

## MASTER

### Work environment and creativity a social and motivational process

van Gool, P.J.R.

*Award date:*  
2012

[Link to publication](#)

#### **Disclaimer**

This document contains a student thesis (bachelor's or master's), as authored by a student at Eindhoven University of Technology. Student theses are made available in the TU/e repository upon obtaining the required degree. The grade received is not published on the document as presented in the repository. The required complexity or quality of research of student theses may vary by program, and the required minimum study period may vary in duration.

#### **General rights**

Copyright and moral rights for the publications made accessible in the public portal are retained by the authors and/or other copyright owners and it is a condition of accessing publications that users recognise and abide by the legal requirements associated with these rights.

- Users may download and print one copy of any publication from the public portal for the purpose of private study or research.
- You may not further distribute the material or use it for any profit-making activity or commercial gain

#### **Take down policy**

If you believe that this document breaches copyright please contact us providing details, and we will remove access to the work immediately and investigate your claim.

Eindhoven, July 2012

**Work Environment and Creativity:  
A Social and Motivational Process**

by  
P.J.R. van Gool

Student identity number 0554981

in partial fulfilment of the requirements for the degree of

**Master of Science  
in Innovation Management**

Supervisors:  
Prof.dr. E. Demerouti, TU/e, HPM  
dr.ir. P.A.M. Kleingeld, TU/e, HPM

TUE. School of Industrial Engineering.  
Series Master Theses Operations Innovation Management

Subject headings: Creativity, Work Engagement, Work Environment, Network, Decision Making, Individual Characteristics, Intuition, Intuitive

Index	3
Summary	4
1 Introduction	7
2 Theoretical background	10
2.1 Creativity	10
2.2 The Impact of the Work Environment on Creativity	11
2.3 Social Process	13
2.4 Knowledge Integration	15
2.5 Motivational Process	16
3 Method	20
3.1 Sample and Procedure	20
3.2 Measures	21
4 Results	24
5 Discussion	30
5.1 Limitations	34
2.2 Practical Implications	36
References	40
Appendix	48

## Summary

Change has become a constitutional force of today's world. To cope with this ever-changing environment, organizations need to innovate. At the basis of all innovation are the creative ideas of individuals (Amabile 1996; Nonaka, 1991). Creativity thus has become essential to organizational survival. Although creativity is of general importance to all processes involving innovation, there are typical (parts of) processes of innovation where the creativity of individuals is of special importance. For example, more creativity is called for in radical innovation as opposed to incremental innovation. Also more creativity is needed in early stages of the innovation process where the focus is more on generation of solutions rather than their implementation. (West, 2002). In order to achieve and manage innovation, organizations must find a way to capture the creative potential of individuals. The challenge is to create an organization that does this; to challenge that turbulently outside environment with an internal work environment that fosters creativity

In the current study two processes are investigated that may play a distinct role in the conversion of the organizational environment into creative performance; an intra-individual process that focuses on how perceptions of the environment lead to creativity at the individual level and an inter-individual process that concentrates on how individual creativity can benefit from social interaction.

In the inter-personal process, it was found in the present study that the creativity of a person's direct colleagues affected the person's own creative performance. This relationship was partially mediated by the social interaction of the person with his colleagues. This suggests that one becomes more creative through the interaction with creative individuals. This may be explained by additional cognitive variation that may arise where the different cognitive structures of colleagues meet in the interaction with each other. This additional cognitive variation is an important aspect of creativity (Simonton, 1999). Following Amabile's componential theory of creativity (Amabile, 1988) in which creativity arises from motivation, task relevant skills and creativity skills, the increased creative performance may be due to any of these components. Focusing on the component of task relevant skills or knowledge, the present study found that indeed knowledge integration partially mediated the relationship between the interaction with colleagues and individual creative performance. This is congruent with Amabile's theory in

which domain relevant knowledge is only one of the components of creativity. Because knowledge integration only partially mediates the relationship, there is room for other mediating effects such as the transfer of creativity skills or motivation.

The other process examined in this study in which the organizational environment may affect individual's creative performance this study examined is the effect of the individual's perception of the attributes of their work environment known as climate for creativity on creative performance. Amabile's theory on creativity states that this climate for creativity affects creative performance through its effect on an individual's intrinsic motivation. Previous research on this mediated relationship had been inconclusive (e.g. Shin & Zhou, 2003). It has been suggested that this might be due to the inadequateness of the construct used to measure intrinsic motivation and that other motivational constructs should be tested (Shalley et al 2004). Furthermore it has been suggested that positive affect may have an effect here as well (Shalley & Perry-Smith, 2004). The present study used a new motivational construct that combines vigor, absorption and dedication into the positive affective state of work engagement. It was found that work engagement fully mediated the relationship between climate for creativity and creative performance, thus substantiating Amabile's (1988) theory. The present study therefore also contributes to the research on work engagement, providing evidence of the relationship between work engagement and the positive organizational outcome of creative performance. Where previous research on the consequences of work engagement focused on more general performance measures such as in- and extra-role performance this study extends this research by focusing on the more specific measure of creative performance. It also provides support for JD-R model (Bakker & Demerouti, 2007) where job resources affect performance through their effect on work engagement. A high climate for creativity is an environment rich of perceived job resources and this study found it to have an effect on creative performance through its effect on work engagement.

Previous research showed that creativity emerges from the interaction between the individual and his characteristics and the environment with its specific characteristic (Shalley et al., 2004). The present study also found such an interaction. It was found that an intuitive decision making style moderates the relationship between a climate for creativity and creative performance, such that this relationship is stronger for individuals with a more intuitive decision making style. Not only was this relationship stronger but also were individuals with a higher intuitive decision making

style in general more creative. This raises the question how intuitive decision-making can be enhanced, because not only are individuals with an intuitive decision making style more creative, this creativity can be even more stimulated by a creative climate. Sinclair et al. (2002) offer a framework on determinants of intuitive decision-making. One of these is experience. It is proposed that people with more relevant experience are more likely to base their decisions on intuition. Findings by Burke and Miller (1999) are congruent with this proposition. Fostering individuals experience for example through training therefore is a way to enhance intuitive decision-making and though that creativity. Looking closer at the relationship between the climate for creativity and creativity, where work engagement was fully mediating the relationship, it was found that intuitive decision making moderated the relationship between a creative climate and work engagement and not (on its own) the relationship between work engagement and creativity. Individuals scoring high on intuitive decision making thus are not more creative in a creative climate because work engagement makes them more creative than their less intuitive counterparts but because a creative climate has a larger effect on their work engagement. As was expected, a creative climate is more important for higher intuitive people to foster their work engagement.

Taking into consideration both the inter- and intra-individual process, it was found that both processes add towards creative performance. Creative climate is important to foster work engagement. This work engagement is on its turn boost creative performance because it may work as a source of cognitive variation (Frederickson, 2001; Simonton, 1999) that is energetically directed towards a task (Bakker & Demerouti, 2008). This confirms the central place of intrinsic motivation that Amabile (1988) proposed. Personal characteristics (intuitive and rational decision making style) have moderating effects on this process as was expected (Shalley et al. 2004, Amabile, 1988). In addition team composition in the form of creative colleagues can increase creative performance. The presence of these creative coworkers leads to better creative performance partly due knowledge that is integrated through interacting with these co-workers.

## **1. Introduction**

Change has become a constitutional force of today's world. To cope with the ever changing environment, organizations need to innovate. This has led to the rise of the field of innovation management which has the process of innovation as its object of study. Rather than solely oriented at explanation of organizational phenomena in an innovation context, the field of innovation management also takes a design perspective. As such it actively strives to formulate "tested and grounded technological rules" that can be used in innovation contexts (Van Aken, 2004, p.1). Rooted in this field of innovation management, the present study will therefore not only seek explanation but will also propose design principles that are relevant to innovation.

At the basis of all innovation are the creative ideas of individuals (Amabile 1996; Nonaka, 1991). Creativity thus has become essential to organizational survival. Although creativity is of general importance to all processes involving innovation, there are typical (parts of) innovation processes where the creativity of individuals is of special importance. For example, more creativity is called for in radical innovation as opposed to incremental innovation. Also, more creativity is needed in early stages of the innovation process where the focus is more on generation of solutions rather than implementation of them (West, 2002). In order to achieve and manage innovation, organizations must find a way to capture the creative potential of individuals. The challenge is to create an organization that does this; to challenge that turbulent outside environment with an internal work environment that fosters creativity

In the current study two processes are investigated that may play a distinct role in the conversion of the organizational environment into creative performance; an intra-individual process that focuses on how perceptions of the environment lead to creativity at the individual level and an inter individual process that concentrates on how individual creativity can benefit from social interaction.

On the intra-individual level, it is believed that the interaction between the person with his or her specific characteristics and the perceived contextual factors leads to creativity (e.g. Shalley et al., 2004; Amabile 1996; Woodman et al., 1993). It is proposed that the environment affects creativity by either fostering or inhibiting individual's motivation. A lot of studies have investigated the relationship between specific contextual factors and creativity. Most of them assume that intrinsic motivation is the driving mechanism behind this relation.(e.g. Amabile,



1996). This intrinsic motivation is motivation stemming from the task itself. This opposed to extrinsic motivation that stems from anything but the task itself such as rewards. Few however, have directly measured this mediation. The studies that have directly addressed this mediation by intrinsic motivation have however provided inconclusive results (Shalley & Perry-Smith, 2001; Shin & Zhou, 2003). It has been suggested that other motivational constructs should be investigated and that affective tone, that is positive or negative or neutral, could play a role as well (Zhou & Shalley, 2011). In the current study therefore a different positive affective motivational construct is proposed that has emerged over the last years. This construct of *work engagement* has yielded positive results for other more general performance measures such as in-role and extra-role performance (Bakker et al., 2004) and financial returns (Xanthopoulou et al., 2009). Rather than look at a specific aspect of the organizational environment, the current research focuses on the general organizational climate as perceived by the individual that is believed to be beneficial for the individual's creative performance. This climate for creativity is proposed to make individuals more engaged in their work which on its turn enhances their creativity. This study therefore also contributes to the literature on work engagement by linking it to a more specific performance measure than before.

Researchers have argued that the influence of contextual factors may vary as a function of employees' creative personality (Zhou, 2003; Amabile, 1996; Woodman et al., 1993). An aspect of personality that has been linked to creativity is the *intuitive decision making style* (e.g. Sinclair et al., 2002). An intuitive decision making style is associated with decisions made without the use of conscious reasoning (Epstein, et al. 1996) It is proposed that a climate for creativity combined with an intuitive decision making style has a beneficial effect on creativity. And because it is proposed that work engagement mediates the relationship between climate for creativity and creativity it is also investigated in this current study whether the climate for creativity interacts with intuitive decision making to produce work engagement, or that work engagement interacts with intuitive decision making to produce creativity or that both interactions are present. Besides this psychological intra individual process, this study looks at creativity from a social inter individual level. Recent research on creativity has taken a network perspective, explaining creativity from network attributes (e.g. Perry-Smith 2006). It is proposed that networks contribute to creativity because they are a source of diverse information and knowledge. From the individual perspective a network manifests itself through the interaction

with others. The current study proposes that the creativity of others present in the working environment may be transferred via social interaction. It is further proposed the reason why diverse knowledge of the network leads to more creativity at the individual level is because the knowledge of others is integrated with individually held knowledge in the form of *knowledge integration*.

The inter- and intra-individual processes on through which the organizational environment affects creativity that are proposed in the present study are visually depicted in Figure 1. In the following section first the concept of creativity is discussed after which the two processes will be discussed in more detail.

