17: Second order model	2673.73	3.32	.05	.90	.04	.92	.89	.92

Note: n/a : not applicable for incremental fit indices

**Table 6 Summary Correlations Between Context, Process and Outcome Variables (Study 3, n = 1285)**

	<i>M</i>	<i>SD</i>	1	2	3	4	5	6	7	8	9	10
1. general support by supervision $\alpha = .80$	3.72	.79										
2. trust in leadership $\alpha = .79$	3.04	.76	.32***									
3. cohesion $\alpha = .77$	3.53	.79	.39***	.23***								
4. participatory management $\alpha = .78$	3.41	.90	.42***	.36***	.37***							
5. politicking $\alpha = .67$	3.10	.81	-.33***	-.52***	-.40***	-.41***						
6. involvement in the change process $\alpha = .87$	3.01	.78	.31***	.56***	.26***	.42***	-.42***					
7. ability of management to lead change $\alpha = .80$	3.24	.64	.54***	.49***	.38***	.45***	-.45***	.62***				
8. attitude of top management towards change $\alpha = .72$	3.59	.72	.29***	.53***	.24***	.30***	-.36***	.55***	.51***			
9. intentional readiness for change $\alpha = .86$	4.20	.59	.18***	.20***	.14***	.23***	-.17***	.27***	.30***	.34***		
10. cognitive readiness for change $\alpha = .69$	3.46	.76	.32***	.48***	.31***	.37***	-.50***	.48***	.53***	.42***	.31***	
11. emotional readiness for change $\alpha = .84$	3.64	.76	.26***	.38***	.23***	.30***	-.29***	.53***	.47***	.42***	.53***	.51***

Note: \*\*\*  $p < .001$

**Table 7 Summary Tests Convergent – Discriminant Validity**

$r_{(xy)} - r_{(zy)}$	$r_{(xy)}$	$r_{(zy)}$	$r_{(xz)}$	$\Delta r_{(xy)}$ and $r_{(zy)}$	df	t-test*	p-value (one-tailed)
1. $r_{(\text{process-ATC})} - r_{(\text{outcome-ATC})}$	.53	.39	.43	.14	1282	5.44	.001
2. $r_{(\text{process-INV})} - r_{(\text{outcome-INV})}$	.59	.44	.41	.15	1282	5.96	.001
3. $r_{(\text{process-ABMC})} - r_{(\text{outcome-ABMC})}$	.56	.43	.41	.13	1282	5.24	.001
4. $r_{(\text{process-ATC})} - r_{(\text{context-ATC})}$	.53	.34	.43	.19	1282	7.48	.001
5. $r_{(\text{process-INV})} - r_{(\text{context-INV})}$	.59	.39	.40	.20	1282	7.85	.001
6. $r_{(\text{process-ABMC})} - r_{(\text{context-ABMC})}$	.56	.46	.37	.10	1282	3.96	.001
7. $r_{(\text{outcome-INRE})} - r_{(\text{process-INRE})}$	.42	.31	.47	.11	1282	4.22	.001
8. $r_{(\text{outcome-COGRE})} - r_{(\text{process-COGRE})}$	.41	.47	.39	-.06	1282	-2.25	.01
9. $r_{(\text{outcome-EMRE})} - r_{(\text{process-EMRE})}$	.52	.47	.39	.05	1282	1.97	.02
10. $r_{(\text{outcome-INRE})} - r_{(\text{context-INRE})}$	.42	.18	.34	.24	1282	8.18	.001
11. $r_{(\text{outcome-COGRE})} - r_{(\text{context-COGRE})}$	.41	.40	.24	.01	1282	.33	.37
12. $r_{(\text{outcome-EMRE})} - r_{(\text{context-EMRE})}$	.52	.29	.29	.23	1282	8.03	.001
13. $r_{(\text{context-GENSUP})} - r_{(\text{outcome-GENSUP})}$	.36	.25	.30	.11	1282	3.58	.001
14. $r_{(\text{context-TLE})} - r_{(\text{outcome-TLE})}$	.36	.35	.27	.01	1282	.33	.37
15. $r_{(\text{context-COH})} - r_{(\text{outcome-COH})}$	.35	.23	.31	.12	1282	3.91	.001
16. $r_{(\text{context-PARMA})} - r_{(\text{outcome-PARMA})}$	.39	.30	.29	.09	1282	2.96	.001
17. $r_{(\text{context-POL})} - r_{(\text{outcome-POL})}$	.41	.32	.28	.09	1282	2.98	.001
18. $r_{(\text{context-GENSUP})} - r_{(\text{process-GENSUP})}$	.36	.38	.40	-.02	1282	-.72	.24
19. $r_{(\text{context-TLE})} - r_{(\text{process-TLE})}$	.36	.52	.37	-.16	1282	-5.99	.001
20. $r_{(\text{context-COH})} - r_{(\text{process-COH})}$	.35	.29	.43	.06	1282	2.16	.02
21. $r_{(\text{context-PARMA})} - r_{(\text{process-PARMA})}$	.39	.39	.40	.00	1282	.00	.5
22. $r_{(\text{context-POL})} - r_{(\text{process-POL})}$	.41	.41	.40	.00	1282	.00	.5

