THE REPUBLIC OF TURKEY
BAHCESEHIR UNIVERSITY

A TEAMWORK USABILITY SCALE: DESIGN AND EVALUATION

Ph.D. Thesis

MEHMET İLKER BERKMAN

ISTANBUL, 2016

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This is to certify that we have read this thesis and we find it fully adequate in scope, quality and content, as a thesis for the degree of Ph.D.

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ABSTRACT

A TEAMWORK USABILITY SCALE: DESIGN AND EVALUATION

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Computer Engineering

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This study presents the development process of a set of questionnaire items to establish a measurement model for the usability of shared workspace groupware systems. Manifest variables and latent variables are based on the various dimensions of teamwork collated through the literature. A structural model was enrooted on the measurement model. Models were both evaluated through PLS-SEM. Data acquired on candidate questionnaire items from 398 international respondents who are users of five different online collaborative word processors was used for model analysis. 22 manifest variables were the retained from 37 candidate items, which were measuring seven latent constructs: “3C Mechanisms”, “Grounding”, “Team Integration”, “Communication”, “Shared Access”, “Awareness” and “Groupware Usability”. Data provided empirical evidence for the structural model based on these latent variables. The responses of the participants were not sensitive to differences between users in terms of gender and native language, but showed sensitivity to age, experience with the evaluatd software and different shared workspace groupware evaluated in the study. Our structural model attempts to integrate several frameworks and models of Usability for CSCW environments and provides an empirical evidence for its reliability, validity based on subjective responses from users of shared workspace groupware.

Keywords: Usability Scale, Teamwork, Groupware, Psychometry, Partial Least Squares Structural Equation Modeling, Computer Supported Collaborative Work

ÖZET

BİR TAKIM ÇALIŞMASI KULLANILABİLİRİLİK ÖLÇEĞİ: GELİŞTİRME VE DEĞERLENDİRME

Mehmet İlker Berkman

Bilgisayar Mühendisliği

Tez Danışmanı: Yrd.Doç.Dr. Dilek KARAHOCA

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Çalışmada, bilgisayar tabanlı paylaşımlı çalışma ortamlarının kullanılabilirliğini ölçmek üzere geliştirilen bir ölçüm modelinin geliştirilme süreci anlatılmaktadır. Açık ve gizil değişkenler bilgisayar ortamında takım çalışmasına dair literatür taraması yolu ile belirlenmiştir. Ölçüm modeline binaen bir yapısal model de oluşturulmuştur. Her iki model PLS-SEM yaklaşımı kullanılarak değerlendirilmiştir. Açık değişkenler, 5 farklı çevrimiçi kelime işlem yazılımının kullanıcısı olan farklı uluslardan 398 kişi tarafından, kullanıcısı oldukları yazılımı değerlendirmek üzere cevaplanmıştır. Önceden belirlenen 37 değişkenin 22 tanesi ölçüm yapabilme kriterlerine uygun bulunmuştur. Bu açık değişkenlerle, bilgisayar tabanlı paylaşımlı çalışma ortamlarının kullanılabilirliğine ilişki 7 gizil değişkenin ölçümü yapılmaktadır. Bu gizil değişkenler 3C Mekanikleri, Ortak Paydalar, Takım Uyumu, İletişim, Paylaşımlı Erişim, Farkındalık ve Kullanılabilirlik öğelerinden oluşmaktadır. Toplanan veriye dayalı olarak, gizil değişkenlerden oluşan yapısal model görgül olarak doğrulanmıştır. Oluşturulan yapısal model, Bilgisayar Destekli İşbirlikli Çalışma Ortamlarının kullanılabilirliğine dair çeşitli iskelet ve modelleri bir araya getirmekte, paylaşımlı çalışma ortamlarının kullanıcıları tarafından sağlanan veriye dayalı olarak ölçeğin güvenilirlik ve geçerliliğine dair gözleme dayalı deliller ortaya çıkmaktadır.

Anahtar Kelimeler: Kullanılabilirlik Ölçeği, Takım Çalışması, Psikometri, Kısmi En Küçük Kareler Yapısal Eşitlik Modeli, Bilgisayar Destekli İşbirlikli Çalışma

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ABBREVIATIONS

3C	:	Communication, Cooperation, Coordination
ASQ	:	After Scenario Questionnaire
AVE	:	Average Variance Extracted
CB	:	covariance based
CSCW	:	Computer Supported Collaborative Work
CSUQ	:	Computer System Usability Questionnaire
CUA	:	Collaborative Usability Analysis
D.G. rho	:	Dillon - Goldsteins's rho
DARPA	:	Defense Advanced Research Projects Agency
EFA	:	Exploratory Factor Analysis
ER	:	Expectation Ratings
EWG	:	Evaluation Working Group
GDSS	:	Geographically Distributed Decision Support Systems
GoF	:	Goodnes-of-Fit Index
HCI	:	Human - Computer Interaction
IC&W	:	Intelligent Collaboration and Visualization
ICT	:	Information Communication Technology
IM	:	Instant messaging
ISO	:	International Standards Organization
K-S test	:	Kolmogorov-Smirnov test
M	:	Mean
MANOVA	:	Multivariate Analysis of Variance
N/A	:	not applicable
PLS	:	partial least squares
PLS-CFA	:	Partial Least Squares-Confirmatory Factor Analysis
PLS-PM	:	Partial Least Squares Path Model
PLS-SEM	:	Partial Least Squares - Structural Equation Modelling
PSSUQ	:	Post-Study System Usability Questionnaire
QUIS	:	Questionnaire for User Interaction Satisfaction
SD	:	Standard Deviation
SEQ	:	Single Ease Question

SMEQ	:	Subjective Mental Effort Question
SPSS	:	IBM Statistical Package for Social Sciences
SUMI	:	Software Usability Measurement Inventory
SUS	:	System Usability Scale
S-W test	:	Shapiro-Wilk test
UME	:	Usability Magnitude Estimation
UMUX	:	Usability Metrics for User Experience
VoIP	:	Voice over Internet Protocol

INTRODUCTION

Usability scales have been valuable tools for the summative evaluation of software products from a subjective user perspective. These standardized questionnaires with confirmed validity, reliability and sensitivity had been an essential part of the researcher's' toolkit since the 1980s in human–computer interaction studies (Sauro & Lewis, 2012).