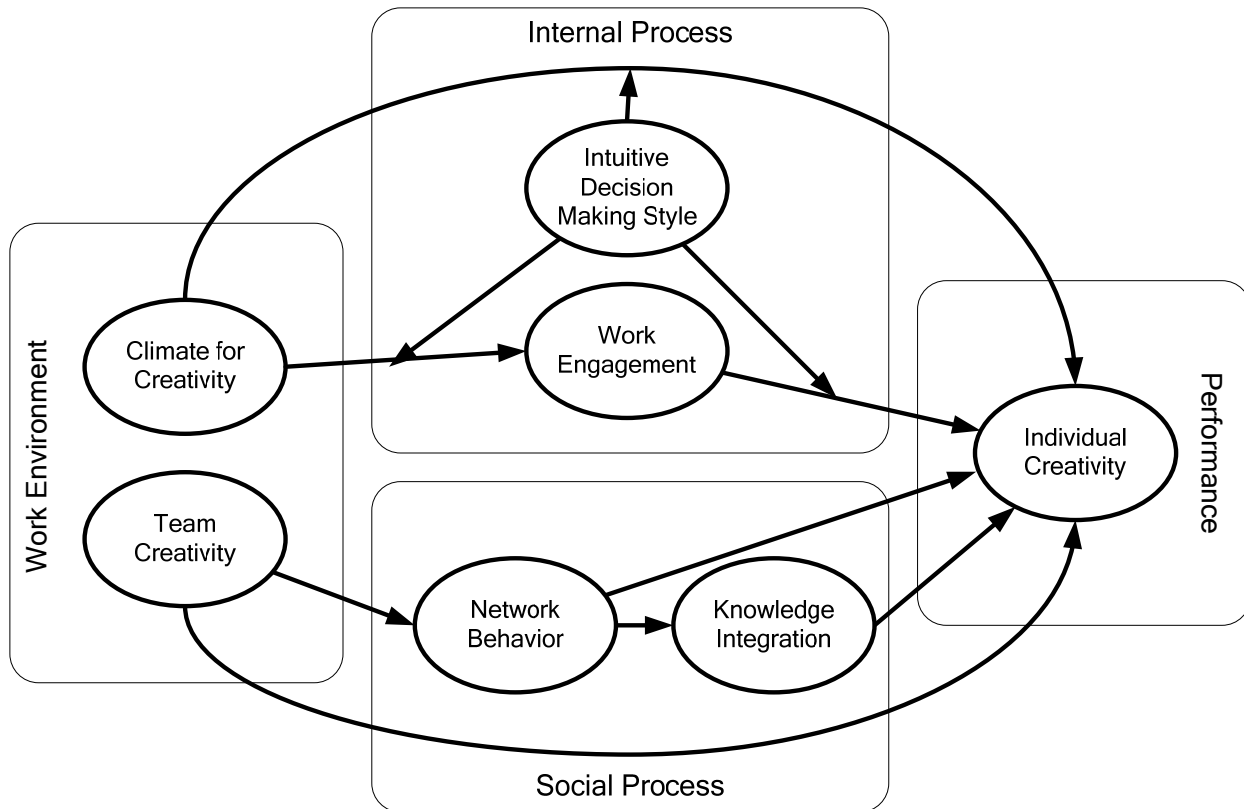


Figure 1 Conceptual Model

## 2. Theoretical Background

### 2.1 Creativity

Creativity at work refers to the creation of new and potentially useful ideas concerning products, services or procedures (e.g. Amabile, 1996; Zhou & Shalley, 2011). Within this definition, both the novelty aspect as well as the usefulness are essential for an idea to be judged as creative in a work environment. Ideas that are very novel but just bizarre are not considered to be creative. For an idea to be novel it has to be unique relatively to the currently available ideas in an organization. For an idea to be useful it has to have the potential to be of value to the organization, be it direct or indirect. As such, creativity ranges from small suggestions how to incrementally change a procedure or a product to major intellectual breakthroughs that have the potential to radically change the world.

All creative ideas are ultimately generated in the minds of people. As such it is primarily a cognitive process. In his *evolutionary theory of creative thinking*, Simonton (1999) proposed that creativity is a process of variation and selective retention. Variation is the force behind the novelty aspect of creative ideas and the selective retention is the processes in which the useful ideas are separated from the bizarre ones. In this theory creative ideas first arise as variation. This variation is a process in which information and knowledge available is used to generate a variety of ideas. Selective retention is the process through which these ideas are then critically assessed against some criteria.

Creativity is believed to arise from personal characteristics, the characteristics of the work environment, and the interaction of those two (e.g. Shalley et al. 2004; Amabile, 1996; Woodman et al. 1993). Personal characteristics include an individual's cognitive ability but also his personality and cognitive style. By themselves and, or in interaction with the context, these characteristics affect particular creative performance. Tierney et al. (1999) for example found that individuals with an innovative cognitive style, that is individuals that generates ideas that are likely to deviate from the norm, tend to be more creative than people with an adaptive cognitive style who will generate ideas that are consistent with convention. With regard to interaction of personal and contextual characteristics Baer et al. (2003) found a positive relation between

extrinsic rewards and creativity for employees with an adaptive cognitive style who worked on relatively simple jobs.

Most research on workplace creativity builds on the *componential theory of creativity* (Amabile, 1988; Zhou & Shalley, 2011). In this theory, creativity or creative behavior is most likely to arise when there is a combination of *domain-relevant skills*, *creativity-relevant skills* and *task motivation*. The first component includes an individual's knowledge and cognitive ability. The second component includes strategies on how to produce creative ideas as well as cognitive and work styles that are beneficial for creative performance. Indeed empirical research showed that training for creative problem-solving skills can enhance an individual's level of creativity (e.g. Basudur et al, 1990). Personal characteristics that are related to creativity are also part of this component. An example of this are people that are open to experience (George & Zhou, 2001). While the first two components determine what one is capable of creatively, the third component determines if creative behavior will actually happen. One may have superior relevant knowledge and excellent out-of-the-box thinking skills; if individuals are not motivated, one will just not engage and persist in the task. More specifically, intrinsic motivation should be high. Amabile proposed that intrinsic motivation should be defined as "any motivation that arises from the individual's positive reaction to the qualities of the task itself" (Amabile, 1996, p.115). Extrinsic motivation on the other hand is motivation that is induced by any source outside the task itself. Results from a meta-analysis of the relationship between motivational state and performance (Utman, 1997) showed that intrinsic motivation leads to more creative flexible thinking. The following section will elaborate on how the environment may impact creativity.

## **2.2 The Impact of the Work Environment on Creativity**

With regard to the organizational environment, the focus of most creativity research is on individual's perception of contextual elements. This perception of environmental attributes is commonly referred to as *climate*. Amabile's componential theory of creativity highlights the role of motivation in enhancing creative behavior. This theory proposes that the environment enhances or inhibits creativity via its effect on an individual's intrinsic motivation. It builds on cognitive evaluation theory (Deci & Ryan, 1985) that proposes that individuals will be intrinsically motivated towards a task if they feel competent and self-determining. A climate's

contextual factors can be either informational or controlling according to this theory. When a contextual factor is experienced as informational, it is expected to enhance intrinsic motivation. Individuals will perceive that they are supported and encouraged to take initiatives and try new things. When the contextual factor is perceived as controlling it is expected to be detrimental to intrinsic motivation and the individual will perceive that his or her thoughts and actions are being constrained. A large number of studies support this view on the effect of various contextual factors on creativity (for a review see Shalley et al., 2004). Individuals perform better creatively when their jobs are characterized high levels of autonomy, feedback, significance, identity and variety (e.g Oldham & Cummings, 1996; Amabile & Gyskiewitz, 1989), they have supportive and non-controlling supervisors (e.g. Zhou & George, 2003) and their work is evaluated in a non judgmental way (Shalley & Perry-Smith, 2001).

The organizational environment however is not only determined by individuals' perceptions of it. Organizations are inherently social, and social processes are therefore an important factor in an organizational environment. With regard to creativity one aspect that draws attention in the social environment, is the creativity of an individual's coworkers. Creativity may be contagious via a social process.

Earlier it was presented that according to the evolutionary theory of creativity (Simonton, 1999) variation is one of the two components of creative thought (the other being selective retention). This variation was seen as a process in which the available knowledge and information are used to generate novel ideas. The available knowledge and information may in the first place be the domain relevant skills an individual has because of his education, training and background. The knowledge of an individual's coworkers however may also contribute to the process of variation, especially when their relevant knowledge is different from that of the individual. This difference in knowledge may be due to the different background of the coworkers but also because of their creativity. With regard to the difference in relevant knowledge, a meta-analysis by Huelshegger et al., (2009) showed that at a group level, job relevant diversity leads to creativity. With regard to creativity, when coworkers are creative, they create variation for themselves, and this variation may be shared with others; this way the variation caused either by the difference in knowledge or by the creativity skills applied by the coworker becomes (at least partly) part of the variation of the individual. By communicating with creative coworkers one can thus not only benefit from their knowledge but also from their creativity skills which can enhance ones own variation and

by that one's creativity. The interaction extends the knowledge and creativity skills of the individual enlarging the cradle out of which variation as basis for their creativity may arise.

Besides this potentially increased variation that is induced by the knowledge and creativity skills of other creative individuals, creativity may also be contagious because creative coworkers could facilitate the acquisition of these creativity relevant skills. Shalley and Perry-Smith (2001) found that observing creative role models allows an individual to obtain strategies and approaches to perform more creatively in their work.

Considering that in an environment for creativity, social processes and perceptions of the environment could both play a role in creative performance of individuals, the following hypothesis is formulated:

*Hypothesis 1:*

*Climate for creativity and team creativity are positively associated with individual creative performance.*

### **2.3 Social Process**

In the foregoing it was proposed that team creativity leads to increased individual creativity. But how does this team creativity lead to more creativity at the individual level? It is now proposed that network behavior makes that team creativity leads to creative performance. Network behavior is here defined as the extent to which individuals interact with others about the content of their work. This network behavior may then enhance creative performance at the individual level because in the interaction with others, one could benefit from the three components of creativity as proposed by Amabile (1988). More interaction means more opportunity for information exchange which could extend the knowledge base to draw on in the creative process of variation but also exposure to knowledge that could be of use in the selective retention process (Simonton, 1999); colleagues could come up with ideas based on their knowledge but they could also disqualify ideas of the individual based on their knowledge. More interaction also means more exposure to the creativity skills of the other. Creativity skills that could not only be used for the content of the interaction but that could also be transferred (Shalley & Perry-Smith,

2001). More interaction finally could also have its effect on the motivation of the individual. Evidence for the cross-over of the motivational construct of work engagement can be found in the research of Bakker et al. (2006). Their results show that teams showed higher levels of work engagement independent from the presence of common job demands and resources (commonly found antecedents of work engagement). This cross over of work engagement could work via two processes; a conscious one and a non-conscious one. The non-conscious process may be similar to what is known as *emotional contagion* (e.g., Sy et al., 2005; Barsade, 2002). Emotional contagion occurs when people automatically mimic other behavior. As a consequence of this, they converge emotionally. Based on *emphatic crossover* (Westman, 2001), Bakker et al. (2006) propose that work engagement may cross over via the conscious cognitive process of *tuning in* to the emotions of others. In social interaction individuals empathize with each other and in this process a mood state, such as work engagement may cross over. As creativity arises as a combination of knowledge, creativity skills and intrinsic motivation (for which in this study we use the concept of work engagement), creative coworkers should possess these elements that could be transferred.

With regard to creativity skills, in interaction with creative coworkers these coworkers could use their skills to generate more variation for creative benefit of the other.

