**E-leadership: When information technology systems influence**

**and are influenced by new leadership behaviors, processes, and outcomes**

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Abstract

The present book chapter focuses on e-leadership, reviewing and discussing latest developments in new (e-)leadership conceptions, such as transformational leadership and others. We propose alternative, albeit well-proven measures (e.g., MLQ 5X Short, Bass & Avolio, 1990) and an e-leadership tool called Virtual Team Trainer (VTT; Reips et al., 2007). The VTT uses the Online Leader Behavior Description Questionnaire (OLBDQ; Reips & Heilmann, 2009), assessing the Ohio State Leadership styles *consideration* and *initiatating structure*. Among personality tests and group process development units that were built from the Existential Mapping Process (EMP; Horowitz, 1985) the tool contains modules that help leaders and team members to identify their Ohio State leadership styles. The VTT relates the results of the self- and other-questionnaires to team structure, development, and modifications and improvement of leadership skills. The VTT is available free for use via the *iScience Server* portal at http://iscience.eu.

E-leadership: When information technology systems influence and are influenced by

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Over the last decade, a new branch of leadership research has gained in massive importance: e-leadership (e.g., Avolio, Walumbwa, & Weber, 2009). The overall fundamental issue for leadership researchers and practitioners around the world is: how do information technology systems transform leadership styles, the processes of leadership, and the outcomes at an individual and collective level – and vice versa: how are information technology systems influenced? Unfortunately, e-leaders often extensively use information technology systems without knowing their full impact on organizational dynamics. The change in information technology systems is too fast for leadership research to keep up with the pace, thus the understanding of e-leadership styles and their processes is lagging behind new technological advancements. Furthermore, within leadership research and application, a couple of new leadership theories have emerged more recently: the so-called *new leadership paradigms* (Bryman, 1993). The current chapter defines this two-fold gap between theoretical and technological advancements and proposes solutions to close it.

According to Bass (1990) leadership is about developing and maintaining relationships, structuring or restructuring of the situation and the perceptions and expectations of the members. Leadership is about affecting others and modifying the motivation or competence of team members. Indeed, information technology systems enable leaders to interact with individuals or teams, from different departments or even from remote continents (e.g., Avolio & Kahai, 2003). However, in order to be a successful e-leader one might need to behave differently than usual and be aware of virtual team members' change in perceptions compared to face-to-face leadership interaction. E-leaders

might need to use procedures that differ from traditional leadership processes.

The first section of this chapter reviews and discusses the most recent leadership conceptions. We will provide a review of so-called *new leadership theories* (Bryman, 1993), such as *transformational leadership* (Bass, 1985), *authentic leadership* (Avolio, Gardner, Walumbwa, Luthans, & May, 2004), *charismatic leadership* (e.g., Conger & Kanungo, 1998), and *ethical leadership* (Brown, Treviño, & Harrison, 2005).

In the second section we will then apply new leadership conceptions – in particular transformational leadership – to virtual environments. The section refers to common questions in transformational e-leadership while reporting latest research studies on specificities of transformational e-leadership and differences between face-to-face- and transformational e-leadership-interaction. Particular attention is given to possible pitfalls. For example, how do information technology systems impact on individual outcomes such as objective performance in a transformational e-leadership process? Is trust of special relevance in an e-leadership process? Does anonymity influence the e-leadership process? Further, we will report on remaining methodological issues in measuring transformational e-leadership.

The third section of this chapter deals with technological developments that can be used to build and maintain virtual teams and to measure virtual team processes and outcomes. As a specific example of an applied e-leadership tool, we will present the Virtual Team Trainer (Reips et al., 2007) that is available via the *iScience Server* portal at http://iscience.eu. We will point out that the assessment of transformational leadership shows a couple of methodological restrictions. We decided that our e-leadership tool should assess the Ohio State Leadership (OSL) conceptions. These conceptions are well-proven alternatives to the new leadership paradigms such as transformational leadership.

Integrating the theoretical and technological developments as well as the methodological restrictions in sections 1 and 2, we outline a set of features that seem essential in e-leadership tools.

The concluding fourth section presents a summary and an overall discussion as well as an outlook for further research.

New Leadership Theories

New leadership theories (Bryman, 1993) place a greater emphasis on "vision/mission articulation, … motivating and inspiring, … creating change and innovation, … the empowerment of others, … [and] stimulating extra effort" (Bryman, 1993, p. 111). In contrast "old leadership" theories such as behavior approaches, for example the Ohio State Leadership Studies led by the researchers Stogdill, Shartle, and Hemphill  (Stogdill, 1950) and situational approaches such as Fiedlers's contingency model (1967), the decision-making model by Vroom and Yetton (1973), or the path-goal theory of leadership by House (1971, 1996) mainly focus on planning, allocating responsibility, controlling, problem-solving or creating routines (Bryman, 1993).

Several new leadership theories have emerged that share the "new view" and thus show strong conceptual overlaps, as will be described further below. Because transformational leadership theory is the new leadership theory that best integrates the other approaches and as it is the most studied new leadership conception, we will focus on and explain the paradigm of transformational leadership by comparing all new approaches.

*Transformational Leadership*

For 24 years, there has been research on the theory of transformational and

transactional leadership. Based on Burns' (1978) and House's (1977) work, Bass (1985) provided a distinction of transformational and transactional leadership. According to Bass (1985), transformational leaders transform, that is, they motivate followers to do more than they were originally expected to do by widening employees' scope and creating acceptance for the group mission, which results in extra effort. Transformational leader behaviors have an effect on followers' effort, performance, and satisfaction by raising followers' self-efficacy, self-esteem (Kark, Shamir, & Chen, 2003; Kirkpatrick & Locke, 1996) and locus of control (Bass, 1985) through expressing high expectations of followers and belief in followers' abilities. Bass (1985) proposes that *transformational leadership* is accomplished through four dimensions: *Idealized influence* refers to serving as a role model to followers. Transformational leaders have high standards of moral and ethic conduct, and provide followers with a vision and a sense of mission. *Inspirational motivation* refers to leaders with a strong vision for the future based on values and ideals. Transformational leaders use emotional appeals to focus followers' efforts to achieve more than they would in their own interest. *Intellectual stimulation* refers to leaders that stimulate followers' creativity by questioning and challenging them. An example is a leader who promotes IT-specialists' efforts to develop unique ways to solve problems that have caused slowdowns in the IT landscape. *Individual consideration* refers to attending to individual needs and developing followers as a coach or consultant. A transformational leader might spend time treating every follower in a caring and unique manner. E.g., for some followers the transformational leader might give more consideration or mentoring, for the other follower more specific directives in solving tasks.

In contrast, transactional leadership – another leadership style related to transformational leadership proposed by Bass (1985) – aims at monitoring and controlling

employees through rational or economic means, by operating with existing structures and systems. Transactional leadership is comparable to the so-called "old" leadership theories mentioned above.