Just a few years ago, it was suggested that as cloud computing systems emerged, groupware applications would be used by larger audiences for a diverse array of tasks (Chauhan & Babar, 2012). For this reason, summative methods like questionnaires are expected to be in high demand for the evaluation of collaborative work executed through shared workspace groupware. Current questionnaire tools have been designed for evaluation in a single user paradigm, i.e. to elicit feedback from an individual who interacts with a system to achieve personal goals. However, a shared workspace groupware requires a different perspective to evaluate the feedback of a group of people working on the same system to achieve a shared goal. A standardized evaluation tool for the assessment of the quality of use in groupware needs to be able to acquire the user's feedback on groupwork aspects rather than taskwork metrics.

This study presents the development process of a set of questionnaire items for assessing the usability of shared workspace groupware applications, based on the various dimensions of collaborative work. These groupwork-related usability dimensions were determined from the related literature of usability in groupware systems, and a set of candidate items for the psychometric evaluation was established. Subsequent to data collection using these items, results were examined for validity, reliability and sensitivity, to develop a measurement model for subjective evaluation of shared workspace groupware applications. Based on the measurement model, a structural model was offered and evaluated based on the empirical data.

1.1 MOTIVATION

Software quality can be defined according to the process and product quality. The level that software conform the explicit and implicit set of requirements relates the quality of the software as a product, while set of development criteria followed to engineer the software relates to the process quality. Usability is one the implicit criteria that should be met to maintain a high-quality software product.

Unlike other engineering disciplines, software engineering is not grounded in the quantitative laws of physics. For this reason, some software measures and metrics are indirect and inabsolute (Pressman, 2005: 461). On the other hand, there are some more direct and absolute metrics of software quality, such as function-based metrics like number of inputs, outputs, inquiries and files (Albrecht, 1979). Another example is the architectural design metrics which depend on measures like the number of modules in different categories. There are different set of metrics to assess the quality of object-oriented software, based on measures like the number of root classes or depth of inheritance tree (Pressman, 2005: 655-659) that indicates the complexity of the software. However, as an indicator of software quality, usability cannot be assessed with direct measures that acquired through the software itself. The metrics of usability, e.g. efficiency, should be determined according to measures based on user interactions, such as number of user actions to achieve a goal, or time that the users spend to recover from their erroneous actions. Besides such objective measures, there are also subjective approaches to assess the usability of a software product. Usability scales assess the quality of use in a subjective manner.

Usability scales have a long history in HCI (Human-Computer Interaction) research. They have been valuable tools for summative evaluation of software products from a subjective user perspective. Those standardized tools, with confirmed validity, reliability and sensitivity, had been an essential part of HCI researchers' toolkit to understand the users' feedback on usability aspects.

Based on the Nunnaly's work (1978), Sauro and Lewis (2012, p.185-186) summarizes the advantages of standardized scales. Objectivity, replicability, quantification, economy, communication and scientific generalization are important features of

standardized scales, which made them also useful for summative usability evaluation of computer systems.

As the cloud-computing systems emerge, groupware applications will be used by a larger audience, for diverse array of tasks (Chauhan & Babar, 2012). Thus, summative usability evaluation methods are expected to gather more demand for the evaluation of CSCW (Computer Supported Collaborative Work) applications, especially the collaborative shared workspaces. However, current usability scales are designed to investigate the feedback of a single user interacting with a system to reach personal goals. Metrics evaluated through usability scales are focused to single user's feedback about her experience to reach a personal goal. On the contrary, collaborative work requires a different perspective to evaluate the feedback of a group of people working on the same system to achieve a shared goal. For this reason, a standardized usability evaluation scale for collaborative applications needs to be able to acquire user's feedback on teamwork aspects, rather than taskwork metrics.

1.2 STATEMENT OF THE RESEARCH PROBLEM

This study aims to develop a standardized usability scale to measure teamwork aspects of system use in collaborative shared workspace applications. In addition, measurement model would be transferred into a structural model to assess the relationships between the latent variables which affect the quality of teamwork on shared workspaces.

2. BACKGROUND

On their early study, Gutwin and Greenberg (2000) emphasize the complexity of groupwork evaluation, since it is affected by social factors such as organizational culture, differences in personalities, and group dynamics. On the other hand, they claim that, rather than being caused by social or organizational matters, usability problems in groupware applications firmly connected to "insufficient or mismatched support for the basic activities of collaboration", which they call "mechanics of collaboration", defined as "small-scale actions and interactions that group members must carry out in order to get a shared task done".Multiple factors penetrate the success of collaborative work, containing group characteristics, group dynamics, the social and organizational context in which the collaborative work is being executed, and the effects of technology on the group's tasks and processes, which might be either negative or positive (Antunes et al, 2012).

Antunes et al. (2012) propose a three-layer view for evaluation of CSCW: *Role-based evaluation*, *rule based evaluation* and *knowledge based evaluation*. The *role-based evaluation methods* gather data at the individual's cognitive level. Group activity is basically considered as a collection of independent activities. Independent activities of each user are investigated with a high level of granularity, i.e. keystrokes or mouse movements. Efficiency and usability metrics are offered for evaluations at the role-based level. In *rule-based approach*, the concern of the evaluation is a group of individuals "who must coordinate themselves to accomplish a set of tasks". Granularity of investigated system's details is larger. Instead of keystrokes or mouse movements, evaluators focus on the interdependent activities of users, such as messages exchanged. Besides the metrics related to organizational goals, e.g. conformance to regulations, metrics related to group performance, such as productivity, are proposed for rule-based evaluations. The main focus of *knowledge-based evaluation* is organizational impact. The aim of the evaluator is to understand about the broader concepts such as "knowledge management, creativity and decision-making abilities". Thus, the investigated "system detail has coarse granularity, favouring broad issues such as perceived utility or value to business." Case studies and ethnographic studies are

suggested methods.