As discussed before, is creativity according to Simonton (1999) not only a process of variation, but also of selective retention. Where the process of variation mainly contributes to novelty and originality of ideas, selective retention makes sure ideas are potentially useful. In this process interaction with others may play also a role. Based on the specific knowledge these others, they may find ideas that are communicated useful that may else be overlooked.

The knowledge of others can also contribute to the creation of more variation as discussed before and it is here that there may be a role to play for *knowledge integration*. The following section will elaborate on that.

Based on the above it is proposed that the creativity of other team members may lead to individual creativity through the interaction with coworkers and the following hypothesis is formulated:

*Hypothesis 2:*

*Network behavior mediates the relationship between team creative performance and individual creative performance*

## **2.4 Knowledge Integration**

Before going deeper into the potential role of knowledge integration in the social process leading to creativity, first the concept of knowledge integration needs to be clarified. At the core of the knowledge based view of the firm lies the claim that organizational capabilities not only depend on the specialized knowledge held by individuals but also on the ability of an organization to integrate that specialized knowledge (e.g. Grant, 1996; Okhuyzen & Eisenhardt, 2002; Berends et al., 2004). This integration is becoming increasingly important because of the specialization needed by individual organizational members to attain a high level of expertise. This is driven by rapid expansion of the relevant knowledge in many fields and the limitations of human processing (Simon, 1991). Because of this specialization, knowledge is more and more dispersed in organizations, leaving firms with the challenge to integrate all this scattered knowledge.

Drawing on Alavi & Tiwana (2002) and Patrashkova-Volzdoska et al. (2003), Robert et al. (2008) define knowledge integration in a team setting as “*the ‘synthesis’ of individual team members’ information and expertise through ‘social interactions’*” (p. 315).

How does this knowledge integration play a role in creativity? In the social interaction of the team members, the different cognitive structures of the team members come together (Tiwana & McLean, 2005). Where these structures or the knowledge that is embedded in them become integrated into new knowledge, the outcome can be more creative than the outcome could have been without this integration because it draws upon a greater reservoir of knowledge. Knowledge integration may arise as a result of combined variation (Simonton, 1999) stemming from knowledge component of Amabile’s (1988) componential theory of creativity. As Tiwana & McLean (2005) remark, the integration of individually held expertise (or knowledge) at the team level is a mechanism for enhancing creativity because it leads team members to *access, explore, and use* diverse information from related knowledge domains associated with the project. In their study among 42 information systems design teams, Tiwana & McLean (2005) indeed found a



strong positive relation between the integration of individually held expertise and creativity at a team level. But as creativity is ultimately a product of individual cognition, it is proposed in this study that knowledge integration at the individual level contributes to creativity at the individual level. More specifically it is proposed that knowledge integration is a mechanism that explains how the interaction between individuals in the form of network behavior leads to individual creativity. Therefore the following hypothesis is formulated:

*Hypothesis 3:*

*Knowledge Integration mediates the relationship between network behavior and individual creative performance*

## **2.5 Motivational Process**

Besides the social process that leads from the environment to creativity, this study also investigates an intra-individual process leading from the environment to creativity. As has been discussed before suggests the componential theory of creativity that organizational climate impacts creativity through its effect on individual's intrinsic motivation. Only a few studies however, have directly tested this mediation with rather inconclusive results. Shin and Zhou (2003), for example, found that intrinsic motivation only partially mediates the relationship between transformational leadership and creativity. Moreover, Shalley and Perry-Smith (2001) found no significant relation at all between an informational or controlling expected evaluation and creativity. In their review of the research on the effect of contextual characteristics on creativity, Shalley et al. (2004) suggest that the inconclusive results may be due to inadequate measurement of intrinsic motivation and that other motivational measures should be tested. Because of this and because in recent years work engagement has emerged as a new motivational concept that has been linked to a number of general performance measures, this study investigates the role of this concept as the motivational force that connects organizational climate and creativity. Before going deeper into the role of work engagement in this process first the concept itself will be discussed.

Work engagement is defined as “*a positive fulfilling, work-related state of mind that is characterized by vigor, dedication and absorption*” (Schaufeli et al., 2002) *Vigor* is characterized by high levels of energy and mental resilience. *Dedication* is characterized by a sense of significance, enthusiasm, inspiration, pride and challenge. Finally *absorption* is characterized by being fully concentrated and deeply engrossed in one’s work. In a state of absorption time passes quickly and one has difficulties detaching oneself from the work. Conceptually vigor is closely related to intrinsic motivation (Mauno et al., 2007). Vigor sets work engagement apart from other work related positive affective concepts such as *job satisfaction* because it induces an inherent energy into the concept making it an activating state of mind. This is in contrast to *job satisfaction* that is indecisive in this dimension; it can be either activating or not. Work engagement thus is an activating positive affective state of motivation that directs energy and attention towards the work.

In their overall model of work engagement, Bakker and Demerouti (2008) position work engagement as the mediating factor between job and personal resources on the one end and performance on the other. These job resources are those physical, social or organizational aspects of a job that may be functional in achieving work goals, reduce job demands and the physiological and psychological costs that comes with them and stimulate personal growth, learning and development (Bakker & Demerouti, 2007). Several studies have found job resources to predict work engagement. Schaufeli and Bakker (2004) for example found a positive relationship between the job resources of performance feedback, social support and supervisory coaching and work engagement. Where job resources stimulate personal growth, learning and development they are assumed to play an intrinsically motivating role because they fulfill basic human needs such as needs for autonomy, relatedness and competence (Deci & Ryan, 1985; Bakker & Demerouti, 2008). It is these needs that the climate for creativity addresses. A climate for creativity is therefore proposed to be rich of perceived job resources which will foster work engagement. In a creative climate there is support for autonomy, encouragement from management, there are sufficient resources, and there is support from colleagues. Similarly, Hakanen et al. (2006) found that innovative climate as a job resource was positively related to work engagement.

There are several reasons why work engagement may lead to enhanced creativity. Frederickson (2001) proposed in her *broaden and build theory* that people’s momentary thought-action

repertoires are broadened by the experiencing of positive emotions, widening the array of the thoughts and actions that come into mind. This is believed to be one of the driving forces behind the more general performance increase associated with work engagement (Bakker & Demerouti, 2008) but this is specifically of importance for creative performance. With the wider array of thought induced by positive emotions, there is, according to Simonton (1999), more cognitive variation and this increases the probability of creative thought at the individual level. Because work engagement can be seen as a positive affective state, the initiator of positive emotions and the outcome of positive emotions (Salanova et al. 2009) it is proposed to inherit the positive effects of positive affect on creativity. Empirical support for the link between positive affect and creativity is provided by Isen (1999). In a series of laboratory experiments it was found that induced positive mood leads to higher levels of creative performance. In an organizational setting Amabile et al. (2005) found positive affect to be positively associated with creativity.

Baas et al. (2008) show that the effect of activating positive moods such as happiness and joy on creativity is larger, than the effect of non-activating positive moods such as being relaxed. Bakker and Oerlemans (2011) argue that work engagement is such a mode that is high on both positive emotions and activation. It is therefore to be expected that work engagement is more strongly related to creativity than other positive work related moods that are not necessarily activating such as for example job satisfaction, which shares no significant correlation with activation (Fisher, 1998).

The second component of work engagement, dedication, ensures that there is a focus of attention. This focus of attention leads to concentration of effort and an allocation of resources to the task. The additional cognitive resources invoked by the positive affect need to be focused on a particular (creative) task and not to get wasted. Where vigor provides the energy to perform, dedication focuses this energy on the job. Similarly, Sternberg and Lubart (1996) identified task-focused motivation as being critical for creative performance.

The last component of work engagement, absorption, may have its own contribution to creativity. In being absorbed in one's work one may forget the fears and other demands to the self thereby suspending fears of failure and negative judgment that are detrimental to creativity (Mainemelis, 2001). All of this leads to the following hypothesis:

*Hypothesis 4:*

*Work engagement mediates the relationship between the climate for creativity and individual creative performance*

There is, as discussed earlier, general agreement among researchers that creativity emerges in the interaction of the individual and his characteristics and the environment and its characteristics (Amabile 1998; Woodman et al., 1993; Shalley et al., 2004). An individual characteristic that is often linked to creativity is intuitive decision making style (e.g. Reidl & Lubart, 2001; Dane & Pratt, 2009). An intuitive decision making style is defined by attention to details in the flow of information rather than systematic search for and processing of information and a tendency to rely on premonitions and feelings (Scott & Bruce, 1994). Intuition is defined as “affectively charged judgments that arise through rapid, unconscious, and holistic associations” (Dane & Pratt, 2007, p.40). Because intuition is an unconscious process, it is not consciously controllable. This makes that work environments that are perceived as controlling (that is environments that score low on climate for creativity which is informational rather than controlling) may be especially binding for individuals that have an inclination in deciding on intuitive grounds because their preferred way of thinking is not supported. This misfit between the environment and the individual’s decision making style may lead to decreased levels of work engagement and through that to lower levels of creative performance. This leads to the following hypotheses:

*Hypothesis 5a:*

*Intuitive Decision making style moderates the relationship between the climate for creativity and individual creative performance, such that there will be a stronger relationship when intuitive decision making is high than when it is low.*

*Hypothesis 5b:*

*Intuitive decision-making style moderates the relationship between climate for creativity and work engagement, such that there will be a stronger relationship when intuitive decision making is high than when it is low.*

Intuitive judgments are affectively charged (Van Riel et al., 2006). Sinclair et al. (2002) theorized that positive moods encourage the use of intuition. Because work engagement is such a positive mood and intuition is associated with creativity it is proposed that the interaction of an intuitive decision making style and work engagement leads to enhanced creativity.

Based on this the following hypothesis is defined:

*Hypothesis 5c:*

*Intuitive Decision making style moderates the relationship between work engagement and individual creative performance, such that there will be a stronger relationship when intuitive decision making is high than when it is low.*

### **3. Method**

#### **3.1 Sample and Procedure**

Two thousand and ninety seven invitations to participate in an online survey were sent. Target participants were employees for whom creativity is to some extent a desirable component of their performance. To this end engineers, designers and researchers were selected from online databases and from the personal network of the researcher. The online databases included registers of licensed engineers and networks of researchers and designers. To verify to what extent creativity was indeed a relevant factor in their performance this was asked in the

questionnaire (the average score was 4.4 on a scale of 5 with a standard deviation of .87<sup>1</sup>). To encourage participation, the participants were given assurance that their responses would be kept confidential. In order to improve the response rate, the invitations were personalized and an optional incentive in the form of a summary of the research results was offered. There were two versions of the questionnaire an English version and a Dutch translation. Participants came from ten different countries; The Netherlands (96), Australia (42), Canada (25), Italy (14), UK (12), Ireland (10), USA (6), China (3), Brazil (1) and Switzerland (1). Ten percent ( $N=210$ ) of the invitations yielded a fully completed questionnaire, which is typical for such method to approach participants (Marcussen, 2001) 183 (87%) of the participants were male, and 24 (11%) were female. The average age was 47.0 (SD=11.1) and 60 (29%) of the participants were self employed.