Note: \* computed t-value for the difference between two dependent correlations from the same sample. Following formula was used:  $t = (r_{xy} - r_{zy}) * \text{SQRT} [\{(n - 3)(1 + r_{xz})\} / \{2(1 - r_{xy}^2 - r_{xz}^2 - r_{zy}^2 + 2r_{xy} * r_{xz} * r_{zy})\}]$ ; GENSUP: general support by supervision; TLE: trust in leadership; COH: cohesion; PARMA: participatory management; POL: politicking; INV: involvement in the change process; ABMC: ability of management to lead change; ATC: attitude of top management towards change; INRE: intentional readiness for change; COGRE: cognitive readiness for change; EMRE: emotional readiness for change.

**Table 8 Summary Known-groups Differences**

Main-effects only	Sector (n = 1285)				Job position (n = 924)			
	Profit (n = 797)		Non-profit (n = 488)		Managerial (n = 433)		Non-managerial (n = 491)	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
1. GENSUP (con)	3.70	.83	3.75	.73	3.85	.72	3.65	.79
2. TLE (con)	3.14	.77	2.88	.74	3.17	.79	2.88	.69
3. COH (con)	3.52	.80	3.55	.78	3.69	.72	3.47	.84
4. PARMA (con)	3.29	.91	3.61	.85	3.70	.78	3.25	.95
5. POL (con)	3.13	.82	3.07	.78	2.85	.80	3.23	.80
6. INV (proc)	3.08	.78	2.91	.75	3.26	.78	3.25	.95
7. ABMC (proc)	3.26	.66	3.19	.60	3.39	.62	3.11	.60
8. ATC (proc)	3.72	.72	3.39	.67	3.75	.75	3.47	.66
9. INRE (outc)	4.23	.61	4.14	.56	4.32	.54	4.14	.60
10. COGRE (outc)	3.47	.78	3.43	.72	3.72	.66	3.33	.75
11. EMRE (outcome)	3.71	.76	3.55	.75	3.86	.70	3.56	.74

  

Interaction-effects only	Profit (n = 458)				Non-profit (n = 466)			
	Managerial (n = 196)		Non-managerial (n = 262)		Managerial (n = 237)		Non-managerial (n = 229)	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
1. GENSUP (con)	3.91	.70	3.61	.85	3.80	.73	3.71	.71
2. TLE (con)	3.31	.75	3.04	.73	3.06	.81	2.69	.61
3. COH (con)	3.80	.67	3.42	.88	3.60	.74	3.53	.80
4. PARMA (con)	3.54	.80	3.11	.98	3.83	.74	3.41	.90
5. POL (con)	2.84	.83	3.19	.86	2.86	.77	3.27	.71
6. INV (proc)	3.50	.72	3.00	.69	3.05	.76	2.74	.69
7. ABMC (proc)	3.52	.61	3.13	.64	3.29	.61	3.10	.56
8. ATC (proc)	4.04	.71	3.65	.64	3.51	.70	3.27	.61
9. INRE (outc)	4.48	.52	4.19	.59	4.19	.52	4.08	.60
10. COGRE (outc)	3.85	.61	3.41	.77	3.61	.68	3.23	.72
11. EMRE (outc)	4.09	.61	3.67	.69	3.67	.72	3.43	.77

Note: GENSUP: general support by supervision; TLE: trust in leadership; COH: cohesion; PARMA: participatory management; POL: politicking; INV: involvement in the change process; ABMC: ability of management to lead change; ATC: attitude of top management towards change; INRE: intentional readiness for change; COGRE: cognitive readiness for change; EMRE: emotional readiness for change.

