

Users' motives shape trust in personalized applications: the importance of be-goals for perceived trustworthiness and risk

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Abstract. The achievement of instrumental goals (do-goals) in automated systems is essential in forming users' trust. However, the use of personalized applications is additionally linked to non-instrumental goals (be-goals). Be-goals include the satisfaction of needs like stimulation, relatedness or competence that makes the use of personalized applications so popular. In an experimental study (N = 34) we investigated how different levels of be-goal achievement affect users' trust in two applications, a social network and a cloud service. Results reveal that greater be-goal achievement is related to lower users' trust, a lower perception of trustworthiness and higher risk. This finding suggests that users associate a higher vulnerability with online situations which are closely connected to the self. However, the be-goals competence and security appear to be positively influencing users' trust. From these first findings we argue that for enhancing trust in personalized applications both do-goals and be-goals should be considered.

Keywords: users' trust, be-goals, trustworthiness, risk, personalized applications

1 Be-goals in personalized applications

The user acceptance of personalized applications depends on a multitude of factors with users' trust in the system being one of them. The understanding of the application's purpose and trust in its proper functioning are important elements for high user satisfaction and frequent use. Concepts like the dynamic model of trust and reliance on automation [1] or models of antecedents of online trust in e-commerce [for an overview, see 2] highlight this relationship. Accordingly, trust is enhanced when the application supports the users in achieving instrumental goals (do-goals). But the claim to facilitate the users' understanding of the system's purpose in order to enhance trust neglects the role of non-instrumental user motives (be-goals). Be-goals are closely connected to the individual experience during an interaction [3] and essential for the decision to use an application. They explain certain fundamental qualities of experience humans strive for, e.g. the feeling of being the cause of one's own actions

(autonomy) or the impression of being capable and effective (competence) [4]. For experiences with technology the most salient be-goals can be categorized as stimulation, relatedness, competence and popularity [5]. Do-goals, in contrast, are concrete outcomes of actions. They are task-driven and closely related to the technology used to achieve them [3]. In general, all personalized applications mediate goal-directed actions, i.e. they fulfil do-goals. However, only a few applications specifically address be-goals beyond the level of do-goals. Applications like social networks and cloud services are much more than means to an end. Beyond do-goal achievement they allow additionally non-instrumental use. People use social networks and cloud services in the first place for be-goals like connecting with their friends, sharing personal information or presenting oneself. Therefore they fulfil be-goals to a higher extent than other applications.

2 Trust and the role of be-goals

In trust research the fulfilment of be-goals does not obtain sufficient attention when compared to do-goals. HCI focuses on providing help for the users to achieve their do-goals as the concrete outcomes of actions. Consequently, uncertainty in task-driven usage situations is reduced and trust emerges [1]. Users' trust in applications is defined as an attitude of confident expectation that one's vulnerabilities will not be exploited in a situation of risk [6]. In this definition the aspects of vulnerability and risk are crucial. Being vulnerable includes an exposure of the user [6]. Risk as the appraised likelihood of a negative outcome [7] comprises both the perceived probability of negative consequences resulting from the usage of a product or a service and the significance of these consequences [8]. Vulnerability and risk perception on do-goal level could evolve due to a lack of knowledge of the application's functioning, e.g. the user fails in achieving a concrete task like adding a person in a social network or a cloud service. On be-goal level the user becomes vulnerable when the meaning of an action within the application is of high personal relevance, e.g. a failure in adding a person who is important for the user. So the mere failure in achieving the do-goal "add a person" does not provide any significance to the goal in case it is a person the user hardly knows and does not care about. Only the be-goal "feel connected to an important person" provides the significance for the user and makes the consequences of not achieving this goal personally meaningful [3]. In other personalized applications which focus on do-goals the negative consequences of not achieving the goal (e.g. access personalized timetables) the personal meaning will not evolve to the same extent like in applications which focus on be-goals. Therefore, we assume that the users' exposure (vulnerability) and potential negative consequences (risk) of the use of personalized applications are more significant for the users when they feel an intense connection to the application, i.e. when the application helps to achieve a high amount of be-goals.