### 3.2 Measures

#### *Climate for creativity*

For assessing the climate for creativity, a subsection of the KEYS instrument (Amabile et al., 1995) was used. The full instrument consists of 77 items on a 5- point likert-scale ranging from 1 (*never*) to 5 (*daily*) and is factored into eight different subscales: *supervisory encouragement*, *freedom*, *organizational encouragement*, *productivity*, *organizational impediments*, *work group support*, *sufficient resources* and *top management support*. To limit the questionnaire length, for each subscale the highest correlating items (Mostafa, 2005) were taken. Furthermore, the productivity and organizational impediments items were left out. This resulted in 15 items. For some dimensions this meant that only two items were selected where for others three or four were selected. A factor analysis was performed using varimax rotation. Following Hair et al. (2009) items with loadings less the .50 were excluded, resulting in the inclusion of 10 items. The participants were asked to indicate for a series of statements to what extent it applied to their organization. A sample item per dimension is: supervisor encouragement (1 item), “I get constructive feedback about my work”; freedom (1 item), “I have the freedom to decide how I am going to carry out my projects”; organizational encouragement (3 items), “There is a good blend

---

<sup>1</sup> Nine of the two hundred ten participants indicated that creativity was only of little importance in their work (one or two on a scale of five). All analyses in this study were performed for both the whole sample and the sample excluding these nine. The results differed only marginally. The results shown in this study include all participants.

of skills in my work group”; work group support (2 items), “There is free and open communication in my work group”; sufficient resources (1 items), “Generally, I can get the resources I need for my work”; top management support (2 items), “The organization has an urgent need for successful completion of the work I am doing.” Climate for creativity was represented by the mean score of all 10 items.

### *Network Behavior*

A network construct was used reflecting the work specific interactions of the individual. The construct was adapted from Schalk (2012) and consists of nine 5-point likert-scale items ranging from 1 (*never*) to 5 (*daily*). It consisted of questions of job related interactions about the content of the work. Separate questions on the direction of the interaction were asked; was advice asked or given about the content of the work or was there discussion about the content of the work (bi-directional) A sample question is: With which of the following colleagues do you discuss the content and/or execution of your work?” The questions on the intensity of the interaction and the direction of the interaction were asked for colleagues with a different position to the individual; direct colleagues, colleagues from another department, supervisors or colleagues from outside the organization.. All items can be found in the appendix.

### *Knowledge Integration*

To measure knowledge integration, four five point likert-scale items were used ranging from 1 (*completely not*) to 5 (*completely*) (on which participants were asked to what extent the statement applied to them). A sample item was “In my work I synthesize and integrate my expertise with the expertise of my colleagues”. These items were derived from the items used by Tiwana and McLean (2005). Tiwana and McLean’s items measure the conceptual similar expertise integration at a team level. Because the current study measures knowledge integration at the individual level, the items were rewritten to reflect this. All items can be found in the appendix.

### *Work Engagement*

Work engagement was measured using the short version of the Utrecht Work Engagement Scale (UWES, Schaufeli & Bakker 2003). It consists of nine items, three for each dimension (vigor, dedication and absorption). A seven point likert-scale was used ranging from 1 (*never*) to 7

(*always*). A sample question per dimension is: vigor, “At work, I feel bursting with energy”; dedication, “I am enthusiastic about my job”; absorption, “I feel happy when I am working intensely.” All items can be found in the appendix.

### *Intuitive Decision Making Style*

To measure decision making style, a subsection of the General Decision Making Style questionnaire (GDMS, Scott & Bruce, 1995) was used. This questionnaire measures five different decision making styles; rational, intuitive, dependent, avoidant and spontaneous. In the current research only the items regarding intuitive decision making style are relevant and therefore only the five items relating to this style were used in the questionnaire. On a 5-point likert-scale ranging from 1 (*completely not*) to 5 (*completely*) the participants indicated to what extent the provided statements applied to them. A sample item was for intuitive decision making was: “When I make decisions, I tend to rely on my intuition.” A sample item for rational decision making style was: “I make decisions in a logical and systematic way.” All items can be found in the appendix.

### *Individual Creativity*

The participants’ creative behavior was measured using an adaptation of the selection of the eight items Janssen and Huang (2008) took from George and Zhou’s (2001) original thirteen items. These eight items focus on the generation and communication of creative ideas rather than on taking risks and applying ideas. The original scale is used for supervisor rating and was therefore rewritten to a self report format. Participants were asked to indicate on a 5-point likert-scale ranging from 1 (never) to 5 (daily) to what extent statements applied to them. A sample item was: “I come up with new and practical ideas to improve performance.” All items can be found in the appendix.

### *Team Creativity*

The same scale was used for team creativity as for individual creativity with the only difference that the scale was rewritten to reflect team creativity. Instead of being asked to what extent the statements applied to themselves, the participants were asked to what extent it applied to their direct colleagues/team members. A sample item was: “My fellow team members/ direct



colleagues come up with new and practical ideas to improve performance.” All items can be found in the appendix.

#### 4. Results

Table 1 summarizes the means, standard deviations and correlations for all variables.

Hypothesis 1 predicts that a climate for creativity and team creativity are positively associated with creative performance. Based on the correlation between climate for creativity and creative performance ( $\beta = .21, p < .01$ ) and between team creativity and creative performance ( $\beta = .46, p < .01$ ), this hypothesis is confirmed.

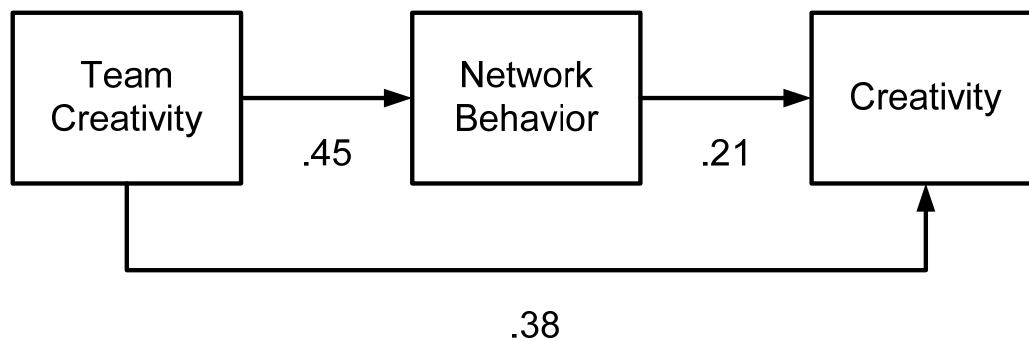


Figure 2

Graphical representation the results of the test of mediation of Hypothesis 2

Hypothesis 2 states that network behavior mediates the relationship between team creativity and individual creative performance. To test this hypothesis, a series of multiple regression analyses were performed based on Baron and Kenny (1986). The results of these analyses are found in Table 2. In step one, network behavior is regressed on team creativity. The standardized regression coefficient ( $\beta = .45$ ) associated with the effect of team creativity on network behavior was significant ( $p < .001$ ). Step 2 is a regression of creativity on team creativity. The standardized regression coefficient ( $\beta = .47$ ) associated with the effect of team creativity on creativity was significant ( $p < .001$ ). The next step to establish mediation is a regression of creativity on both team creativity and network behavior. The coefficient associated

Table 1

**Means, Standard Deviations, Cronbach's Alpha (on the diagonal) and Intercorrelations among All Variables (N=210)**

	Mean	s.d.	1	2	3	4	5	6	7
1. Climate for creativity	3.00	.45	(.83)						
2. Team Creativity	3.01	.81	.46**	(.94)					
3. Network Behavior	2.90	.68	.28**	.45**	(.87)				
4. Knowledge Integration	4.08	.53	.09	.16**	.27**	(.74)			
5. Work Engagement	4.84	.59	.51**	.37**	.08	.12	(.87)		
6. Intuitive Decision Making Style	3.38	.69	.23**	.07	.21**	.13	.12	(.82)	
7. Creativity	3.57	.72	.21**	.47**	.38**	.43**	.37**	.23**	(.91)

\*\* . p < .01, \* p < .05

with the relation between network behavior and creativity (controlling for team creativity) was significant ( $\beta = .21$ ,  $p = .002$ ). Because the path between team creativity and creativity (controlling for network behavior) was also significant ( $\beta = .38$ ,  $p < .001$ ), network behavior does not fully mediate the relationship between team creativity and creativity. The Sobel test showed a significant indirect effect ( $Z = 2.841$ ,  $p = .004$ ), confirming partial mediation, partially supporting Hypothesis 2. A graphical representation of this result can be found in Figure 2.

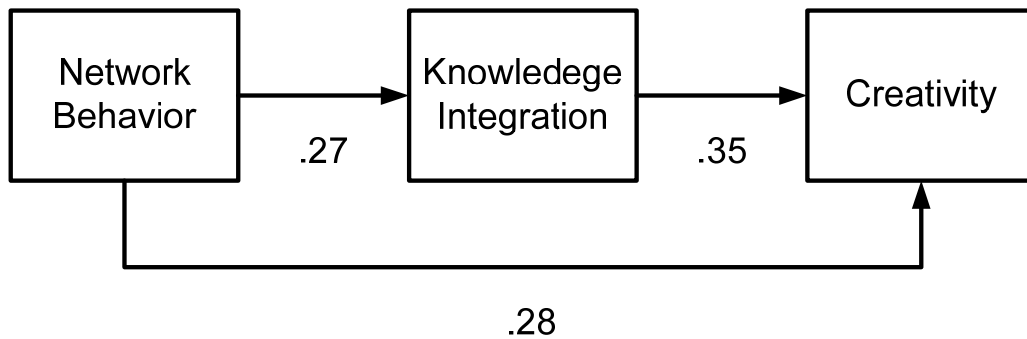


Figure 3

Graphical representation the results of the test of mediation of Hypothesis 3

Table 2

*Tests of Mediation Using the Baron and Kenny (1986) Method*

Regression	Path	$\beta$	$t$	$p$	$F$	Adjusted $R^2$
Network behavior mediating Team Creativity and Creativity ( <i>Hypothesis 2</i> )						
1.	Team Creativity → Network Behavior	.45	7.31	.001	53.46	.20
2.	Team Creativity → Creativity	.47	7.76	.001	60.12	.22
3.	Team Creativity, Network Behavior → Creativity	.38 .21	5.67 3.07	.001 .002	35.99	.25
Knowledge Integration mediating Network Behavior and Creativity ( <i>Hypothesis 3</i> )						
1.	Network Behavior → Knowledge Integration	.27	4.11	.001	16.92	.07
2.	Network Behavior → Creativity	.38	5.89	.001	34.68	.14
3.	Network Behavior, Knowledge Integration → Creativity	.28 .35	4.53 5.56	.001 .001	35.30	.25
Work Engagement mediating Climate and Creativity ( <i>Hypothesis 4</i> )						
1.	Climate → Work Engagement	.51	8.64	.001	74.63	.26
2.	Climate → Creativity	.21	3.10	.002	9.63	.04
3.	Climate, Work Engagement → Creativity	.03 .36	.33 7.79	.736 .001	16.79	.13

*Note.* Regression 1 is a regression of the mediator on the independent variable, regression 2 a regression of the dependent variable on the independent variable and the third regression regresses the dependent variable on both the independent variable and the mediator.