**Table 9 Summary OLS Regression Analyses**

Variables	INRE		EMRE		COGRE	
	$\beta$	t-test	$\beta$	t-test	$\beta$	t-test
Sector (profit)	-.09	-2.67**	-.11	-3.74***	-.05	-1.66
Job position (managerial)	-.07	-2.15*	-.07	-2.30*	-.10	-3.69***
GENSUP	.01	.31	.00	.05	.03	.79
TLE	-.03	-.69	.02	.61	.19	5.47***
COH	-.00	-.02	.01	.30	.04	1.43
PARMA	.12	3.21***	.08	2.26*	.04	1.29
POL	.07	1.88	.03	.89	-.18	-5.61***
INV	.09	2.09*	.29	7.43***	.06	1.70
ABMC	.08	1.71	.18	4.32***	.24	6.12***
ATC	.25	6.11***	.10	2.72**	.05	1.56
R <sup>2</sup>	.18		.34		.44	

Note: \*p < .05; \*\*p < .01; \*\*\*p < .001. GENSUP: general support by supervision; TLE: trust in leadership; COH: cohesion; PARMA: participatory management; POL: politicking; INV: involvement in the change process; ABMC: ability of management to lead change; ATC: attitude of top management towards change; INRE: intentional readiness for change; COGRE: cognitive readiness for change; EMRE: emotional readiness for change.

**Table 10 Summary Interrater Agreement Indices for Change Climate Scales**

	MeanR <sub>wg(J)</sub>	MedianR <sub>wg(J)</sub>	ICC(1)	ICC(2)
1. General support by supervision	.81	.83	.03	.49
2. Trust in leadership	.84	.86	.18	.86
3. Cohesion	.81	.83	.09	.72
4. Participatory management	.76	.79	.21	.88
5. Politicking	.75	.78	.21	.82
6. Involvement in the change process	.90	.90	.16	.88
7. Ability of management to lead change	.91	.91	.14	.84
8. Attitude of top management towards change	.86	.87	.24	.89
9. Intentional readiness for change	.92	.94	.10	.75
10. Cognitive readiness for change	.82	.85	.16	.83
11. Emotional readiness for change	.86	.86	.13	.83



## Figures

*Figure 1 Classification of Climate Dimensions*

<b>Process</b>	<b>Context</b>
Quality of change communication Support by supervisors Attitude of top management Participation	Trust in leadership Politicking Cohesion



<b>Criterion – Outcome</b>
Readiness for change Emotional dimension Cognitive dimension Intentional dimension

## Appendix

### Description of the Content of each of the 10 Climate Dimensions

Context variables	Description
<i>Trust in leadership</i> (Korsgaard, Schweiger & Sapienza, 1995; Lines, Selart, Espedal, Johansen, 2005; Schoorman, Mayer & Davis, 2007)	Trust in leadership is the extent to which staff members perceive their supervisors and top management as trustworthy. Does management practice what they preach? Do they keep their promises? Are they honest and fair towards all departments? To put it differently, employees feel they can communicate openly about problems, without running the risk of being held responsible for it.
<i>Politicking</i> (Allen, Madison, Porter, Renwick & Mayer, 1979)	Politicking describes the perceived level of political games within the organization. A high degree of politicking leads to unnecessary expense, considerable delays, and unwillingness to share knowledge.
<i>Cohesion</i> (Koys & Decotiis, 1991)	Cohesion refers to the extent of cooperation and trust in the competence of team members? It is the perception of togetherness or sharing within the organization setting, including the willingness of members to support each other. In general are colleagues accessible?
<b>Process variables</b>	
<i>Participation</i> (Lines, 2004; Miller & Monge, 1986)	Participation is the extent to which staff members are involved in and informed about decisions that directly concern them, decisions about organizational change inclusive. Can procedures and guidelines be discussed bottom up? In other words, is the information supplied by front line staff considered, and is the frontline involved in the change process?
<i>Support by supervisors</i> (Eisenberger, Huntington, Hutchinson & Sowa, 1986; Eisenberger, Stinglhamber, Vandenberghe, Sucharski & Rhoades, 2002)	Support by supervisors is conceived as the extent to which employees experience support and understanding from their immediate supervisor. More specifically it measures their openness to reactions of their staff and their ability to lead them through the change process.
<i>Quality of change communication</i> (Miller, Johnson & Grau, 1994)	Quality of change communication refers to how change is communicated. The clarity, the frequency and openness determine whether or not communication is effective. Are the staff clear about how they must apply change in practice? Should they learn about changes through rumours?
<i>Attitude of top management towards change</i> (Carter, Ulrich & Goldsmith, 2005; Covin & Kilmann, 1990)	Attitude of top management involves the stance top management is taking with regard to change? Does management support the change initiative? Are they actively involved in the change?
<b>Criterion variables</b>	
<i>Emotional readiness for change</i> (Piderit, 2000; Oreg, 2006)	Emotional readiness for change is the affective reactions toward change.
<i>Cognitive readiness for change</i> (Piderit, 2000; Oreg, 2006)	Cognitive readiness for change is the beliefs and thoughts people hold about the change. For example, what are the benefits or disadvantages caused by the change?
<i>Intentional readiness for change</i> (Piderit, 2000; Oreg, 2006)	Intentional readiness for change is the extent to which employees are prepared to put their energy into the change process.