By focusing on be-goals in personalized applications we see a chance to narrow the understanding of trust. Components of users' trust in applications are the perceived trustworthiness, the perceived risk, general system trust and the users' propensity to trust. The first component, perceived trustworthiness, includes characteristics

of ability which are indicated e.g. by the usability of an application. Ability is closely related to do-goals. The more the application enables the user to achieve do-goals, the more trustworthiness will be perceived. Additionally, the adherence to principles the user finds acceptable (integrity) and the benevolence of the application's provider or developer belong to perceived trustworthiness [6]. For instance, applications which offer accounts free of charge signal that they are not intended to serve profit motives in the first place and are therefore considered to be benevolent. Both integrity and benevolence relate to intentions and motives of the application's provider concerning the users' needs. Hence, they are considered to match be-goals. The second component of trust is perceived risk. It is defined as the appraised likelihood of a negative outcome [7] connected to the use of the application. As shown above, negative outcomes are of more relevance when the use of personalized applications contains personally meaningful be-goals. As a third component of users' trust in applications system trust refers to the trust in the underlying Internet technology [6] and contributes to the basic level of trust. Finally, propensity to trust has a direct impact on the use of applications and the formation of users' trust. The combination of the four components forms users' trust.

We hypothesize that applications with higher be-goal achievement are related to lower perceived trustworthiness and higher perceived risk. Users' trust resulting from perceived trustworthiness, perceived risk and the dispositional factors system trust and propensity to trust is assumed to be lower with a higher degree of be-goal achievement.

3 Method

To investigate the effects of be-goals on users' trust two personalized applications were tested in a within-design. The experimental study required interaction with both of the applications, a social network and a cloud service, as well as a rating of individual be-goal achievement and trust. The applications were chosen on the basis of a pre-test which defined the differences in be-goal achievement between them. One of the applications was facebook.com representing the social networks. The other application was the cloud service dropbox.com which is widely popular within the student population. All participants had an account on each of the systems and used them regularly. Both applications have a high relevance for the daily life of the participants and were considered to be equally accepted.

Material. In a pre-study the achievement of different types of be-goals was assessed. The scale of need satisfaction employed by Hassenzahl, Diefenbach and Göritz [4] was used. It consists of 30 items depicting each of the top ten psychological needs [5] by three items. We skipped the items for luxury and physicalness because they seemed inappropriate for the context of personalized applications. The remaining 24 items included the psychological needs autonomy, competence, relatedness, meaning, stimulation, security, self-esteem and popularity. Participants were asked to rate the level of need fulfilment they usually feel during the use of the application on a 6-point

Likert scale, e.g. “When using [the application] I feel that I am a person whose advice others seek out and follow”. For measuring users’ trust in the main study we used the scale on online users’ trust (SCOUT) [9, in preparation]. It contains 15 items and measures situational and dispositional aspects of trust on a 5-point Likert scale. Participants were asked for their level of agreement on four dimensions: perceived trustworthiness, perceived risk, system trust and propensity to trust. The items for perceived trustworthiness include the assessment of both interaction characteristics and characteristics of the application’s provider, e.g. “The application makes me think the provider is competent.” The items for risk include statements about the usage situation, e.g. “I feel it is insecure to use this application.”. Beside situational components of trust the scale measures also dispositional components like system trust (e.g. “For me the internet is a trustworthy environment.”) and the user’s propensity to trust (e.g. “I tend to quickly trust persons or things.”). Furthermore, the Web Analysis Measurement Inventory [10] was applied to control for differences in usability. It contains five dimensions (attractiveness, controllability, efficiency, helpfulness, learnability) with four items on each dimension. Agreement is measured on a 5-point Likert scale.