Transformational leadership is consistently related to several outcomes across study settings such as business, college, military, and the public sector (Judge & Piccolo, 2004) and across cultures (Den Hartog et al., 1999). The list of studies on transformational leadership outcomes is long. In essence, on organizational levels, transformational leadership is positively linked to organization and business unit performance (Whittington, Goodwin, & Murray, 2004) such as economic criteria (Geyer & Steyrer, 1998; Howell & Avolio, 1993), as well as group performance (Sosik, Avolio, & Kahai, 1997). On an individual level, transformational leadership is a valid predictor for psychological criteria such as commitment (e.g., Meyer, Stanley, Herscovitch, & Topolnytsky, 2002), creativity (e.g., Jung, Chow, & Wu, 2003), follower job performance, and job satisfaction (e.g., Fuller, Patterson, Hester, & Stringer, 1996; Lowe, Kroeck, & Sivasubramaniam, 1996), motivation (e.g., Bass, Avolio, Jung, & Berson, 2003), and many others.

*Authentic Leadership*

According to Avolio, Gardner, Walumbwa, Luthans, and May (2004), authentic leaders are "those who are deeply aware of how they think and behave and are perceived by others as being aware of their own and others' values/moral perspectives, knowledge, and strengths; aware of the context in which they operate; and who are confident, hopeful, optimistic, resilient, and of high moral character" (p. 802). What distinguishes transformational leadership and authentic leadership conceptually? Avolio and Gardner (2005) argue that transformational leadership might be immoral if leaders such as

transformational leaders project an image of good leadership, but act in a way that serves their own interests at the cost of their followers. Avolio et al. (2004) and Avolio and Gardner (2005) reason that the concept of transformational leadership only pretends to be "universally positive" (Judge, Woolf, Hurst, & Livingston, 2006, p. 211). Avolio et al. (2004) find support for their reasoning in a statement by Bass (1985), who assumed that "transformational leadership is not necessarily beneficial" (p. 21). Indeed, this is somewhat inconsistent with the predominant conceptual assumption by Bass (1997) who stated that "transformational leaders move their followers to transcend their own self-interests for the good of the group, [and for the] organization" (p. 133).

Paradoxically, although Avolio and Gardner (2005) argue that transformational leadership and authentic leadership are distinct from each other, they believe that authentic leadership "could incorporate … transformational … leadership" (p. 329). Due to the lack of research, it is not possible to tell whether transformational leadership is less moral than authentic leadership. It is not even clear whether transformational leadership is a necessary condition for authentic leadership or vice versa (Judge et al., 2006, p. 211). However, what is missing is research showing that authentic leadership has the same impact on individual and organizational outcomes as transformational leadership. At the moment, transformational leadership seems preferable over authentic leadership in theory and application.

*Charismatic Leadership*

The terms *charismatic leadership* and *transformational leadership* are often used interchangeably (Hunt & Conger, 1999) – even by leadership researchers. However, we believe one should differentiate on a conceptual level. House (1977), who is credited for

advancing charismatic leadership research, further developed Weber's conception (1947) of charismatic leadership. The word "charisma" is etymologically Greek and means "gift". According to Weber (1947), a person with charisma is "set apart from ordinary people and treated as endowed with supernatural, superhuman, or at least specifically exceptional powers or qualities […] regarded as of divine origin or as exemplary, and on the basis of them the individual concerned is treated as a leader" (p. 358). Conger and Kanungo (1998) argue that charisma "is not some magical ability limited to a handful" (p. 161). They report widely accepted, typically charismatic characteristics such as possessing and articulating a vision, willing to take risks to achieve a vision, exhibiting sensitivity to followers' needs, and demonstrating novel behavior. According to Kirkpatrick and Locke (1996), charismatic leadership focuses clearly on communication styles. However, even if their framework of charismatic leadership has similarities to transformational leadership, and the differences between both concepts seem to be "minor" or "fine tuning" (House & Podsakoff, 1994, p. 71), there is an important hierarchical distinction. Bass (1985) suggests that "charisma is a necessary ingredient of transformational leadership, but by itself is not sufficient to account for the transformational process" (p. 31).

*Ethical Leadership*

Brown et al. (2005) defined ethical leadership as "the demonstration of normatively appropriate conduct through personal actions and interpersonal relationships, and the promotion of such conduct to followers through two-way communication, reinforcement, and decision-making" (p. 120). In brief, an ethical leader is an ethical role model. Some researchers saw a need to look closer at ethics in leadership due to ethical scandals in business (Brown & Treviño, 2006). Is there any difference between ethical leadership and

transformational leadership? Transformational leadership is defined as having an ethical component, whereby transformational leaders demonstrate "high standards of ethical and moral conduct" (Avolio, 1999, p. 43) that are applied through idealized influence. Furthermore, research shows that followers perceive leaders with higher moral reasoning to be more transformational. The sticking point for ethical leadership researchers is that Bass (1985) argued that transformational leaders could be ethical or unethical, depending on their motivation. Generally, ethical leadership researchers would agree that transformational leadership and ethical leadership overlap. "Transformational and ethical leaders care about others, act consistently with their moral principles (i.e., integrity), … and are ethical role models for others" (Brown & Treviño, 2006, p. 599). However, Brown et al. (2005) suggested that ethical leadership and transformational leadership are distinct constructs and set out to prove their point empirically. In fact, to their surprise, the results of their study did not show "distinctiveness" (p. 129). A closer look at their study reveals that their ethical leadership scale is highly correlated with the examined transformational dimension *idealized influence* behavior, a transformational subdimension that refers to actions of the leader (e.g., Antonakis, Avolio, & Sivasubramaniam, 2003). Furthermore, the data from confirmatory factor analysis indicate that the ethical leadership scale by Brown et al. (2005) and idealized influence behavior do overlap. Regardless, Brown et al. (2005) make a case for a "construct valid measure" (p. 132). We do not think that these results are sufficiently compelling to justify the "distinctiveness" of ethical leadership at this point.

## Adding the "E": Transformational E-Leadership

The (new) leadership theories mentioned above – unlike old leadership approaches – were implicitly conceptualized for face-to-face interactions. However, e-leadership, that

is the leadership of virtual teams, is defined as "a social influence process mediated by advanced information technologies to produce changes in attitudes, feelings, thinking, behavior, and/or performance of individuals, groups, and/or organizations" (Avolio, Kahai, & Dodge, 2001, p. 617). That means, communication in virtual teams in mainly based on information, i.e., communication technologies. And communication is certainly the main aspect of the so-called new leadership approaches described above (e.g., Avolio & Kahai, 2003). Communication "holds the group structure together… without communication, groups could not exist; without communication, people could not interact" (Applbaum et al., 1974, p. 9).

To understand the situation in leadership of teams that communicate via Internet, we have to turn to the young field of Internet Psychology that recently evolved (e.g. Joinson, McKenna, Postmes, & Reips, 2007; Reips & Bosnjak, 2001; Sassenberg, Postmes, Boos, & Reips, 2003). E-leadership relies on communication processes that are influenced by interacting psychological and technological factors. As much as Internet-based communication follows different rules than offline communication, the usual conceptions of leadership are affected in e-leadership. On the Internet, teams may be formed and cooperate much more frequently than offline under conditions of high anonymity. There is evidence that such conditions can be very helpful under certain circumstances, and thus moving to the "e" (or rather "i" – for reasons of convention we will stick to the "e" however) provides new opportunities for leaders. For example, indispensability effects support motivation gains among inferior group members even during sequential group work under highly anonymous (i.e. Internet) conditions (Wittchen, Schlereth, & Hertel, 2007).