Based on their classification of evaluation methods for collaborative work, Antunes et al. (2014) proposed a set of design elements that correspond to important awareness functions. They also built a checklist for developers to review awareness in collaborative software. When we reviewed the items of their checklist, we found out that majority of the items are related with the system functions to be checked by developers, but not suitable for an evaluation from the subjective perspective of users to reflect on users' overall experience.

Current standardized usability scales are capable of assessing a CSCW system only through an individual's feedback on system use based on individual's activities and cognition, within the *role-based approach*. *Knowledge-based approach* may require ad-hoc or special-purpose questionnaires, depending on their focus on broad issues and longer period of time for the evaluation. Since the *rule-based approach* of evaluation is mainly concerned in interdependent activities of several subjects coordinating themselves to accomplish a set of tasks, a standardized scale can be used for understanding the issues related to group performance through inspecting each individuals' feedback about group activities. Considering the "rule-based evaluation" (Antunes et al.,2012) approach that focuses on interdependent activities of users and "mechanics of collaboration" perspective (Gutwin and Greenberg, 2000) defining the interactions between group members, the measures and metrics for the groupware evaluation scale should aim to identify the quality of use in a groupwork oriented manner.

However, the quality measures of computer supported groupwork are not well established as usability metrics which are primarily developed to assess the interactions of a single user with a computer system. Gutwin and Greenberg (2000) consider "the task execution to be the taskwork", to define the activities of a work to be done, such as "words put on paper, objects placed in order, or parts fixed together to form a whole." They claim that taskwork "is no different for a group than it is for an individual". Thus, usability metrics which are primarily developed to assess the interactions of a single user with a computer system can also be used to evaluate a collaborative system. In this case they are called taskwork metrics. *Efficiency and effectiveness* are quite well defined

dimensions of taskwork established for evaluating the single user's performance interacting with a computer system. In addition, methods to assess *satisfaction* of the user and *learnability* of the system are used to evaluate usability of a system. Those metrics are used and refined through decades to identify the quality of use within the single user paradigm. However, usability issues in CSCW systems are relatively novel and the dimensions to define the quality of use in such a system are not defined as precisely as taskwork metrics. A different set of measures are required to assess the "interdependent activities of users" for "rule-based evaluation", in other words, "interactions between group members" as "mechanics of collaboration". We think that those metrics can be called as "teamwork metrics", excluding the "social and affective elements of group dynamics."

Coordination (Ellis et al.,1991; Gutwin & Greenberg, 2000), *communication* (or *conversation*) (Ellis et al., 1991; Cugini et al., 1997; Gutwin & Greenberg, 2000), *awareness* (Cugini et al., 1997; Gutwin & Greenberg, 2002), *participation* (Cugini et al., 1997) are some of the metrics proposed in several studies. However, it is required to clarify teamwork metrics through a literature survey of usability studies in collaborative work and CSCW field for the development of a standardized scale that measures group performance. The first part of the following literature review will give a summary of collaborative work. Afterwards, efforts to define the CSCW are summarized. Then the studies which suggest metrics and measures for the evaluation of groupware systems are inspected to define a set of teamwork metrics. Rest of the literature review will give a summary of studies related to current subjective summative evaluation tools to establish a methodology for developing a novel tool.

2.1 RELATED LITERATURE

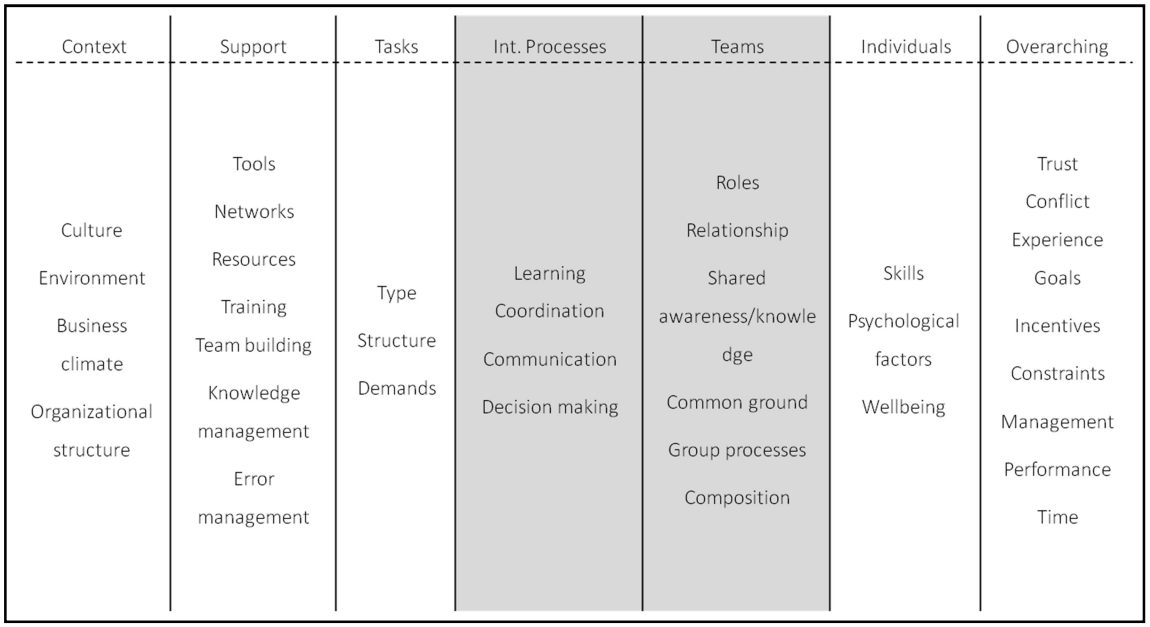
There are several frameworks and models to propose an evaluation approach for quality assessment of CSCW. These studies will be explored to derive a set of items for developing a teamwork usability scale. We also decided to review the classification studies of CSCW and efforts to define the interaction within the context of group work to distinguish different types of software that can be the subject of our experimental

study. At the first step, we think that a summary of collaborative work factors would help.