Hypothesis 3 states that knowledge integration mediates the relationship between network behavior and individual creative performance. To test this hypothesis, a series of multiple regression analyses were performed based on Baron and Kenny (1986). The results of these analyses are found in Table 2. In step 1, knowledge integration is regressed on network behavior. The standardized regression coefficient ( $\beta = .27$ ) associated with the effect of network behavior on knowledge integration was significant ( $p < .001$ ). Step 2 is a regression of creativity on network behavior. The standardized regression coefficient ( $\beta = .38$ ) associated with the effect of network behavior on creativity was significant ( $p < .001$ ). The final step to establish mediation is a regression of creativity on both network behavior and knowledge integration. The coefficient associated with the relation between knowledge integration and creativity (controlling for network behavior) was significant ( $\beta = .35$ ,  $p < .001$ ). The path between network behavior and

Table 3

*Tests of Moderation*

Variable	$\beta$	$t$	$p$	$F$	Adjusted $R^2$
Intuitive Decision Making Style moderates Climate and Creativity ( <i>Hypothesis 5a</i> )					
Climate $\rightarrow$ Creativity	.19	2.83	.005	7.91	.09
Intuitive Decision-Making Style $\rightarrow$ Creativity	.19	2.76	.006		
Climate x INT $\rightarrow$ Creativity	.16	2.44	.016		
Intuitive Decision-Making Style moderates Climate and Work Engagement ( <i>Hypothesis 5b</i> )					
Climate $\rightarrow$ Work Engagement	.53	8.68	.001	26.55	.27
Intuitive Decision-Making Style $\rightarrow$ Work Engagement	-.01	-.01	.993		
Climate x INT $\rightarrow$ Work Engagement	.12	2.06	.041		
Intuitive Decision-Making Style moderates Work Engagement and Creativity ( <i>Hypothesis 5c</i> )					
Work Engagement,	.35	5.48	.001	14.37	.16
Intuitive Decision -Making Style $\rightarrow$ Creativity	.18	2.80	.006		
Work Engagement x Intuitive Decision -Making Style $\rightarrow$ Creativity	.02	.33	.743		

creativity (controlling for knowledge integration) was also significant ( $\beta = .28$ ,  $p < .001$ ), indicating that knowledge integration partially mediates the relationship between network behavior and creativity. The Sobel test (showed a significant indirect effect ( $Z = 3.302$ ,  $p < .001$ ), confirming partial mediation, thus partially supporting Hypothesis 3. A graphical representation of this result can be found in Figure 3.

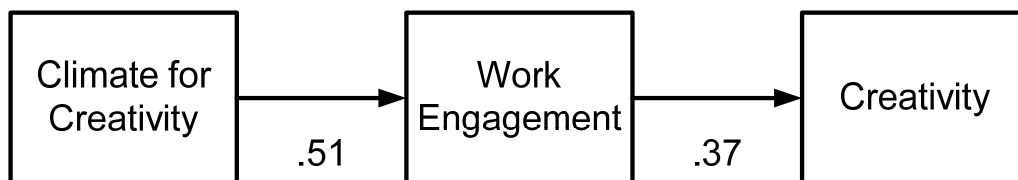


Figure 4

Graphical representation the results of the test of mediation of Hypothesis 4

Hypothesis 4 states that work engagement mediates the relationship between climate for creativity and individual creative performance. To test this hypothesis, a series of multiple regression analyses were performed based on Baron and Kenny (1986). The results of these

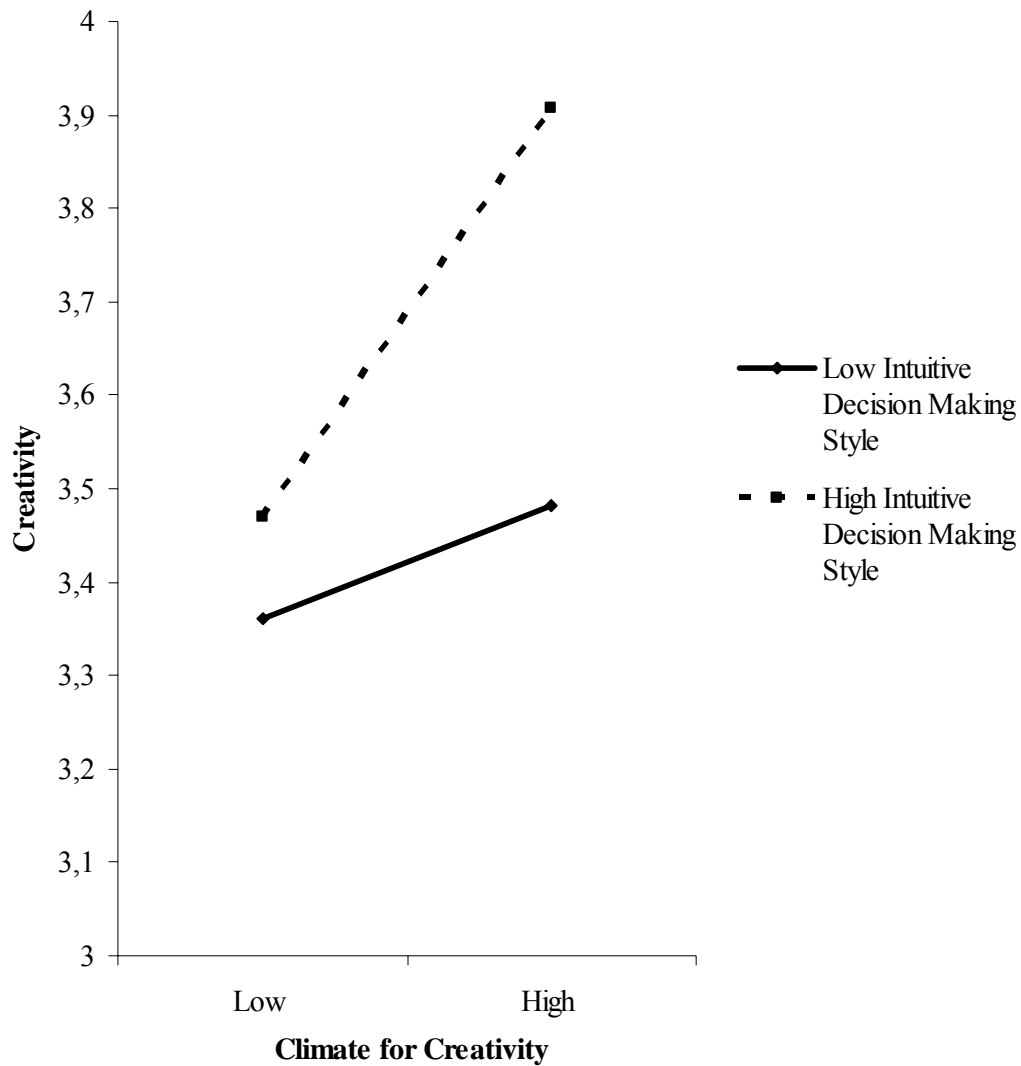


Figure 5  
Climate-Intuitive Decision Making Style Interaction for Creativity

analyses are found in table 2. In step one of the series of regression analyses, work engagement is regressed on climate for creativity. The standardized regression coefficient ( $\beta = .51$ ) associated a regression of creativity on work engagement. The standardized regression coefficient ( $\beta = .21$ ) associated with the effect of work engagement on creativity was significant ( $p < .002$ ). The final step to establish mediation is a regression of creativity on both climate for creativity and work engagement. The coefficient associated with the relation between work engagement and creativity (controlling for climate for creativity) was significant ( $\beta = .36, p < .001$ ). The path between climate for creativity and creativity (controlling for work engagement) was not with the

effect of climate for creativity on work engagement was significant ( $p < .001$ ). Step 2 is significant in step three ( $\beta = .03$ ,  $p = .736$ ) where it was significant without controlling for work engagement (see step 2). This indicates that work engagement fully mediates the relationship between climate for creativity and creativity. The Sobel test showed a significant indirect effect ( $Z = 4.205$ ,  $p < .001$ ), confirming mediation, supporting Hypothesis 4. A graphical representation of this result can be found in Figure 4

In Hypotheses 5 a, b, and c moderation effects are proposed. These moderation effects are tested using the method as described by Frazier et al. (2004). For each proposed moderation effect, a regression analysis was performed. This regression regresses the dependent variable on the independent variable, the moderator(s) and their cross products. If the cross product is significant, a diagram of moderation was generated using the procedures by Aiken and West (1991) and Dawson and Richter (2006). If the pattern of interaction in the diagram is as expected, the hypothesis of moderation is confirmed. The results of all these analyses can be found in Table 3.

Hypothesis 5a states that an intuitive decision making style moderates the relation between climate for creativity and creativity. The cross product of intuitive decision-making style and climate for creativity is significant ( $\beta = .12$ ,  $p = .041$ ). The interaction diagram (Figure 5) shows a stronger relationship between climate for creativity and creativity when intuitive decision making style is high than when it is low, confirming Hypothesis 5a.

Hypothesis 5b states that an intuitive decision making style moderates climate for creativity and work engagement. The cross product of intuitive decision making style and climate for creativity is significant ( $\beta = .16$ ,  $p = .016$ ) Figure 6 shows the interaction diagram. The pattern of interaction shows a stronger relationship between climate for creativity and work engagement when intuitive decision making style is higher than when it is low, confirming Hypothesis 5b.

Hypothesis 5c states that an intuitive decision making style moderates work engagement and creativity. Since the cross product of work engagement and intuitive decision making style is not significant ( $\beta = .02$ ,  $p = .743$ ), Hypothesis 5b is not supported.

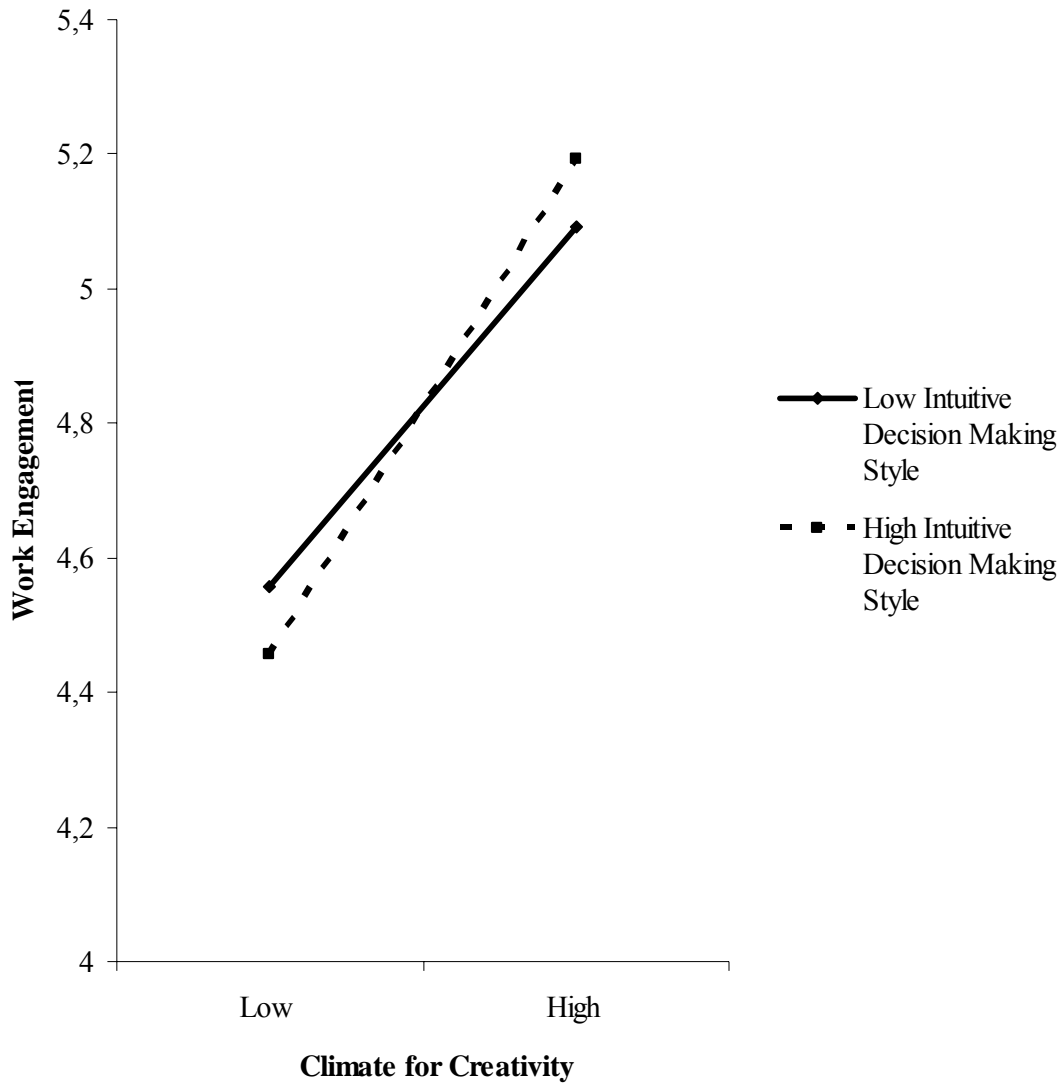


Figure 6  
Climate-Intuitive Decision Making Style Interaction for Work Engagement