The question is, if new leadership communication-centered behaviors have the

same effect on individuals or organizational criteria in virtual teams compared to traditional teams? As a general statement one can say that there is more opportunity for misinterpretations of electronic communication, such as e-mails for example. The relative low potential for text-only communication in building trust online (Riegelsberger, Sasse, & McCarthy, 2007) may have part of its roots in such misunderstandings (Reips, 2008). Having said this, we have to admit that research is somewhat lagging behind. To our knowledge, there is no research on new leadership paradigms in the setting of virtual teams except on transformational leadership. The significant research in this area will be summarized next.

*Transformational E-Leadership: Outcomes of and Conditions in different Information Technology Systems Settings*

*Transformational e-leadership through e-mails*. Kelloway et al. (2003) showed in two experimental studies that individuals can detect and respond to transformational leadership behaviors expressed through *e-mails*. Furthermore, performance in group tasks was higher for those who experienced transformational e-leadership behaviors. For example, participants who read intellectually stimulating e-mails rated their leader as being more intellectually stimulating than did participants who read a non-intellectually stimulating e-mail. Furthermore, participants who received an e-mail with a transformational leadership message as opposed to a non-transformational message reported higher job satisfaction or perceived interpersonal justice. Next, participants who had to perform in a virtual group task showed higher motivation and higher performance.

*Transformational e-leadership in group decision support systems*. Sosik, Avolio, and Kahai (1997) were the first to study transformational leadership in virtual

(experimental) settings. They found that transformational leadership affected the effectiveness of virtual teams working on creativity tasks within *a group decision support system*. High transformational leadership led to solutions of higher quality, that is original solutions, or questions about solutions than conditions with low transformational leadership. Furthermore, groups that were led with a highly transformational leadership style reported more perceived performance, extra effort, and satisfaction with leadership.

Similar to Sosik et al. (1997), Sosik, Avolio, Kahai and Jung (1998) provided evidence that transformational leadership behaviors affect the collective belief of group members that the group can be effective (i.e., group potency) as well as the actual effectiveness in *brainstorming* sessions in *anonymous* group decision support systems. According to Sosik et al. (1998) the effectiveness of those groups might be a function of the interaction of leadership style and *anonymity*. The explanation is that transformational leaders influence group members' beliefs concerning their ability to perform cooperatively for the sake of the "good of the group" (Bass & Avolio, 1994).

Kahai, Sosik and Avolio (2003) replicated the effect of transformational leadership in anonymous virtual teams within the frame of creativity tasks. Under transformational e-leadership and anonymous conditions, study participants generated more solutions to an assigned problem and helped the leader to determine the group's most appropriate solutions. Furthermore, transformational leadership limited *social loafing*, which may occur when group members are not identified, by getting all members to work for the good of the group.

Why is anonymity so important in transformational e-leadership? An explanation by Kahai et al. (2003) is that transformational e-leaders might challenge virtual team members in a positive way to exert effort instead of threatening them. That is, if (virtual)

team members feel more anonymous, they might accept comments by their virtual leader more likely as being constructive and less personal.

*Transformational e-leadership in an avatar environment.* Hoyt and Blascovich (2003) showed in an experimental study that transformational leadership was associated with higher qualitative performance in creativity tests within avatar settings compared to a low transformational leadership condition. Furthermore, groups that were led with a highly transformational leadership style reported more perceived performance, extra effort, or satisfaction with leadership. On the other hand, the quantitative performance was not better than in low transformational leadership conditions. Trust appeared to play an important role. It mediated the relationships between transformational e-leadership and outcomes. According to Hoyt and Blascovitch, trust is more likely to form if a relationship is built between a leader and a follower – such as in transformational leadership.

*Transformational e-leadership in desktop videoconference and text-based chat.* Hambley, O'Neill and Kline (2007) conducted an experiment on the impact of transformational behaviors in *desktop videoconference* and *text-based chat* on team interaction styles and outcomes. They found that transformational leadership – next to transactional leadership – has a positive impact on teams' problem solving tasks across communication media. However, transformational e-leadership did not provide an add-on effect. That is, its impact was not higher compared to transactional leadership. But this lack of an effect might be due to validity issues in measuring transformational leadership as described in the next section.

*Limitations of Transformational E-Leadership Research*

Overall research suggests that information technology systems do not constrain

transformational leadership. However, transformational e-leadership research faces some challenges. First of all, researchers might want to further explore the effectiveness of transformational e-leadership. It seems as studying transformational leadership might represent the other new leadership theories within e-leadership research due to its high explanations of variance in various criteria.

Nevertheless, a crucial issue is the assessment of transformational e-leadership. The assessment of transformational leadership behaviors in traditional settings faces some problems: the validity of the most extensively validated and used measures of transformational leadership (Felfe, 2006; Judge et al., 2006), called the Multifactor Leadership Questionnaire (MLQ) by Bass and Avolio (1990). This measure also assesses transactional leadership. There are lots of controversies and criticisms about the relatively high levels of multicolinearity reported among the transformational leadership scales (Avolio, Bass, & Jung, 1999; Felfe, 2006; Heinitz, Liepmann, & Felfe, 2005; Judge & Piccolo, 2004). Some authors even suggested that the transformational scales do not measure different or unique underlying constructs (Bycio, Hackett, & Allen, 1995; Carless, 1998). A larger number of studies failed to confirm the proposed factorial model. The numbers of factors range from two factors (e.g., Tepper & Percy, 1990) to three (e.g., Hinkin, Tracey, & Enz, 1997), four (e.g., Lievens, Van Geit, & Coetsier, 1997), five (e.g., Bycio et al., 1995; Koh, Steers, & Terborg, 2005; Yammarino, Spangler, & Bass, 1995) and six factors (e.g., Avolio, Bass, & Jung, 1999; Hater & Bass, 1988). This is unsatisfactory from the authors' point of view. But also from a practitioner's point of view the lack of validity is clearly a disadvantage: One would not be able to feedback reliable information about leadership behavior in an online development tool as presented further below.

Alternatives: The Ohio State Leadership Behaviors

Due to the methodological restrictions in traditional and transformational e-leadership research we propose to go back to the Ohio State Leadership (OSL) research (Stogdill, 1950) when doing research for practitioners. The Ohio State Leadership group identified two valid factors (Fleishman, 1953; Hemphill & Coons, 1957; Halpin & Winer, 1957): *consideration* and *initiating structure*. Consideration behaviors are essentially relationship behaviors such as being friendly and supportive, building respect, trust and liking between leaders and followers. Initiating structure implies behaviors such as organizing work, giving structure to the work context, defining roles and responsibilities, and scheduling work activities. Specifically, consideration seems to be the conceptual progenitor of transformational leadership, as they share basic conceptual similarities (Judge, Piccolo, Ilies, 2004; Seltzer & Bass, 1990). In fact, until the introduction of transformational leadership, the topics of consideration and initiating structure dominated leadership research. According to Fleishman (1995), "consideration and initiating structure have proven to be among the most robust of leadership concepts." (p. 51). For example, the two leadership factors have been used as operationalizations for autocratic vs. democratic, directive vs. participative, and task-oriented vs. relation-oriented leadership styles (e.g. Seltzer & Bass, 1990). We further argue for the OSL because a recent meta-analysis by Judge et al. (2004) clearly shows that both OSL concepts have important main effects on various indicators of effective leadership, such as job satisfaction, motivation or leader effectiveness. Furthermore, we assume that the two-factorial structure has a good face validity and acceptance by practitioners. In addition, the scales for OSL are short and reliable (e.g. Seltzer & Bass, 1990).