2.2 SUMMARY OF COLLABORATIVE WORK FACTORS

Patel et al. (2012) identified seven main categories of factors involved in collaborative work: Context, support, tasks, interaction processes, teams, individuals, and overarching factors. They have developed a framework of factors and sub-factors of collaboration, based on a literature survey of studies several studies about systems of work, design and enginnering, and determined evidence for mechanisms, factors positive and negative effects which is depicted on Figure 2.1. Some of the factors in the identified categories are social, affective and organizational. Although we think that most of those factors should be examined in role-based and knowledge based evaluation approaches, a short review of the study is given here to draw a broader picture of collaborative work literature.

Figure 2.1: Main categories of factors involved in collaborative work



The "context" factor relates to "culture, environment, business climate", and "organisational structure". In our opinion, such factors should be handled within the knowledge-based approach (Antunes et al. 2012) and beyond the limitations of our study.

"Support" factors are "tools, networks, resources, training, team building, knowledge management" and "error management". "Tools" refer to the supportive technologies for collaborative work and issues related to communication have an important place within the studies related to the subcategory. Other subcategories are thought to be related to organizational impact which should be investigated within the knowledge-based approach.

Another major factor of collaborative work is identified as "tasks", with the subfactors "type, structure" and "demands". Task type is the nature of the tasks, "routine or non-routine, predictable or unpredictable, complex or easy". Also "tasks can be cognitive (e.g. conceptual tasks) or behavioural (e.g. executing work)". Task structure is the order of the activities executed by individuals, which can be fixed or flexible. The work also can be "loosely coupled", that tasks depend on each other at a low level resulting with minimum interaction between team members, or inversely, "tightly coupled". Task demands are the amount of resources required for collaborative work and mostly point out to the intensity and pressure on an individual team member, which may lead to a negative effect on wellbeing of the individual. In other words, executing the task would be less satisfying for the team member. The subfactors related to the task directly affect taskwork metrics. If the task type is unpredictable or complex, this may lead to a decrease in effectiveness. A "loosely coupled" task structure would end up with efficiency. High intensity and pressure can be related to a low satisfaction. Thus, we think that task type, structure and demands are related to individual's cognitive level rather than the interdependent activities of users, and can be evaluated through taskwork metrics of usability.

"Interaction processes" define the interactions between the users and they have a potential to assess the usability of CSCW systems within a rule-based approach, focusing on the interdependent activities of users. "Learning, coordination, communication" and "decision making" are sub-factors that define the "interaction processes". Users of a CSCW system have the opportunity of learning from each other, in a formal or an informal manner, to increase their skills and team performance. Coordination is involved with setting goals, people and information management and integration, time scheduling, management of division of labour across different

activities, managing the dependencies between tasks, watching and assessing work progresses, process standardization when necessary, resource management, and giving feedback on state of the activities and performance. Communication “underpins how people understand each other and how knowledge is transferred”. Collaborative “decision making” will involve both intellectual and judgement tasks based on participation of more than one participant. It can be considered as process of communication resulting with a decision.

“Roles, relationships, shared awareness/knowledge, common ground, group processes” and “composition” are sub-factors categorized below the “teams” title. Collaborative work “roles” are the ways each team member contributes to the function of the team. When roles are coordinated, it contributes to collaboration and it requires “particular effort for participating members to have an understanding of roles and responsibilities”. “Relationships” are emotional interactions within team members and positive relationships such as friendship, reduces the communication and coordination demands. “Shared knowledge and awareness” allow team members to “adjust their activities as necessary through an understanding of colleagues’ roles, responsibilities, expertise, skills, limitations, preferences, biases, social networks, intentions, and emotions”. Another perspective to define awareness is to consider it as “task and activitiy awareness”; user being aware of the “project status, availability of resources, whereabouts and the actions of collegues”. Common ground refers to the level that members of the team share a similar culture, vocabulary, interests and values, and a mutual understanding of practices of work and group norms. “Group processes” are social and psychological interactions. “Composition” refers to the size of the team and heterogeneity of team members in terms of age, ethnicity, professional background, skills or personality. Among the sub-factors inspected within “teams” title, “common ground” and “task and activity awareness” can be evaluated to assess a CSCW system with a rule-based evaluation approach. Other items are related to personal and organizational levels, which require “knowledge-based evaluation”.

“Skills, psychological factors” and “wellbeing” of individuals are concerned with the participants involved in a collaborative work process. Standardized surveys used in HCI field intend to evaluate the system’s attributes but not the users as individuals. In HCI

studies, effects of the individual differences on system use are eliminated by selecting suitable participants, representing target users.