Procedure. In the pre-study the scale of need satisfaction [4] was administered online with a short introduction explaining both parts of the experiment. Participants rated their level of be-goal achievement for each of the applications (social network, cloud service) in randomized order. In the main study all of the participants were asked to interact with both applications in randomized order. For each application the initial task was to log in to the application with the participant’s own username and password. They were then asked to carry out a brief information search task to create a user experience immediately before they rated perceived trustworthiness and perceived risk of each application. By using their own accounts within the experiment the participants were meant to feel as close to a real usage situation as possible by still keeping up standardized conditions. Several questionnaires for assessing control variables were administered after the participants had finished the tasks.

Participants. A total of $N = 34$ students of Chemnitz University of Technology (23 female, 11 male) took part in the study. The mean age was $M = 22.2$ ($SD = 2.9$) years. They were all well-grounded in Internet use and spent about 26 hours per week online for private purposes. All of them had an account on both of the applications used. There were no significant differences in the reported personal importance of the applications. The participants felt equally connected to both their accounts on facebook.com and dropbox.com.

4 Results

The pre-study was conducted to check for different levels of be-goal achievement. Results show significant differences on the be-goals competence, relatedness, stimulation, security, self-esteem and popularity (Table 1) between the social network and the cloud service. The social network scored higher on relatedness, stimulation self-esteem and popularity whereas the cloud service showed higher values for compe-

tence and security. Thus, the social network clearly offers a higher number of be-goals achieved.

Table 1. Means, standard deviations and results from paired t-tests for the be-goal achievement (scale of need satisfaction, scale ranging from 1-6)

	Social Network		Cloud Service		t	p
	M	SD	M	SD		
Autonomy	3.61	1.38	3.57	1.28	.19	.852
Competence**	2.74	1.25	3.68	1.28	-4.09	.000**
Relatedness**	4.62	1.22	3.41	1.37	4.43	.000**
Meaning	2.44	1.17	2.21	.98	1.44	.159
Stimulation**	3.74	1.28	3.17	1.28	3.23	.003**
Security*	2.77	1.07	3.34	1.21	-2.77	.009*
Self-esteem*	3.22	1.30	2.82	1.24	2.34	.026*
Popularity*	3.34	1.35	2.91	1.29	2.24	.033*

According to the different levels of be-goal achievement we expected differences in trust scores between the applications in the main study. The social network as the application with a higher level of be-goal achievement should evoke less perceived trustworthiness, more perceived risk and less users' trust than the cloud service which serves a lower level of be-goal achievement. For the analysis of the trust scores a t-test for related samples revealed significant differences in the total score for users' trust ($t(33)=-6.79$; $p<.001$). The total users' trust scale consists of the mean of the four subscales perceived trustworthiness, perceived risk and the dispositional subscales system trust and propensity to trust. The comparison of the situational subscales perceived trustworthiness ($t(33)=-5.73$; $p<.001$) and perceived risk ($t(33)=5.83$; $p<.001$) confirms the significant differences between both applications (Fig. 1).