In the next chapter, we will present an e-leadership tool that integrates consideration (high overlap with transformational leadership) – and initiating structure – as well as some of the implications derived through experiments with transformational e-leadership, and technological developments.

The Virtual Team Trainer

The Virtual Team Trainer (VTT, see Figure 1) was developed as a general team development tool that runs on the Internet (Reips & Ito, 2007). The tool contains personality tests, group process development units, and modules that help leaders and any team member to identify their OSL leadership style, relate it to team structure and development, and subsequently modify and improve on their leadership skills. The VTT is available free for use via the *iScience Server* portal at http://iscience.eu.

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*Insert Figure 1 about here*

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Within the VTT the leadership modules are embedded in a broader set of tools for self-evaluation, team analysis and development. For example, the module "Rate" offers team ratings by using three sets of categories taken from the Existential Mapping Process (EMP, Horowitz, 1985; Tucker, 1987; Reips, 1992): Roles, Scripts and Stage Directions. In any given moment of a group interaction each individual can be perceived as "performing" one of six Roles in combination with one of the five Scripts. The individual stages her/his behavior in a certain "Direction" (Vector), with a certain "Energy" (Valence), and with a more spontaneous or more delayed "Timing" (Velocity). For a given scene from a team session, a user of the VTT thus may rate some or all team members on one or several of the

EMP categories. Ratings of the same scene by different team members are automatically combined to a set of team statistics by the VTT. Ratings of several scenes and/or sessions of the same team by several of its members are suited to reveal team processes as they unfold over time.

For research purposes, and for more comprehensive support in team development, the combination of data from several submodules is suited to reveal in-depth analysis of processes underlying leadership functions. For example, via the VTT leadership can be linked to personality characteristics and team dynamics as rated in the Existential Mapping Process. These processes can be followed over time, and via comparison of different teams the individual components can be separated from team components, leadership components, and from interactions between these factors.

*Diagnosing the Ohio State Leadership Style within VTT*

Figure 2 shows the Online Leader Behavior Description Questionnaire (OLBDQ; Reips & Heilmann, 2009) test tab that is part of the leadership module within the VTT. Upon entering the module the instruction that is adapted from Stogdill (1950) reads "On the following pages, a list of items that may be used to describe the behavior of the chosen team member is presented. This is not a test of ability. It simply asks you to describe as accurately as you can, how the chosen team member behaves as a leader of the group that she/he supervises. Note: The term "group," as employed in the following items, refers to a department, division, or other unit of organization that she/he supervises. The term "members," refers to all the people in the unit that she/he supervises. 1. READ each item carefully. 2. THINK about how frequently she/he engages in the behavior described by the item. 3. DECIDE whether she/he 'always', 'often', 'occasionally', 'seldom' or  'never' acts as

described by the item. 4. CHOOSE one of the 5 radio buttons following the item to show the answer you selected."

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*Insert Figure 2 about here*

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Once all ratings have been made VTT will display a graphical visualization of the results upon request. The two dimensions *consideration* ("people orientation") and *initiating structure* ("task orientation") are crossed to make up a leadership behavior space (see Figure 3). The target person's leadership style resulting from answering the questionnaire is marked as a red dot. Two dotted lines that part the leadership behavior space currently represent the averages from the LBDQ test manual, but in the future they will mark the average scores from all users who have taken the test in VTT. These lines will then dynamically adjust with use of the VTT. Thus, the underlying user database, i.e., sample, is growing steadily. The lines result in four simplifying quadrants that are useful to communicate leadership style easily, for example in training sessions.

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*Insert Figure 3 about here*

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Before actually filling in the questionnaire, a user needs to decide on the target person and state. One can either rate oneself or – anonymously – a different person from one of one's teams, and the test can be taken as one of *actual* leadership behavior or as one of determining one's *ideal* leadership behavior. If one intends to rate someone else, then VTT first asks for the team (via a list of all teams it knows one is a member of), then for the team member to be rated, see Figure 4.

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*Insert Figure 4 about here*

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A user can come back and repeatedly take the test, thus documenting changes over time (Figure 5). Accordingly, with frequent use the OLBDQ module in VTT works as a leadership diagnosis and management tool. Also, self-evaluations can be compared to those by others, and those of leaders can be compared to those of regular team members. With wide use of the VTT in perhaps thousands of real teams we will be able to derive many factors and combinations of factors that distinguish successful from not so successful e-leadership.

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*Insert Figure 5 about here*

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Conclusion

From the conception of e-leadership and its practical application we are able to derive a set of features that seem essential in comprehensive e-leadership tools. First, such a tool needs to contain validated tests suited to help in (self-)diagnosing one's leadership skills. Designers of e-leadership tools need to be aware that an online version of a previously available paper-and-pencil test cannot simply be constructed by copying the items, it needs to be validated in its own right (Buchanan, 2001; Buchanan, Johnson, & Goldberg, 2005; Reips, 2006). Second, e-leadership tools preferably contain self- and other-ratings that can be put in relation to each other. Third, e-leadership tools can and should continuously adjust their benchmarks, i.e., utilize their growing user database as a reference for relative feedback to each new user. Fourth, e-leadership tools should provide

a leadership memory to the user, so results from repeated sessions can support the learning process. Finally, e-leadership tools provide powerful connections between team members who are not present at the same location, and thus should contain some means of communication with each other about the results in regards to one's common team fate.

Future research on e-leadership will largely benefit from the advent of e-leadership tools in the style of communication-enriched social Web sites and tools. Real teams will provide a wealth of new data under Internet conditions of high anonymity that previously were difficult to obtain. These results will help us understand much better the interplay of leadership as well as e-leadership, team constellation, and individual differences. Thus, we will be able to develop more fine-grained (e-)leadership theories.

References

Antonakis, J., Avolio, B. J., & Sivasubramaniam, N. (2003). Context and leadership: An examination of the nine-factor full-range leadership theory using the Multifactor Leadership Questionnaire. *Leadership Quarterly*, *14*, 261-295.

Applbaum, R. L., Bodaken, E. M., Sereno, K. K., & Anatol, K. W. E. (1974). The process of group communication. Chicago, IL: Science Research Associates, Inc.

Avolio, B. J. (1999). *Full leadership development: Building the vital forces in organizations*. Thousand Oaks, CA: Sage.

Avolio, B. J., Bass, B. M., & Jung, D. I. (1999). Re-examining the components of transformational and transactional leadership using the Multifactor Leadership Questionnaire. *Journal of Occupational and Organizational Psychology*, *72*, 441-462.

Avolio, B. J., & Gardner, W. L. (2005). Authentic leadership development: Getting to the root of positive forms of leadership. *Leadership Quarterly*, *16*, 315-338**.**

Avolio, B. J., Gardner, W. L., Walumbwa, F. O., Luthans, F., & May, D. R. (2004). Unlocking the mask: A look at the process by which authentic leaders impact follower attitudes and behaviors. *Leadership Quarterly*, *15*, 801-823.