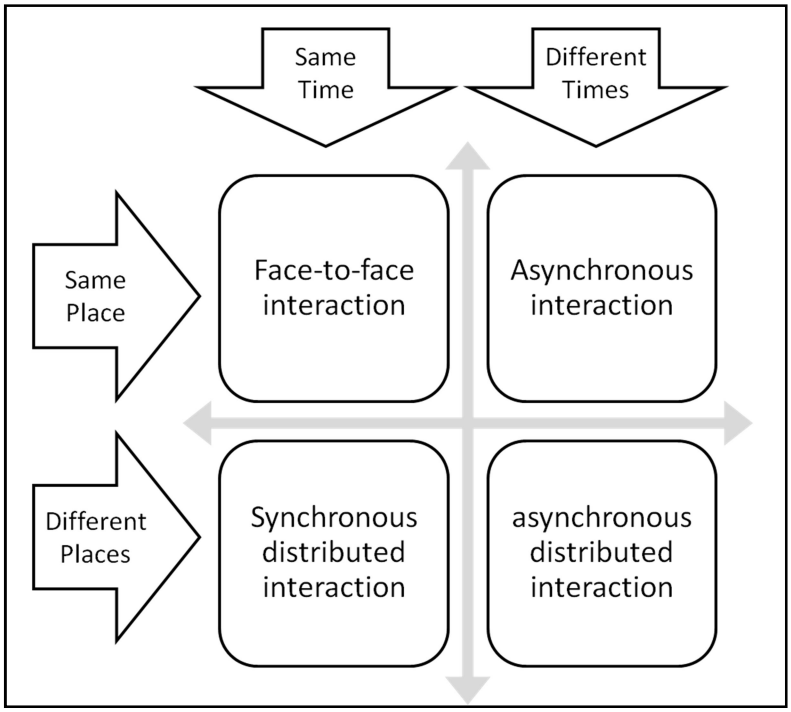
“Trust, conflict, experience, goals, incentives, constraints, management, performance” and “time” is “overarching factors”, which affect and/or interact with other factors. Trust, conflict, experience and goals are factors that are related to individuals. Constraints, management, performance and time are subjects to be considered in organizational level. None of the overarching factors can be evaluated within a rule based approach and they are beyond the scope of our study. Figure 1 illustrates the approach of Patel et al. (2012), where the Interaction Processes is mainly within the scope of our study. On the other hand, since “CSCW brought together two main organizational assets: technology and humans.” (Antunes et al., 2014). Our approach to the problem of usability assessment for shared workspace grupwares also involves the humans in terms of Teams, mainly focusing on shared awarenes/knowledge as well as common ground. Efforts to Define Interaction in CSCW and Classify Applications

Cruz et al. (2012) give a taxonomic literature review of classification efforts in CSCW. They reviewed the literature according to “time/space (collaboration can be synchronous and asynchronous, as well as co-located and remote); CSCW characteristics (based on 3C model); group issues (size, characteristics and task types); technical criteria (scalability, software and hardware); and complementary features (e.g., ergonomics and usability, awareness, or application domains)”. McGrath’s study (1984) is considered as the earliest known taxonomic approach to study groups, in which he extracted main ideas from prior studies of of Carter et al. (1950), Shaw (1954) and McGrath & Altman (1966) and developed “a conceptually interrelated set of classification dimensions about tasks”, resulted with “a group task circumplex constituted by four quadrants (generate, choose, negotiate, or execute), within which are specific task types: planning, creativity, intellective, decision-making, cognitive conflict, mixed-motive, contests/battles, and performance”. (Cruz et al., 2012). McGrath also proposes that model of interaction within groups can be explained with a three-stage process model: communication process, action-attraction model process and influence process.

Bui and Jurke (1986) classified the group communication, focusing on Group Decision Support Systems. Their study proposes spatial and temporal approaches to classify GDSS.

Originated from Johansen (1988; Johansen et al., 1991) time-space taxonomy of Ellis et al.(1991) defines four different types of interaction using collaborative software as seen on Figure 2.2. Here, the word "interaction" emphasize on interaction of people with data using a computer, as well as interactions between users.

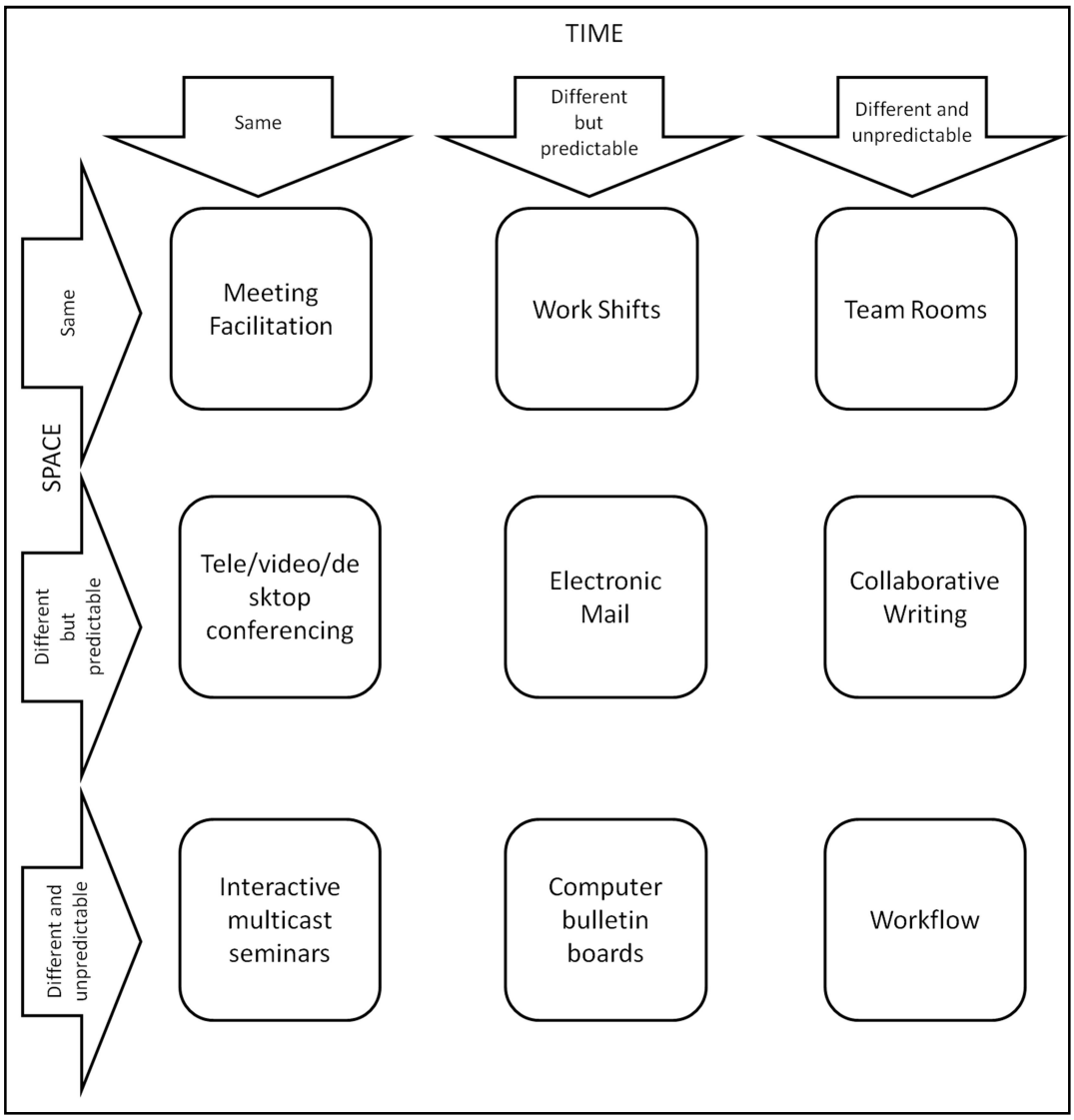
Figure 2.2: Time / Space Taxonomy Dimensions