## 5. Discussion

The aim of the present study was to examine two processes in which the organizational environment may contribute to individual creative performance at work. These two processes stemming from two different streams of research were brought together to get a more complete view on how creative performance comes to be in a working situation. One process took an intra-

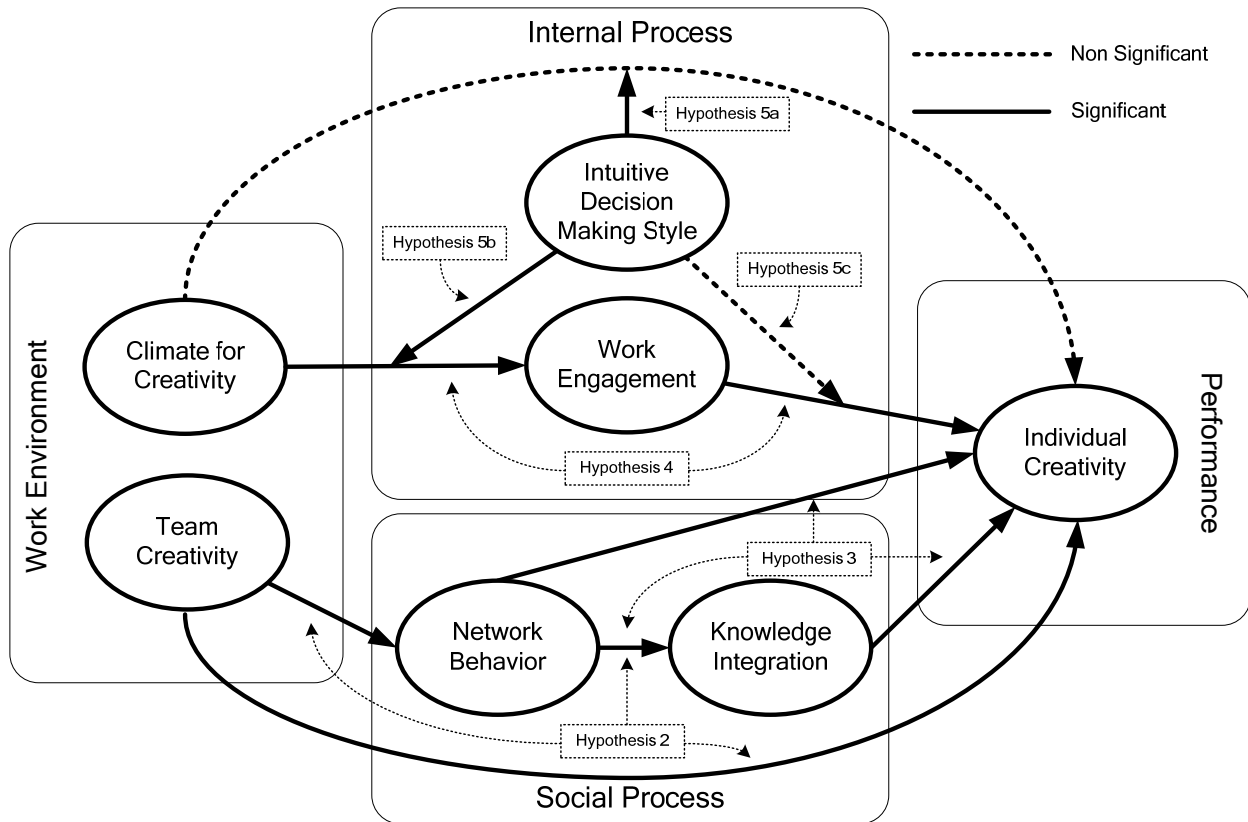


Figure 7  
Graphical Depiction of the Results

individual stance while the other had an inter-individual perspective. The results show that indeed the two processes both play a role in individual creative performance. This is graphically depicted in Figure 7.

In the inter-personal process it was found that the creativity of a person's direct colleagues affected the person's own creative performance. This relationship was partially mediated by the social interaction of the person with his colleagues. This suggests that one becomes more creative from the interaction with creative individuals. This may be because where the different cognitive structures of colleagues meet in interaction, additional cognitive variation arises which is an important aspect of creativity (according to Simonton, 1999). Following Amabile's componential theory of creativity (Amabile, 1988) in which creativity arises from motivation, task relevant skills and creativity skills, the increased creative performance may be due to any of these components. Focusing on the component of task relevant skills or knowledge, the present study found that indeed knowledge integration partially mediated the relationship between the



interaction with colleagues and individual creative performance. This is congruent with Amabile's theory in which domain relevant knowledge is only one of the components of creativity. Because knowledge integration only partially mediates the relationship, there is room for other mediating effects such as the transfer of creativity skills or motivation.

The social inter individual process that this study examined thus starts with team creativity which affects individual creativity partially through the interaction with colleagues which in turn affects individual creative performance partially through the integration of domain relevant knowledge.

The other process through which the organizational environment may affect individual's creative performance this study examined is the effect of the individuals' perception of the attributes of their work environment known as climate for creativity on creative performance. Amabile's theory on creativity states that this climate for creativity affects creative performance through its effect on an individual's intrinsic motivation. Previous research on this mediated relationship had been inconclusive (e.g. Shin & Zhou, 2003). It has been suggested that this might be due to the inadequateness of the construct used to measure intrinsic motivation and that other motivational constructs should be tested (Shalley et al 2004). Furthermore it has been suggested that positive affect may have an effect here as well (Shalley & Perry-Smith, 2004). The present study used a new motivational construct that combines vigor, absorption and dedication into the positive affective state of work engagement. It was found that work engagement fully mediated the relationship between climate for creativity and creative performance, thus substantiating Amabile's (1988) theory. The present study therefore also contributes to the research on work engagement providing evidence of the relationship between work engagement and the positive organizational outcome of creative performance. Where previous research on the consequences of work engagement focused on more general performance measures such as in- and extra-role performance this study extends this research by focusing on the more specific measure of creative performance. It also provides support for JD-R model (Bakker & Demerouti, 2007) where job resources affect performance through their effect on work engagement. A high climate for creativity represents an environment rich of perceived job resources and this study found it to have an effect on (creative) performance through their effect on work engagement. The finding that work engagement fully mediates the relationship between a creative climate and creative performance poses the question whether also other job and personal resources related to work engagement will enhance creativity or that specific job resources present in the creative climate

are needed for creative performance. Is it sufficient to focus on work engagement in order to get better creative performance or are there specific job resources related to creative performance? More research on how specific job resources are related to creative performance is needed.

Previous research showed that creativity emerges from the interaction between the individual and his characteristics and the environment with its specific characteristic (Shalley et al., 2004). The present study found such an interaction. It was found that an intuitive decision-making style moderates the relationship between a climate for creativity and creative performance, such that this relationship is stronger for individuals with a more intuitive decision making style. Not only was this relationship stronger but also were individuals with a higher intuitive decision making style more creative. This raises the question how to intuitive decision making can be enhanced because not only are individuals with an intuitive decision making style more creative, this creativity can be even more stimulated by a creative climate. Sinclair et al. (2002) offer a framework on determinants of intuitive decision making. One of them is experience. It is proposed that individuals with more relevant experience are more likely to base their decisions on intuition. Findings by Burke and Miller (1999) are congruent with this proposition. Fostering individuals experience for example through training therefore is a way to enhance intuitive decision making and through that creativity. Other factors that enhance intuitive decision making are time pressure and ambiguity. More time pressure urges individuals to make use of the fast intuitive decision making process. More ambiguity makes that individuals cannot fall back easily on predefined paths calling for a more intuitive approach. A note of warning must given for these last two factors that can affect intuitive decision making because they can be perceived as job demands. It is in the presence of these job demands that according to the JD-R model, the relationship between job resources and work engagement (and work engagement relates to (creative) performance) is stronger. Job resources thus particularly have a positive impact on work engagement when job demands are high. In order to benefit from time pressure and ambiguity in terms of intuitive decision making style and creative performance, the presence of a high creative climate (full of resources) therefore is crucial. More research is needed to confirm the function of job demands in the context of creative performance.

Looking closer at the relationship between climate for creativity and creativity, where work engagement was fully mediating the relationship, it was found that intuitive decision making moderated the relationship between a creative climate and work engagement and not the

relationship between work engagement and creativity. Individuals scoring high on intuitive decision making thus are not more creative in a creative climate because work engagement makes them more creative than their less intuitive counterparts but because a creative climate has a larger effect on their work engagement. As was expected, a creative climate is more important for more intuitive people to foster their work engagement.

Taking into consideration both the inter- and intra-individual process, it was found that both processes add towards creative performance. Creative climate is important to foster work engagement. This work engagement is on its turn boost creative performance because it may work as a source of cognitive variation (Frederickson, 2001; Simonton, 1999) that is energetically directed towards a task (Bakker & Demerouti, 2008). This confirms the central place of intrinsic motivation that Amabile (1988) proposed. The personal characteristic of intuitive rational decision-making style has a moderating effect on this process as was expected (Shalley et al. 2004, Amabile, 1988). But also team composition in the form of creative colleagues can increase creative performance. This occurs partially because of interaction among colleagues which in turn partially increases creative performance because it lets individuals draw from a greater reservoir of knowledge integrating this knowledge into creative solutions.

### 5.1 Limitations

Several limitations to this study should be noted. First off all the study was fully based on self-reports which may cause common-method bias (Podsakoff et al., 2003). Also the performance measure of creativity relied solely on self-reports. It may be that individuals systematically overestimate their own performance. If this is uniform, this might not pose a threat to the results and conclusions but it may also be that more engaged individuals feel more confident and may as a result of that overestimate their performance. This effect (if existent) might bias the results towards the measured effect of work engagement on creative performance. Previous research with (other) performance measures not susceptible to this bias has, however, shown a similar direction of the effect (e.g. Xanthopoulou et al. 2009). Therefore the potential bias is most likely to only potentially affect the size of the effect. Future studies with more objective measures of creative performance could be conducted to provide more evidence.

Another limitation may be in the sample from which the data stems. Firstly, the sample was drawn from categories of workers for whom creativity is an important aspect of their job. It is possible that the effects on creative performance are different for workers with jobs that have less need for creativity or even in jobs in which creativity is not desirable at all. A further potential limitation is that the results are susceptible to non-response bias (Hudson et al. 2004) given that only ten percent of the invitations sent yielded a fully completed questionnaire. The non-respondents may have different characteristics from the respondents. For example, because more engaged workers may have more energy to complete the questionnaire or on the contrary more engaged employees may be too absorbed with their work take time to fill out a questionnaire.

The research is also limited by the degree in which creative performance is predicted by the measured constructs. The variance explained by the factors taken into account leaves a lot of room for other constructs to be of importance as well. More research on other antecedents of creative performance is necessary.