Avolio, B. J., & Kahai, S. S. (2003). Adding the "e" to e-leadership: How it may impact your leadership. *Organizational Dynamics*, *31*, 325-338.

Avolio B. J, Kahai, S. S., &, Dodge, G. E. (2001). E-leadership: Implications for theory, research, and practice. *Leadership Quarterly*, *11*, 615–668.

Avolio, B. J., Walumbwa, F. O., &, Weber, T. J. (2009). Leadership: Current theories, research, and future directions. *Annual Review of Psychology*, *60*, 421-449.

Bass, B. M. (1985). *Leadership and performance beyond expectations*. New York: Free Press.

Bass, B. M. (1990). *Bass & Stogdill's handbook of leadership: Theory, research, and managerial applications*. New York: Free Press.

Bass, B. M. (1997). Does the transactional-transformational leadership paradigm transcend organizational and national boundaries? *American Psychologist*, *52*, 130-139.

Bass, B. M., & Avolio, B. J. (1990). *Transformational leadership development: Manual for the Multifactor Leadership Questionnaire*. Palo Alto, CA: Consulting Psychologists Press.

Bass, B. M., & Avolio, B. J. (1994). *Improving organizational effectiveness through transformational leadership*. Thousand Oaks, CA: Sage.

Bass, B. M., Avolio, B. J., Jung, D. I., & Berson, Y. (2003). Predicting unit performance by assessing transformational and transactional leadership. *Journal of Applied Psychology*, *88*, 207-218.

Brown, M. E., Treviño, L. K., & Harrison, D. A. (2005). Ethical leadership: A social learning perspective for construct development and testing. *Organizational Behavior and Human Decision Processes*, *97*, 117-134.

Brown, M. E., & Treviño, L. K. (2006). Ethical leadership: A review and future directions. *Leadership Quarterly*, *17*, 595-616.

Bryman, A. (1993). *Charisma and leadership in organizations*. Newbury Park, CA: Sage.

Buchanan, T. (2001). Online Personality Assessment. In U.-D. Reips & M. Bosnjak (Eds.). *Dimensions of Internet science* (pp. 57-74). Lengerich: Pabst Science Publishers.

Buchanan, T., Johnson, J. A., & Goldberg, L. (2005). Implementing a Five-Factor personality inventory for use on the Internet. *European Journal of Psychological Assessment*, 21, 115-127.

Burns, J. M. (1978). *Leadership*. New York: Harper & Row.

Bycio, P., Hackett, R. D., & Allen, J. S. (1995). Further assessments of Bass' s (1985) conceptualization of transactional and transformational leadership. *Journal of Applied Psychology*, *80*, 468-478.

Carless, S. A. (1998). Assessing the discriminant validity of transformational leadership behavior as measured by the MLQ. *Journal of Occupational and Organizational Psychology*, *71*, 353-358.

Conger, J. A., & Kanungo, R. N. (1998). *Charismatic leadership in organizations*. Thousand Oaks, CA: Sage.

Den Hartog, D., House, R. J., Hanges, P. J., Ruiz-Quintanilla, S. A., & Dorfman, P. W (1999). Culture specific and cross culturally generalizable implicit leadership theories: Are attributes of charismatic/transformational leadership universally endorsed? *Leadership Quarterly*, *10*, 219-256.

Felfe, J. (2006). Transformationale und charismatische Führung - Stand der Forschung und aktuelle Entwicklungen [Transformational and charismatic leadership: State of research and recent developments]. *Zeitschrift für Personalpsychologie*, *5*, 163-176.

Fiedler, F. E. (1967). *A theory of leadership effectiveness*. New York: McGraw-Hill.

Fleishman, E. A. (1953). The description of supervisory behavior. *Journal of Applied Psychology*, *37*, 1-6.

Fleishman, E. A. (1995). Consideration and structure: Another look at their role in leadership research. In F. Dansereau & F. J. Yammarino (Eds.), Leadership: *The*

*multiple-level approaches: Classical and new wave* (pp. 51–60). Stamford, CT: JAI Press.

Fuller, J. B., Patterson, C. E. P., Hester, K., Stringer, D. Y. (1996). A quantitative review of research on charismatic leadership. *Psychological Reports*, *78*, 271-287.

Geyer, A. L., & Steyrer, J. M. (1998). Transformational leadership and objective performance in banks. *Applied Psychology: An International Review*, *47*, 397-420.

Halpin, A. W., & Winer, B. J. (1957). A factorial study of the leader behavior descriptions. In R. M. Stogdill & A. E. Coons (Eds.), *Leaders behavior: Its description and measurement* (pp. 39-51). Columbus, OH: The Bureau of Business Research College of Commerce and Administration, Ohio State University.

Hambley, L. A., O'Neill, T. A., Kline, T. J. B. (2007). Virtual team leadership: The effects of leadership style and communication medium on team interaction styles and outcomes. *Organizational Behavior and Human Decision Processes*, *103*, 1-20.

Hater, J. J., & Bass, B. M. (1988). Superiors' evaluations and subordinates' perceptions of transformational and transactional leadership. *Journal of Applied Psychology*, *73*, 695-702.

Heinitz, K., Liepmann, D., & Felfe, J. (2005). Examining the factor structure of the MLQ: Recommendation for a reduced set of factors. *European Journal of Psychological Assessment*, *21*, 182-190.

Hemphill, J. K., & Coons, A. E. (1957). Development of the leader behavior description questionnaire. In R. M. Stogdill & A. E. Coons (Eds.), *Leaders behavior: Its description and measurement* (pp. 6-38). Columbus, OH: The Bureau of Business Research College of Commerce and Administration, Ohio State University.

Hinkin, T. R., Tracey, J. B., & Enz, C. A. (1997). Scale construction: developing reliable and valid measurement instruments. *Journal of Hospitality and Tourism Research*, *21*, 100-120.

Horowitz, L. J. (1985). *The Existential Mapping Process*. Unpublished manuscript, Sonoma State University.

House, R. J. (1971). A path-goal theory of leader effectiveness. *Administrative Science Quarterly*, *16*, 321-339.

House, R. J. (1977). A 1976 theory of charismatic leadership. In J. G. Hunt & L. L. Larson (Eds.), *Leadership: The cutting edge* (pp. 189-207). Carbondale, IL: Southern Illinois University Press.

House, R. J. (1996). Path-goal theory of leadership: Lessons, legacy, and a reformulated theory. *Leadership Quarterly*, *7*, 323-352.

House, R. J., & Podsakoff, P. M. (1994). Leadership effectiveness: Past perspectives and future directions for research. In J. Greenberg (Ed.), *Organizational behavior: The state of the science* (pp. 45-82). Hillsdale, NJ: Erlbaum.

Howell, J. M., & Avolio, B. J. (1993). Transformational leadership, transactional leadership, locus of control, and support for innovation: Key predictors of consolidated-business-unit performance. *Journal of Applied Psychology*, *78*, 891-902.

Hoyt, C. L., & Blascovich, J. (2003). Transformational and transactional leadership in virtual and physical environments. *Small Group Research*, *34*, 678-715.