Source: Ellis, C. A., Gibbs, S. J., & Rein, G. (1991). Groupware: some issues and experiences. Communications of the ACM, 34(1), 39-58.

Grudin (1994) uses the time-space taxonomy approach to classify different type of software according to their purpose of use. Their classification leads to 9 different categories of collaborative software as illustrated at Figure 2.3.

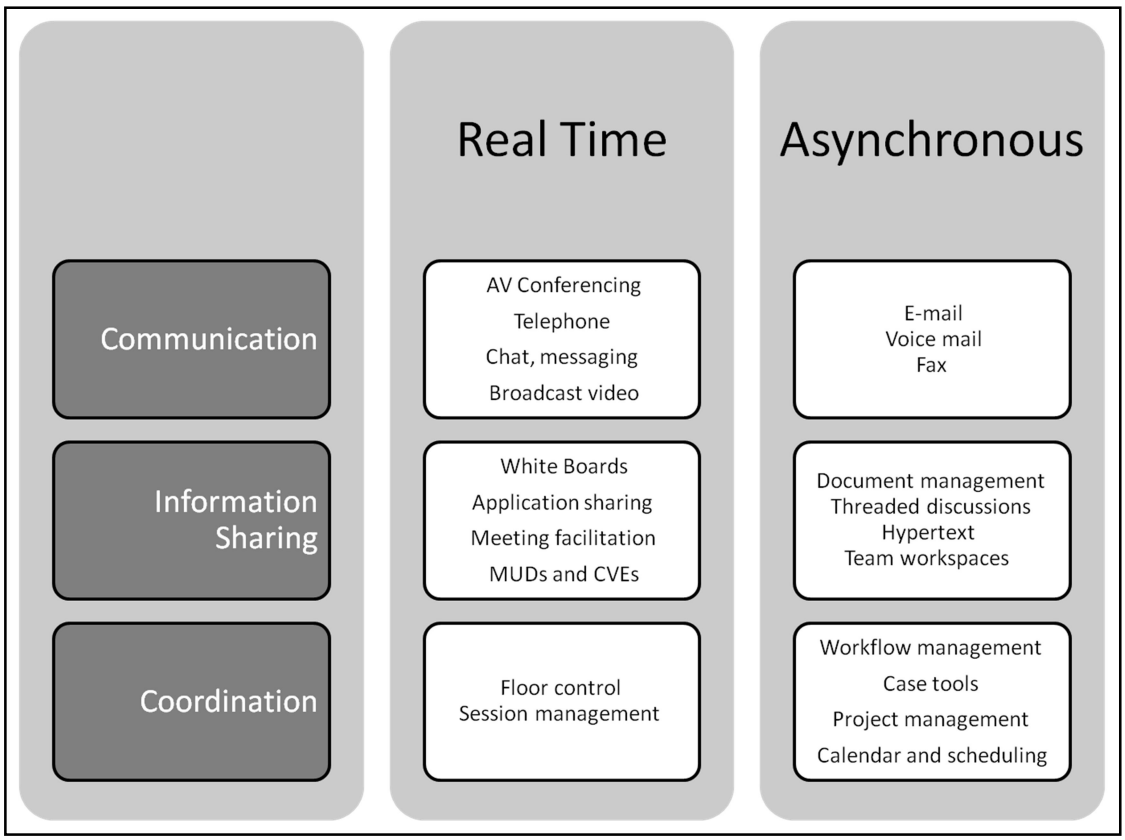
Figure 2.3: Time / Space Taxonomy of Groupware



Source: Grudin, J. (1994). Computer-supported cooperative work: History and focus.Computer, 27(5), 19-26

In addition to temporal and spatial dimensions, Poltrock and Grudin (1998) adds an "activity dimension and includes a social structure dimension that is hidden in the figure but emerges as overlays". Activity dimension involves communicating, sharing information, and coordinating as seen on Figure 2.4.