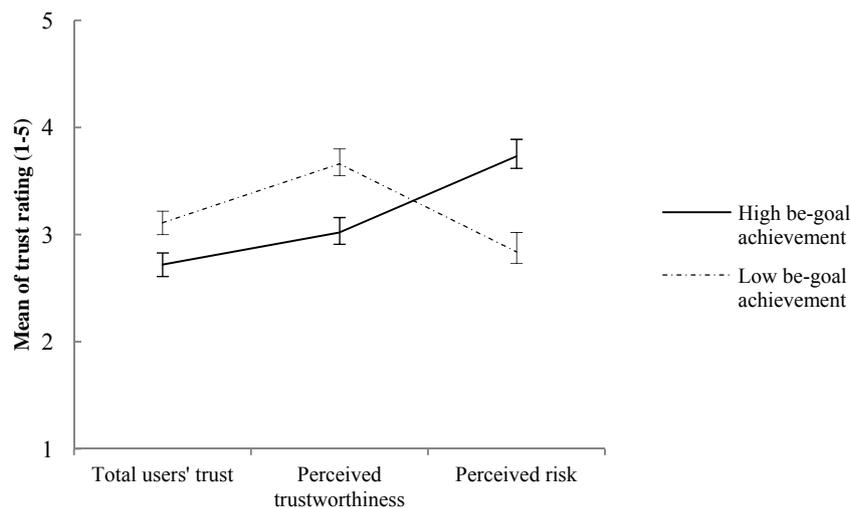


Fig. 1. Mean ratings on the scale of online users' trust, error bars indicate standard errors

Internal consistency for the scale on online users' trust (SCOUT) was $\alpha = .83$ for the social network and $\alpha = .87$ for the cloud service. The applications did not differ significantly on their usability scores ($t(33) = .769$, $p = .448$). Our results support the hypothesis that applications that fulfil more be-goals are related to less users' trust, less trustworthiness of the application and a higher perceived risk.

4 Discussion

Different degrees of be-goal achievement in personalized applications are related to different levels of users' trust. We found a higher be-goal achievement like relatedness, stimulation or self-esteem to be related to lower users' trust, lower perceived trustworthiness and higher perceived risk than a lower be-goal achievement. It seems that non-instrumental be-goals are associated with a higher personal meaning. People become more attached to applications the more intense the applications help to achieve their be-goals [3]. Therefore, potential negative consequences of interactions carry more weight and have to be considered when assessing trust in applications. If a user faces the risk of not achieving be-goals in an online situation of risk, the self will automatically be affected. That enhances vulnerability and hence, reduces perceived trustworthiness and aggravates risk. Furthermore, we discovered that different types of be-goals are differently related to users' trust in applications. Competence and security were fulfilled to a higher extent by the tested cloud service and were related to higher users' trust. Both competence and security refer to the feeling of being capable or in control. This connects directly to the concept of perceived trustworthiness, which is enhanced by the perception of ability. The distinction of be-goals between security and growth needs, which has been discussed by several authors [5], offers a possible explanation for the differences in users' trust related to those be-goals. Do-goals have not been an explicit part of this study. It is argued that for most products the fulfilment of do-goals can be seen as precondition for users' acceptance [11] and trust. The interplay between do-goals, be-goals and users' trust should be investigated in future research.

Our experimental study is to be seen as a first step in examining the relationship between be-goal achievement and users' trust in personalized applications. By using two existing applications with different levels of need satisfaction we created a setting of high external validity. Studies on users' trust gain validity by creating a real-life setting though we trade-off internal validity in return. For internal validity we controlled for influences on users' trust as far as possible. All of the participants had an own account on both of the applications. They used both accounts regularly on a voluntary basis. Both applications are well-known. Although facebook.com suffered from bad publicity lately we believe the high usage rates indicate that general acceptance was not affected by that. Usability as situational antecedent of trust was the same for both applications. By using a within test design we could eliminate the influence of personality factors. Still, there are external factors like social influences or media influences we did not cover in this study. For further investigation of the rela-

tionship between different levels of be-goal achievement and trust in personalized applications the effects of such external factors should be regarded. For enhancing internal validity a comparison of applications of only one type is advisable. Additionally, other applications apart from social networks and cloud services should be systematically tested. Depending on the service offered by different applications factors like the voluntariness of use or specific content of the application might influence the formation of users' trust.

Particularly for personalized applications users' motives and be-goal achievement should be considered before designing the system. Users' understanding of the underlying structure and the way their data is managed by the system do without question contribute to the formation of users' trust. But the degree of the achievement of be-goals – that determine the decision to use the application in the first place – is the key to a more detailed trust assessment and can give implications for designing trust-enhancing interfaces.

4 References

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