Hunt, J. G., & Conger, J. A. (1999). From where we sit: An assessment of transformational and charismatic leadership research. *Leadership Quarterly*, *10*, 335-343.

Judge, T. A., & Piccolo, R. F. (2004). Transformational and transactional leadership: A meta-analytic test of their relative validity. *Journal of Applied Psychology*, *89*, 755-768.

Judge, T. A., Piccolo, R. F., & Ilies, R. (2004). The forgotten ones: The validity of consideration and initiating structure in leadership research. *Journal of Applied Psychology*, *89*, 36-51.

Judge, T. A., Woolf, E. F., Hurst, C., & Livingston, B. (2006). Charismatic and transformational leadership. A Review and an agenda for future research. *Zeitschrift für Arbeits-und Organisationspsychologie*, *50*, 203-214.

Jung, D., Chow, C., & Wu, A. (2003). The role of transformational leadership in enhancing organizational innovation: Hypotheses and some preliminary findings. *Leadership Quarterly*, *14*, 525-544.

Kark, R., Shamir, B., & Chen, G. (2003). The two faces of transformational leadership: Empowerment and dependency. *Journal of Applied Psychology*, *88*, 246-255.

Kahai, S. S., Sosik, J. J., & Avolio, B. J. (2003). Effects of leadership style, anonymity, and rewards in an electronic meeting system environment. *Leadership Quarterly*, *14*, 499-524.

Kelloway. E. K., Barling, J., Kelley, E., Comtois, J., Gatien, B. (2003). Remote transformational leadership. *Leadership & Organization Development Journal*, *24*, 163-171.

Kirkpatrick, S. A., & Locke, E. A. (1996). Direct and indirect effects of three core charismatic leadership components on performance and attitudes. *Journal of Applied Psychology*, *81*, 36-51.

Koh, W. L., Steers, R. M., & Terborg, J. R. (1995). The effects of transformational leadership on teacher attitudes and student performance in Singapore. *Journal of Organizational Behavior*, *16*, 319-333.

Lievens, F., Van Geit, P., & Coetsier, P. (1997). Identification of transformational leadership qualities: an examination of potential biases. *European Journal of Work and Organizational Psychology*, *6*, 415-530.

Lowe, K. B., Kroeck, K. G., & Sivasubramaniam, N. (1996). Effectiveness correlates of transformational and transactional leadership: A meta-analytic review of the MLQ literature. *Leadership Quarterly*, *7*, 385-425.

Meyer, J. P., Stanley, D. J., Herscovitch, L., & Topolnytsky, L. (2002). Affective, continuance, and normative commitment to the organization: A meta-analysis of antecedents, correlates, and consequences. *Journal of Vocational Behavior*, *61*, 20-52.

Reips, U.-D. (1992). *The composition and systematic exploration of an observation device for the Existential Mapping Process*. Unpublished Master's thesis, Sonoma State University.

Reips, U.-D. (2006). Web-based methods. In M. Eid & E. Diener (Eds.), *Handbook of multimethod measurement in psychology* (pp. 73-85). Washington, DC: American Psychological Association.

Reips, U.-D. (2008). Potenziale jenseits der Privatsphäre: Risiken und Chancen internetbasierter Kommunikation [Potentials beyond privacy: Risks and benefits of Internet-based communication]. *Psychoscope, 29*, 8-11.

Reips, U.-D., & Heilmann, T. (2009). The OLBDQ: An online version of the Leader Behavior Description Questionnaire. Manuscript in preparation.

Reips, U.-D., & Ito, T., (2007, January 10). The Virtual Team Trainer. Presentation in lecture series "Educational Engineering", ETH Zürich & Educational Engineering Lab, University of Zürich.

Riegelsberger, J. Sasse, A., & McCarthy, J. D. (2007). Trust in mediated interactions. In Joinson, A., McKenna, K. Y. A., Postmes, T. & Reips, U.-D. (eds.), The Oxford handbook of Internet psychology (pp. 53-69). Oxford: Oxford University Press.

Sassenberg, K., Postmes, T., Boos, M., & Reips, U.-D. (2003). Studying the Internet: A challenge for modern psychology. *Special issue of Swiss Journal of Psychology, 62 (2)*.

Seltzer, J., & Bass, B. M. (1990). Transformational leadership: Beyond initiation and consideration. *Journal of Management, 16*, 693.

Sosik, J. J., Avolio, B. J., & Kahai, S. S. (1997). Effects of leadership style and anonymity on group potency and effectiveness in a Group Decision Support System environment. *Journal of Applied Psychology, 82*, 89-103.

Sosik, J. J., Avolio, B. J., Kahai, S. S., & Jung, D. I. (1998). Computer-supported work group potency and effectiveness: The role of transformational leadership, anonymity, and task interdependece. *Computers in Human Behavior, 14*, 491-511.

Stogdill, R. M. (1950). Leadership, membership and organization. *Psychological Bulletin, 47*, 1-14.

Tepper, B. J., & Percy, P. M. (1994). Structural validity of the Multifactor Leadership Questionnaire. *Educational and Psychological Measurement, 54*, 734-744.

Vroom, V. H., & Yetton, P. W. (1973). *Leadership and decision making*. Pittsburgh, PA: University of Pittsburgh Press.

Weber M. (1947). *The theory of social and economic organization*. New York: Free Press.

Whittington, J. L., Goodwin, V. L., & Murray, B. (2004). Transformational leadership, goal difficulty, and job design: Independent and interactive effects on employee outcomes. *Leadership Quarterly*, *15*, 593-606.

Wittchen, M., Schlereth, D., & Hertel, G. (2007). Social indispensability in spite of temporal and spatial separation: Motivation gains in a sequential task during anonymous cooperation on the Internet. *International Journal of Internet Science, 2*, 12–27.

Yammarino, F. J., Spangler, W. D., & Bass, B. M. (1993). Transformational leadership and performance: A longitudinal investigation. *Leadership Quarterly*, 4, 81-108.

Additional Readings

Antoni, C. & Hertel, G. (Eds.) (2009). Team innovation, knowledge and performance management: Requirements for different types of teamwork. *Special issue of the European Journal of Work and Organizational Psychology, 18(3)*, 251-379.

Balthazard, P. A., Waldman, D. A., & Atwater, L. E. (2008). The mediating effects of leadership and interaction style in face-to-face and virtual teams. In Weisband, S. (ed.), *Leadership at a Distance: Research in Technologically-Supported Work* (pp. 127-150). New York: Erlbaum.

Cascio, W. F., &, Shurygailo, S. (2003). E-leadership and virtual teams. *Organizational Dynamics*, *31*, 362-76.

Clawson, V. K., Bostrom, R. P., & Anson, R. (1993). The role of the facilitator in computer-supported meetings. *Small Group Research, 24*, 547-565.

Jarvenpaa, S., Knoll, K., & Leidner, D. (1998). Is anybody out there? Antecedents of trust in global virtual teams. *Journal of Management Information Systems, 14*, 29-64.

Joinson, A. N., McKenna, K., Postmes, T., & Reips, U.-D. (eds.). (2007). *The Oxford handbook of Internet psychology*. Oxford: Oxford University Press.

Hertel, G., Geister, S. & Konradt, U. (2005). Managing virtual teams: A review of current empirical research. *Human Resource Management Review, 15*, 69-95.