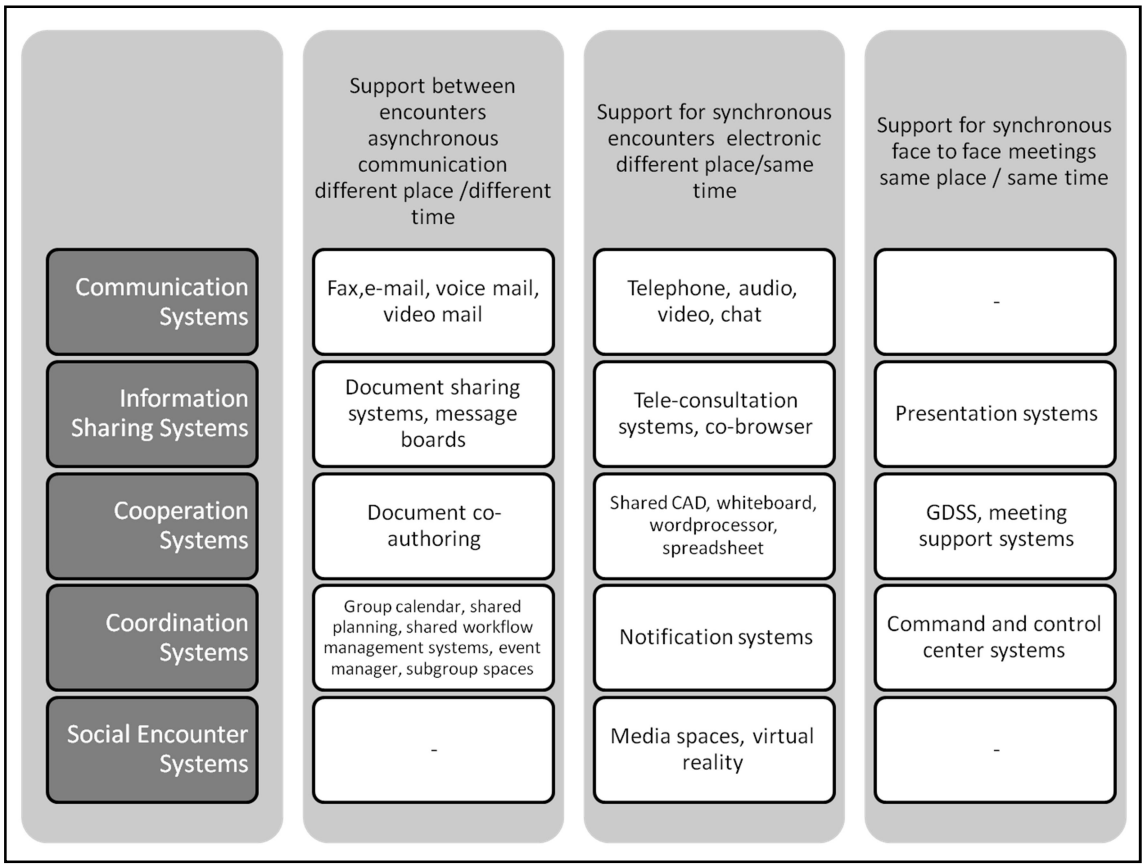
Figure 2.4: Time / Space Taxonomy of Groupware with Activity Dimension



Source: Poltrock, S., & Grudin, J. (1998). Computer supported cooperative work and groupware. Tutorial notes. CH'98 Conference on Human Factors in Computing Systems.

Considering the growing complexity of ICT tools in general and collaboration technologies in particular, Coleman (1997) combined this traditional four-cell representation with five functions of groupware systems as depicted on Figure 2.5. Those functions were explained as communication tools, which are used to make "separate environments become more like a single face-to-face environment by overcoming space and time separations", and can be both synchronous and asynchronous.

Figure 2.5: Time / Space Taxonomy expanded



Source: Coleman, D. (Ed.). (1997). Groupware: Collaborative Strategies for corporate LANs and Intranets. Englewoods Cliff, NJ: Prentice Hall.

Information sharing and consulting tools are mainly the databases for teams, as well as several data sources connected through Internet. Collaboration tools are document sharing and co-authoring applications, but the subgroup of Geographically Distributed Decision Support Systems (GDSS) is considered as collaboration tools. Coordination tools provide mechanisms to synchronise the work processes of a team, such as work calendars, or to-do-lists, which may also contain information on the group and its members. Workflow management systems are primarily applied to well-structured and repetitive work procedures in large scale systems to provide information or documents at the right moment to the right persons and they control the adequate performance of

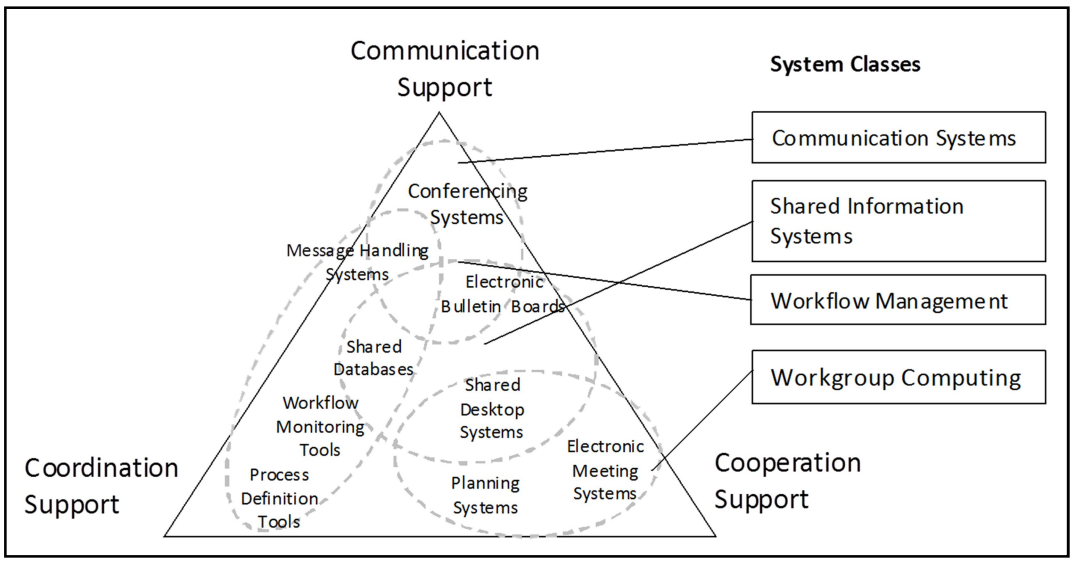
certain work processes “These systems can be distinguished from groupware applications in that they focus mainly on large scale task allocation, instead of on communication between people and remote consultation.” (Andriessen, 2012:11). Nurcan (1998) integrates the coordination tools and workflow management systems, suggesting that “workflow concerns, at first, an activity of scheduling and coordination of work between actors implicated in cooperative work processes”. Coleman’s (1997) last category of functions is the tools to support social encounters, such as permanently available communication interfaces through which people at geographically distant places can meet each other unintentionally. These functions were matched with time/space as illustrated on Table 5.