Furthermore, although the results indicate that there are significant partial mediations of network behavior of the relation between team creativity and individual creativity (Hypothesis 2) and of knowledge integration on the relationship between network behavior and individual creativity (Hypothesis 3), the indirect effects are small (both .09). The practical relevance of these effects should therefore not be overestimated.

The last important limitation is that because the study design was not longitudinal, no causal relationships or direction of the effects could be established. Does work engagement for example lead to more creative performance, is it the other way around or are both effects present in an upward spiral of more work engagement leading to more creative performance leading to even more work engagement and so forth. These upward spirals have been found for other measures of performance and work engagement (Xanthoupoulou, 2007) and also for creativity and positive affect (Amabile et al. 2005) More research is needed on the existence of these spirals for creative performance and work engagement and also on what limits these spirals.

## 5.2 Practical Implications

In this section the practical implications of the present study are discussed. Because this study is rooted in the tradition of innovation management, which strives to be design oriented, design propositions will be formulated. These design propositions try to capture research in technological rules that can be applied in the design of organizational systems. They will be formulated in CIMO-logic as proposed by Denyer et al. (2008). In this formulation, a specific intervention (I) is proposed that leads in a particular context (C) to an outcome (O), and it does this by means of a mechanism (M).

The present study is in the first place relevant for all jobs in which creativity is a desirable component of job performance such as design, researcher and engineering. Since creativity is a key part of innovation (West, 2002), this makes this study of special interest to all people involved in innovation such as workers in new product development teams (NPD-teams). Because the study is about creative performance and its antecedent processes, it gains in relevance in areas where creativity is a more crucial component of performance.

It is important that managers of individuals in creative jobs are aware that the work environment they help to shape, has an important impact on the creative performance of the individual workers. The current study provides two elements of the work environment that have an impact on creative performance.

The first element of the work environment a manager may help to shape, is the climate with regard to creativity. A climate that is not controlling, that promotes freedom, in which workers are encouraged by their managers, supported by their colleagues and with sufficient resources will lead to higher levels of work engagement which will lead to higher creative performance. This leads to the following design principle:

*In the context where creativity at work is required (C), actively shape a non-controlling creative climate (I) to enhance employee's creative performance (O) through the effect of the creative climate on the employee's work engagement (M).*

The present study found that individual differences in intuitive decision-making style is of influence on the effect the creative climate has on work engagement and on the effect work

engagement has on creativity. Specifically individuals with an intuitive decision-making style are more creative and are more affected by a creative climate than individuals with a less intuitive decision-making style. The extent to which individuals use their intuition for example can be enhanced by giving training to increase individual's experience and the promotion of the use of intuition (Sinclair et al. 2002). This leads to the following design principle:

*In the context of a creative climate (C), promote and enhance the use of intuition (I) to benefit more from a creative climate in terms of creative performance (O) through the effect of the intuitive decision-making on the relation ship between a creative climate and creative performance and work engagement (M).*

The present study shows that the relationship between a creative climate and work engagement and creative performance is the strongest for individuals who are highly intuitive. In order to benefit most from the creative potential of these workers it is important to keep them motivated. This is true for all workers but the effect is stronger for these individuals. Highly intuitive workers are the ones that react strongest on a creative climate. A side effect of this is that these individuals help to signal a worsening creative climate. Because these individuals are more dependent on the climate to get engaged and perform creatively, these individuals may show the most notable signs of a climate that is getting worse, i.e. by lowered engagement and creative performance.

The second element in the work environment that managers of creative individuals (such as NPD teams) can influence is the presence of creative coworkers. The presence of creative coworkers will enhance individual's creativity partially because work related interaction between colleagues where they can benefit from each others knowledge, creativity skills and motivation all of which are components of creativity (Amabile, 1988). This leads to the following design principle:

*In the context where creativity at work is required (C), provide access to creative individuals (I) to enhance employee's creative performance (O) through the effect of the work related interaction (M).*

It should be noted however that work related interaction is only a partial mechanism which only provides a limited explanation of the effect of access to creative individuals on individual's creative performance.

One way in which work related interaction with colleagues, be it direct colleagues or colleagues from an other department or even from an other organization, leads to increased creative performance is that because of this interaction, creative solutions can stem from a greater reservoir of knowledge. In the interaction, knowledge that is embedded in the cognitive structures of different individuals can be integrated creating potentially more creative solutions than could have arisen from the knowledge of only one individual. Work related interaction must therefore be stimulated if creativity is desired. A way to do this may be making workers dependent on each other in the execution of their work. This leads to the following design principle:

*In the context where creativity at work is required (C), stimulate work related interactions between individuals (I) to enhance employee's creative performance (O) through the effect of the work-related interaction and knowledge integration (M).*

Also here it should be noted that knowledge integration only offers a limited explanation for effect of interaction between individuals and individual's creative performance. Other mechanisms are yet to be explored.

In a working situation where there is a highly creative climate, workers are more engaged and more creative. This makes that there are also more creative individuals who are each other's colleagues, which on its turn triggers the social process leading to creativity as well. Work engagement being an antecedent of creativity fluctuates from day to day (Xanthopoulou et al. 2009). Individuals with highly intuitive decision-making style react strongly on work engagement to perform creatively. Since the presence of creative coworkers also affects creativity, a combination of people strongly affected by work engagement and people who have decision-making styles that are less dependent on work engagement (such as individuals high on intuitive decision-making style) could help stabilize overall creative performance.

Although the focus of these practical implications was on managing groups of creative individuals, it also applies to the growing group of self employed creative individuals. They need to build themselves a creative climate or find other ways to keep their levels of work engagement in order to perform creatively. This is especially true when they are intuitive decision makers. These self employed individuals could also benefit from interaction with colleagues if they for example create networks of self-employed individuals. Physical environments that bring together individuals with self-employed jobs could help with this.

Concluding, this study shows that creative climate fosters work engagement, that it does so more strongly for intuitive individuals than for non-intuitive individuals. It shows that hat work engagement fosters creative performance. And that the presence of creative coworkers leads to better creative performance partly due to knowledge that is integrated through interacting with these co-workers.



## References

- Aiken, L. S., and West, S. G. "Multiple regression: Testing and interpreting interactions". Newbury Park, London, Sage; 1991
- Aken, J. E. van "Management Research Based on the Paradigm of the Design Sciences: The Quest for Field-Tested and Grounded Technological Rules". *Journal of Management Studies*, 2004; 41(2), p. 219–246.
- Alavi, M., Tiwana A., "Knowledge Integration in Virtual Teams: The Potential Role of KMS". *Journal of the American Society for Information Science and Technology* 2002; 53, p. 1029-1037
- Amabile, T.M. "A Model of Creativity and Innovation in Organizations." In *Research in Organizational Behavior*. Vol. 10, edited by Barry M. Staw and L. L. Cummings. Greenwich, Conn.: J.A.I. Press; 1988
- Amabile, T. M. *Creativity in context*, Westview, Boulder; 1996.
- Amabile, T.M., Barsade, S.G. Mueller, J.S. and Staw, B.M. "Affect and Creativity at Work." *Administrative Science Quarterly* 2005; 50, 3, p.367-403.
- Amabile, T. M., Burnside, R. and Gyskiewicz, S.S. "User's Guide for KEYS: Assessing the Climate for Creativity." Center for Creative Leadership, Greensboro, N.C.; 1995
- Amabile, T. M., and Gyskiewicz, N. D. "The creative environment scales: Work environment inventory." *Creativity Research Journal* 1989; 2, p. 231–252.
- Baas, M., De Dreu, C.K.W., Nijstad, B.A. "A meta-analysis of 25 years of mood-creativity research: Hedonic tone, activation, or regulatory focus?" *Psychological Bulletin* 2008; Vol 134(6), p. 779-806.
- Baer, M., Oldham, G. R., and Cummings, A. "Rewarding creativity: When does it really matter?" *Leadership Quarterly* 2003; 14, p. 569–586.

- Bakker, A.B., and Demerouti, E. "The Job Demands-Resources model: State of the art". *Journal of Managerial Psychology* 2007; 22, p. 309-328.
- Bakker, A.B. and Demerouti, E. "Towards a model of work engagement". *Career Development International* 2008; 13, p. 209-223.
- Bakker, A.B., Demerouti, E., Verbeke, W. "Using the Job Demands-Resources model to predict burnout and performance", *Human Resource Management* 2004; Vol.43, p83-104
- Bakker, A.B., Van Emmerik, IJ.H., and Euwema, M.C. "Crossover of burnout and engagement in work teams". *Work & Occupations* 2006; 33, p. 464-489
- Bakker, A.B., and Oerlemans, W. "Subjective well-being in organizations". In K.S. Cameron and G.M. Spreitzer (Eds.), *The Oxford Handbook of Positive Organizational Scholarship* (pp. 178-189). New York: Oxford University Press; 2011
- Baron, R.M. and Kenny, D.A. "Moderator-Mediator Variables Distinction in Social Psychological Research: Conceptual, Strategic, and Statistical Considerations," *Journal of Personality and Social Psychology* 1986; 51 (6), p. 1173-82.
- Barsade, S.G. "The Ripple Effect: Emotional Contagion and Its Influence on Group Behavior" *Administrative Science Quarterly* 2002; Vol. 47, 4, p. 644-675.
- Basudur, M., Wakabayashi, M., and Graen, G. B. "Individual problem-solving styles and attitudes towards divergent thinking before and after training". *Creativity Research Journal* 1990; 3(1), p. 22-32.
- Berends, J.J., Debackere, K., Garud, R. and Weggeman, M.C.D.P. "Knowledge integration by thinking along." Ecis working paper No. 04.05, Eindhoven: TUE : Technische Universiteit Eindhoven, 36; 2004
- Burke, L.A. and Miller, M.K. "taking the mystery out of Inuitive Decision Making" *Academy of management Executive* 1999; 13, 4, p 91-99

Dane, E. and Pratt, M.G. Exploring intuition and its role in managerial decision making. *Academy of Management Review* 2007; 32, p. 33–54.

Dane, E., and Pratt, M.G. “Conceptualizing and measuring intuition: A review of recent trends”. In G. P. Hodgkinson and J. K. Ford (Eds.), *International Review of Industrial and Organizational Psychology*, Vol. 24 (pp. 1-40); 2009

Dawson, J. F., and Richter, A. W. “Probing three-way interactions in moderated multiple regression: Development and application of a slope difference test”. *Journal of Applied Psychology* 2006; 91, p. 917-926.

Deci, E. L., and Ryan, R. M. “Intrinsic motivation and self-determination in human behavior”. New York; 1985

Denyer, D., Tranfiend, D., Aken, J.E. van, “Developing design propositions through research synthesis” *Organization Studies* 2008; Vol. 29, 3, p. 393-413

Epstein, S., Pacini, R., Denes-Raj, V., and Heier, H. “Individual differences in intuitive experiential and analytical-rational thinking styles”. *Journal of Personality and Social Psychology* 1996; 71, 390–405.

Fisher, C.D. “Mood and emotions while working – missing pieces of job satisfaction” *School of Business Discussion Papers* 1998; Paper 64.

Frazier PA, Tix AP, Barron KE. “Testing moderator and mediator effects in counseling psychology research”. *Journal of Counseling Psychology* 2004; 51, p. 115–134

Fredrickson, B.L. “The role of positive emotions in positive psychology: The broaden-and-build theory of positive emotions”. *American Psychologist* 2001; 56, p. 218-226.

George J.M. and J. Zhou, “When openness to experience and conscientiousness are related to creative behavior: An interactional approach”. *Journal of Applied Psychology* 2001; 86, p. 513–524.