Hertel, G., Konradt, U. & Orlikowski, B. (2004). Managing distance by interdependence: Goal setting, task interdependence, and team-based rewards in virtual teams. *European Journal of Work and Organizational Psychology, 13,* 1-28.

Kozlowski, S. W. J., & Bell, B. S. (2003). Work groups and teams in organizations. In Borman, W.C., Ilgen, D. R., & Klimoski, R. J. (eds.), *Handbook of Psychology: Industrial and Organizational Psychology* (pp. 333–375). London: Wiley.

Lipnack, J., & Stamps, J. (1997). *Virtual teams: Reaching across space, time, and organizations with technology*. New York: John Wiley & Sons.

Malhotra, A, Majchrzak, A., & Rosen, B. (2007). Leading virtual teams. *Academy of Management Perspectives, 21*, 60-70.

O'Mahoney, S., & Barley, S. R. (1999). Do digital communications affect work and organization? The state of our knowledge. *Research in Organizational Behavior, 21*, 125-161.

Reips, U.-D., & Bosnjak, M. (Eds.). (2001). *Dimensions of Internet Science*. Lengerich: Pabst Science.

Weisband, S. (2008). *Leadership at a Distance: Research in Technologically-Supported Work*. New York: Erlbaum.

Xiao, Y., Seagull, F. J., Mackenzie, C. F., Klein, K. J. , & Ziegert, J. (2008). Adaptation of team communication patterns. Exploring the effects of leadership at a distance: task urgency, and shared team experience (pp. 71-96). In Weisband, S. (ed.), *Leadership at a Distance: Research in Technologically-Supported Work* (pp. 127-150). New York: Erlbaum.

Zaccaro, S. J., & Bader, P. (2003). E-leadership and the challenges of leading E-teams: minimizing the bad and maximizing the good. *Organizational Dynamics, 31*, 377-387.

Zigurs I. 2003. Leadership in virtual teams: oxymoron or opportunity? *Organizational Dynamics*, *31*, 339-51.

Terms

*Authentic Leadership*. Authentic leaders know who they are, what they believe and value, and they act upon these values and beliefs while transparently interacting with others.

*Consideration*. The concept of consideration goes back to the Ohio State Studies in the 1950'. It is the degree to which leaders are participative, pleasant, egalitarian, and concerned about the group members' welfare.

*E-leadership*. Unlike the traditional, face-to-face leadership, e-leadership takes place in a context where work is mediated by information technology.

*Ethical Leadership*. Ethical leaders are ethical role models.

*Existential Mapping Process (EMP)*: A group observation and development system developed by Horowitz (1985) and others. The system contains Roles, Scripts and Stage Directions. In any given moment of a group interaction each individual can be perceived as "performing" one of the six Roles in combination with one of the five Scripts. The individual stages her/his behavior in a certain "Direction" (Vector), with a certain "Energy" (Valence), and with a more spontaneous or more delayed "Timing" (Velocity). The Virtual Team Trainer (VTT) combines the Existential Mapping Process with the idea of a structured social Internet platform.

*Initiating Structure*. This concept has its roots in the Ohio State Studies in the 1950'. Inititating Structure is the degree to which a leader deals with clarifying the task requirements, providing information, and structuring tasks.

*Online Leadership Behavior Description Questionnaire*. The Online Leader Behavior Description Questionnaire (OLBDQ) consists of 40 statements, measuring the two factors of consideration and initiating. Typical items are as follows: "He is friendly

and approachable" (consideration), or "He let group members know what is expected from them" (initiating structure).

*Multifactor Leadership Questionnaire*. The Multifactor Leadership Questionnaire is the mostly widely used measure of transformational leadership as well as for the other leadership factors described above. This measure contains 45 items. There are 36 items that represent the several leadership factors described above, and nine items that assess three leadership outcome scales, that is satisfaction with the leader, extra effort and (leader) effectiveness. This measure exists in two versions, the rater form (followers rate their leader) and the leader form (leader's self- rating).

*Transactional Leadership*. Transactional leadership aims at monitoring and controlling employees through rational or economic means, operating with existing structures and systems.

*Transformational Leadership*. Transformational leaders' behaviors affect followers' effort, performance, and satisfaction by raising their self-efficacy, self-esteem and locus of control  through expressing high expectations of followers and belief in followers' abilities.

*Virtual Team Trainer*. The Virtual Team Trainer (VTT) is a general team development tool that runs on the Internet. The VTT contains modules that help leaders and any team member to test their personality, invite others, rate others' team behavior, and – most importantly in this context - identify their leadership style (consideration and initiating structure), relate it to team structure and development, and subsequently modify and improve on their leadership skills.
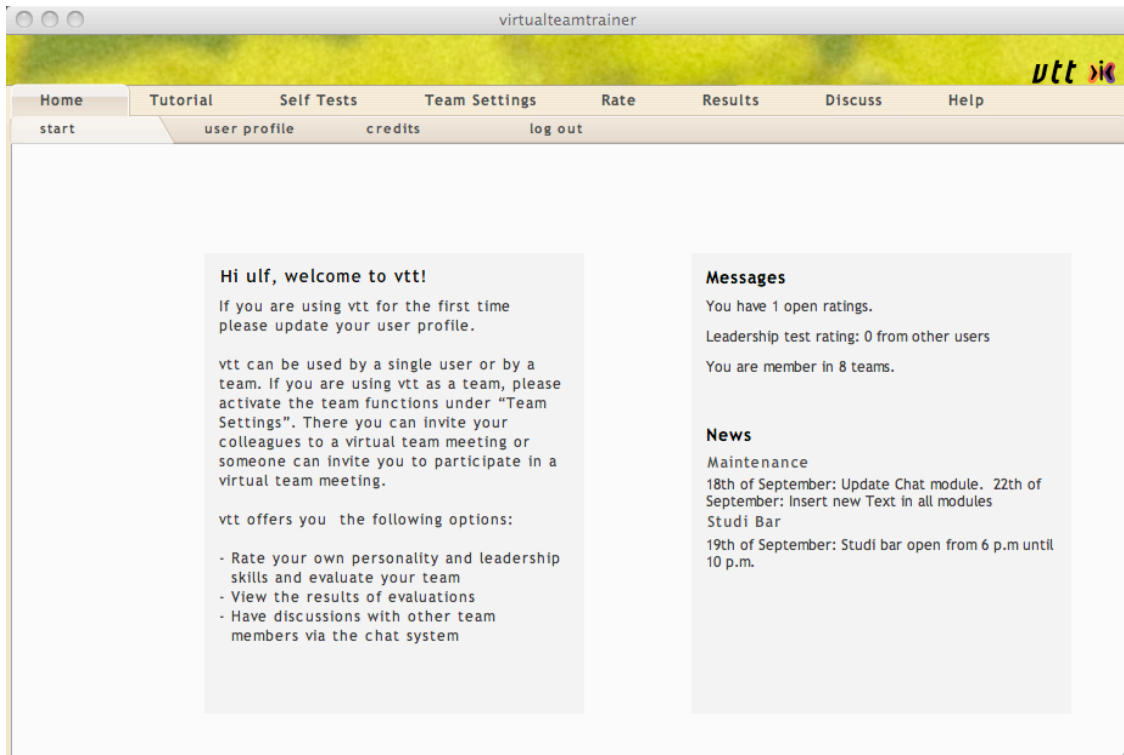
*Figure 1*. Welcome screen to the Virtual Team Trainer.

*Figure 2*. Items with rating options from the OLBDQ in VTT's leadership test submodule.
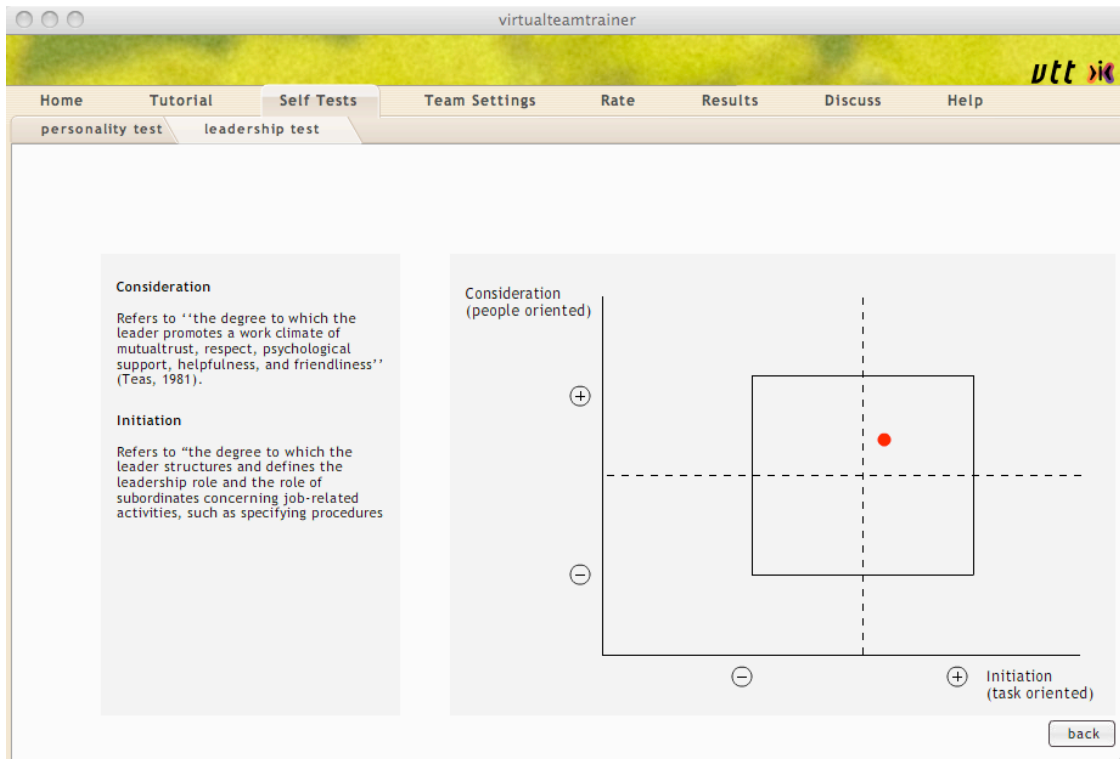
*Figure 3*. Results screen showing one's individual result in the consideration-initiation leadership space.
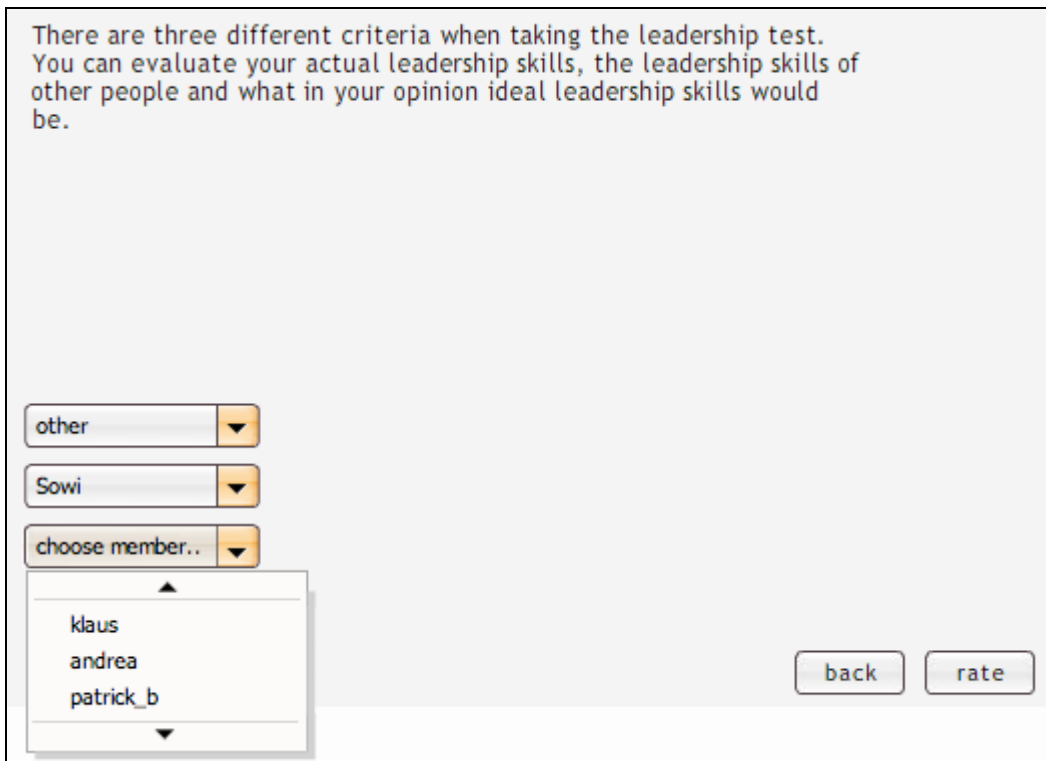
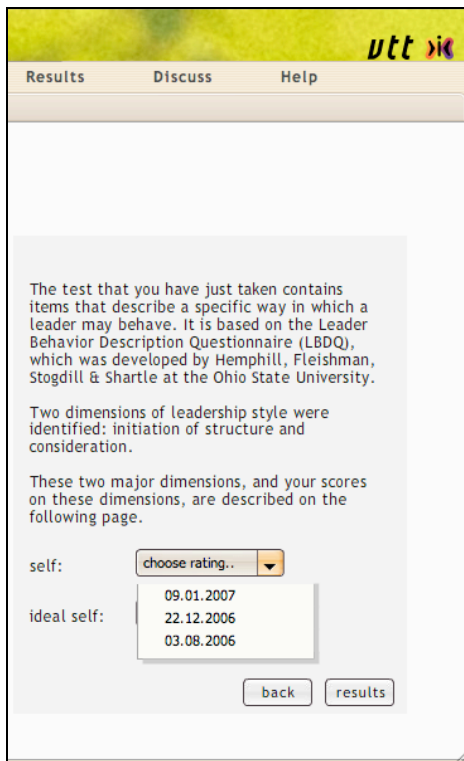*Figure 4*. Options for team and member selection in other-ratings.

*Figure 5*. A VTT screen illustrating time series of sessions, thus the longitudinal aspect of

leadership and team data can be analyzed.