Grant, R.M. “Prospering in Dynamically-Competitive Environments: Organizational Capability as Knowledge Integration,” *Organization Science* 1996; 7(4), pp. 375–387

Hakanen, J., Bakker, A.B., and Schaufeli, W.B. “Burnout and work engagement among teachers”. *The Journal of School Psychology* 2006; 43, p. 495-513

Hair, J.F., Black, B., Babin, B., and Anderson, R.E. “Multivariate Data Analysis”, 2009

Hudson, D., Seah, L.H., Hite, D. and Haab, T. “Telephone presuveys, self-selection, and non-response bias to mail and Internet surverys in economic research”. *Applied Economic Letters* 2004; vol. 11, 4, p. 237-240

Hülsheger, U.R., Anderson, N., and Salgado, J.F. “Team-level predictors of innovation at work: A meta-analysis spanning three decades of research”. *Journal of Applied Psychology* 2009; 94, p. 1128-1145.

Isen, A. M. “On the relationship between affect and creative problem solving”. In S. Russ (Ed.), *Affect, creative experience and psychological adjustment*: 3–17. Philadelphia; 1999

Janssen, O., and Huang, X. “Us and Me: Team identification and individual differentiation as complementary drivers of team members’ citizenship and creative behaviors”. *Journal of Management* 2008; 34, p. 69-88.

Mainemelis C. “When the Muse Takes It All: A Model for the Experience of Timelessness in Organizations” *The Academy of Management Review* 2001; Vol. 26, 4, p. 548-565

Mauno, S., Kinnunen, U., and Ruokolainen, M. “Job demands and resources as antecedents of work engagement: A longitudinal study”. *Journal of Vocational Behavior* 2007; 70 (1), p. 149-171

Mostafa, M. "Factors affecting organisational creativity and innovativeness in Egyptian business organisations: an empirical investigation", *Journal of Management Development* 2005, Vol. 24, 1, p.7 – 33

Nonaka, I."The knowledge-creating company". *Harvard Business Review* 1991; 69, p. 96–104.

Okhuysen, G., and Kathleen M. Eisenhardt. "Integrating knowledge in groups: How simple formal interventions enable flexibility". *Organization Science* 2002; 13, 370-386

Oldham, G. R., and Cummings, A. "Employee creativity: Personal and contextual factors at work". *Academy of Management Journal* 1996; 39, p. 607–634.

Patrashkova-Volzdoska, R.R., McComb, S.A. Green, S.G. and Compton W.D. "Examining a curvilinear relationship between communication frequency and team performance in cross-functional project teams", *IEEE Transactions on Engineering Management* 2003; 50, p. 262-269.

Perry-Smith, J.E. "Social yet creative: The role of social relationships in facilitating individual creativity". *Academy of Management Journal* 2006; 49, p. 85-101.

Podsakoff, P.M., MacKenzie, S.B., Lee, J.-Y., Podsakoff, N.P. "Common method biases in behavioral research: A critical review of the literature and recommended remedies". *Journal of Applied Psychology* 2003; 88, p. 879–903.

Raidl, M. H. and Lubart, T. I. "An empirical study of intuition and creativity. Imagination". *Cognition and Personality* 2001, 20, p. 217–30.

Riel, A.C.R. Van, Ouwersloot, H. and Lemmink, J. "Antecedents of Effective Decision Making: A Cognitive Approach". *ICFAI Journal of Managerial Economics* 2006; 4(4), p. 7-28.

Robert, L.P. Jr., Dennis, A.R., Ahuja, M.K. "Social Capital and Knowledge Integration in Digitally Enabled Teams". *Information Systems Research* 2001; Vol. 19, 3, p. 314-334

Salanova, M., Agut, S., Peiró, J.M. "Linking Organizational Resources and Work Engagement to Employee Performance and Customer Loyalty: The Mediation of Service Climate". *Journal of Applied Psychology* 2009; Vol 90, 6, p. 1217-1227

Schalk, J. "The performance of public corporate actors: Essays on effects of institutional and network embeddedness in supranational, national, and local collaborative contexts" Zutphen; 2012

Schaufeli, W.B., and Bakker, A.B. The Utrecht Work Engagement Scale (UWES). Test manual. Utrecht, The Netherlands: Department of Social & Organizational Psychology; 2003

Schaufeli, W.B., and Bakker, A.B. "Job demands, job resources, and their relationship with burnout and engagement: A multi-sample study". *Journal of Organizational Behavior* 2004; 25, p. 293-315

Schaufeli, W.B., Salanova, M., González-Romá, V., Bakker, A.B. "The Measurement of engagement and burnout: a two sample confirmatory factor approach". *Journal of Happiness Studies* 2002; Vol. 3, p. 71-92

Scott, S., and Bruce, R. "The influence of leadership, individual attributes, and climate on innovative behavior: A model of individual innovation in the workplace." *Academy of Management Journal* 1994; 37, p. 580-607.

Shalley C.E. and Perry-Smith, J.E., "Effects of social-psychological factors on creative performance: The role of informational and controlling expected evaluation and modeling experience". *Organizational Behavior and Human Decision Processes* 2001; 84 , p. 1-22

Shalley, C.E., Zhou, J. and Oldham, G.R. "The Effects of Personal and Contextual Characteristics on Creativity: Where Should We Go from Here?" *Journal of Management* 2004; 30 (6), p. 933-958

Shin, S and Zhou, J. “Transformational leadership, conservation, and creativity: Evidence from Korea”. *Academy of Management Journal* 2003; 46, p. 703–714.

Simon, H.A. “Bounded rationality and organizational learning”. *Organization Science* 1991; 2, p. 125-134.

Simonton, D.K. *Origins of genius: Darwinian perspectives on creativity*. Oxford University Press; 1999

Sinclair, M., Ashkanasy, N.M., Chattopadhyay, P., Boyle, M.V., “Determinants of Intuitive Decision Making in Management: the Moderating Role of Affect” In: Ashkanasy, N.M., Zerbe, W.J., Härtel, C.E.J. (Eds) *Managing Emotions in the Workplace* 2002, p. 143-163

Sternberg, R.J. and Lubart, T. “Investing in creativity”. *American Psychologist* 1996; 51(7), p. 677-688.

Sy, T., Côté, S., Saavedra, R., “The Contagious Leader: Impact of the Leader’s Mood on the Mood of Group Members, Group Affective Tone, and Group Processes”. *Journal of Applied Psychology* 2005; vol. 90, 2, p. 295-305

Tierney, P., Farmer, S. M., and Graen, G. B. “An examination of leadership and employee creativity: The relevance of traits and relationships”. *Personnel Psychology* 1999; 52, p.591–620.

Tiwana, A. and McLean, E. “Expertise Integration and Creativity in Information Systems Development”. *Journal Of Management Information Systems* 2005; 22(1), p. 13-43.

Utman, C.H.. “Performance effects of motivational state: A meta-analysis”. *Personality and Social Psychology Review* 1997; 1, p. 170–182.

West, M.A. “Sparkling fountains or stagnant ponds: An integrative model of creativity and innovation implementation in work groups”. *Applied Psychology: An International Review*; 2002; 51 (3), p 355-424

Westman, M. "Stress and strain crossover:". *Human Relations* 2001; 54, p. 557-591.

Woodman, R.W., Sawyer, J.E. and Griffin, R.W., "Toward a theory of organizational creativity". *Academy of Management Review* 1993; 18, p. 293–321

Xanthopoulou D. "Work Psychological Model that Works: Expanding the Job Demands-Resources Model" Doctoral Thesis. Utrecht University; 2007

Xanthopoulou, D., Bakker, A.B., Demerouti, E. and Schaufeli, W.B. "Work engagement and financial returns: A diary study on the role of job and personal resources". *Journal of Organizational and Occupational Psychology* 2009; vol. 82 (1). p. 183-200

Zhou, J. "When the presence of creative coworkers is related to creativity: Role of supervisor close monitoring, developmental feedback, and creative personality". *Journal of Applied Psychology* 2003; 88, p. 413–422.

Zhou, J., and George, J. M. "Awakening employee creativity: The role of leader emotional intelligence". *Leadership Quarterly* 2003; 14, p. 545–568.

Zhou, J., and Shalley, C.E. "Deepening our understanding of creativity in the workplace: A review of different approaches to creativity research". In S. Zedeck, et al. (Eds.), *APA Handbook of industrial and organizational psychology*, vol.1; 2011 p 275-302



## Appendix

### Questionnaire

#### *Work Engagement*

The following questions refer to the extent you are engaged in your work. Please indicate for each statement to what extent it applies to you.

At my work, I feel bursting with energy  
At my job, I feel strong and vigorous  
I am enthusiastic about my job  
My job inspires me  
When I get up in the morning, I feel like going to work  
I feel happy when I am working intensely  
I am proud on the work that I do  
I am immersed in my work  
I get carried away when I'm working

#### *Creativity*

The Following statements refer to your creative behavior at work. Please indicate for each statement to what extent it applies to you.

I suggest new ways to achieve goals  
I come up with new and practical ideas to improve performance  
I search out new technologies, processes, techniques, and product ideas  
I suggest new ways to increase quality  
I am a good source of creative ideas  
I promote and champion ideas to others  
I come up with creative solutions to problems  
I suggest new ways of performing work tasks

#### *Team Creativity*

The following statements refer to your colleagues' creative behavior. Please indicate for each of the statements to what extent it reflects your colleagues?

My fellow team members/ direct colleagues,

suggest new ways to achieve goals or objectives  
come up with new and practical ideas to improve performance  
suggest new ways to increase quality

promote and champion ideas to others  
exhibit creativity when given the opportunity to  
develop adequate plans and schedules for the implementation of new ideas  
have new and innovative ideas  
come up with creative solutions to problems

### *Network Behavior*

The following statements refer to your dealings with colleagues at work  
With which of the following colleagues do you discuss the content and/or execution  
of your work?

Your direct colleagues  
Your supervisor(s)  
Colleagues in another team or department within your organization  
People outside your organization

To what extent do you ask the following types of colleagues for advice on your  
work?

Your direct colleagues  
Your supervisor(s)  
Colleagues in another team or department within your organization  
People outside your organization

To what extent do the following colleagues ask you for advice on their work?

Your direct colleagues  
Your supervisor(s)  
Colleagues in another team or department within your organization  
People outside your organization

### *Intuitive Decision Making Style*

The following statements refer to your decision making style.  
Please indicate for each statement to what extent it applies to you.

When I make decisions, I tend to rely on my intuition  
When I make a decision, it is more important for me to feel the decision is right than to have a  
rational reason for it  
When making a decision, I trust my inner feelings and reactions  
When making decisions, I rely upon my instincts  
I generally make decisions that feel right to me

### *Knowledge Integration*

The following statements refer to the extent to which you integrate knowledge of others in your work.

Please indicate for each statement to what extent it applies to you.

In my work I synthesize and integrate my expertise with the expertise of my colleagues  
When I work on a project, I contribute to the development of shared project concepts that span several areas of expertise

In general I can clearly see how different pieces of a project I am working on fit together  
I competently blend new project-related knowledge with what I already know

### *Climate for Creativity*

The following question refers to climate in your organization with regard to creativity.

Please indicate for each statement to what extent it applies to you or your organization.

I have the freedom to decide how I am going to carry out my projects

Overall, the people in this organization have a shared vision of where we are going and what we are trying to do

Within my work group, we challenge one another's ideas in a constructive way

People in my work group are open to new ideas

In my work group, people are willing to help one another

Generally, I can get the resources I need for my work

There is a good blend of skills in my work group

Ideas are judged fairly in this organization

Failure is acceptable in this organization, if the effort on the project was good

I get constructive feedback about my work