Ellis et al. (1991) highlights the importance of coordination, communication and cooperation, which leads to 3C Model of Collaboration. 3C Model explains the collaborative work in three dimensions for activities and classifies systems according to these activities as seen on Figure 2.6 (Sauter et al., 1994). “The application concept for communication systems is the separation of communication partners according to time and/or place” (Sauter et al., 1995). Shared information systems allow implicit communication functions to exchange messages but also they have functions for coordination and cooperation. Workflow management systems have their priority on coordination, which “are specified on the basis of permanent organisational rules with the help of process definition tools.” Workgroup computing systems focus on cooperative processes. Users work together on complex tasks within middle or high frequency repetition, in a goal oriented manner.

Some other classification models try to describe collaborative software with a quantitative approach based on team size, social approach due to formality or informality of communication or within an organizational perspective that the software is used at a face-to-face or geographically dispersed situation (Nunamaker et al., 1991; Desanctis & Gallupe, 1987).

More recent approaches are “hybrid taxonomies” of “central schemes (time/space, 3C model, and application domains)” and “give a broad-spectrum classification perspective, integrating the main previously contributions to help programmers, academics and general public to understand collaboration systems” (Cruz et al. 2012).

Figure 2.6: 3C Model Classification



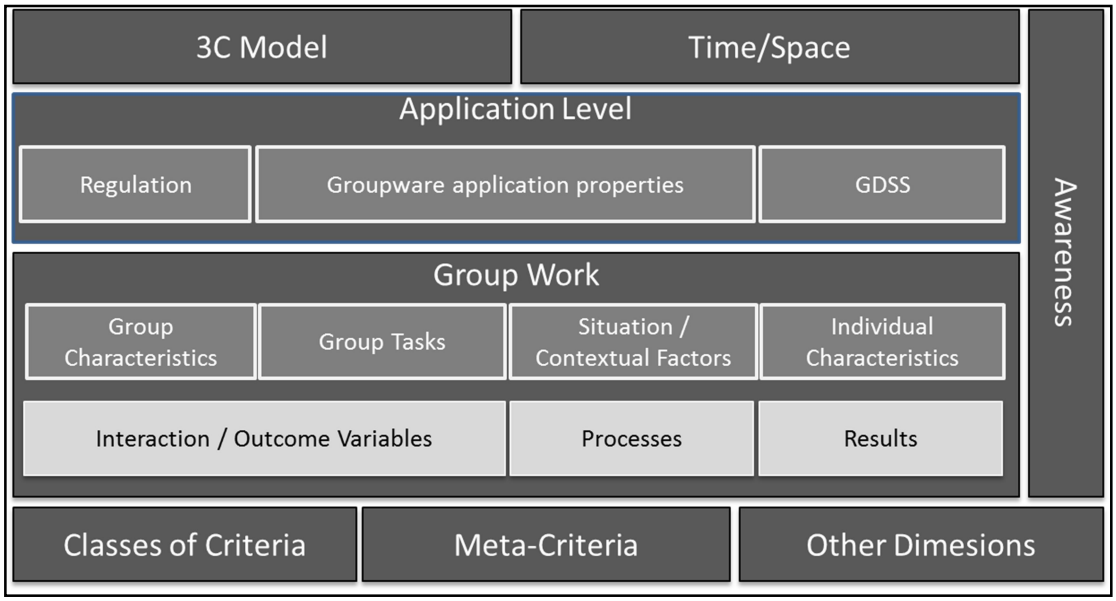
Source: Sauter, C., Morger, O., Mühlherr, T., Hutchison, A., & Teufel, S. (1995, January). CSCW for strategic management in Swiss enterprises: An empirical study. In Proceedings of the Fourth European Conference on Computer-Supported Cooperative Work ECSCW'95 (pp. 117-132). Springer Netherlands

The taxonomic elements in socio-technical model of Cruz et al. (2012) "are fully based in CSCW and group generic literature, which was extracted taking into account their temporal persistence, bibliometric impact, complementarity, and logical consistence". They aim to develop a model that brings "a continuum of collaboration dimensions, which problem relies on the lack of standardization of categories proposed in literature without terminological consensus", "comprising technical requirements and work dimensions in an unified classification model".

The model given on Figure 2.7 uses the widely accepted 3C model as the first category, which "can be systematized into an interactive cycle through the well-known modes of collaboration." Communication is defined based on McGrath (1984), as "interaction process between people, involving explicit or implicit information exchange, in a private or public channel". The participants of this interaction can be "identified or anonymous", "conversation may occur with no support, structured or intellectual process support, with associated protocols." Two or more individuals exchange

messages in “one-to-one, one-to-many or many-to-many setting” (Cruz et al., 2012). Coordination is defined as “management of interdependencies between activities performed by multiple actors, which are based on the mutual objects that are exchanged between activities (e.g., design elements, manufactured parts, or resources)”, based on definition by Malone and Crowston (1994). Activities like “planning, control models, task/subtask relationship and information management, mutual adjustment, standardization, coordination protocol” and “modes of operation” are examples of coordination.

Figure 2.7: Socio-technical Model



Source: Cruz, A., Correia, A., Paredes, H., Fonseca, B., Morgado, L., & Martins, P. (2012). Towards an overarching classification model of CSCW and groupware: a socio-technical perspective. In Collaboration and Technology (pp. 41-56). Springer Berlin Heidelberg.

To support these types of activities, a groupware should have “time management, resources, or shared artifacts produced along the activity chain”. Cooperation requires a group working towards a common goal (Malone and Crowston, 1994) with “high degrees of task interdependencies” and participants share available information on a shared space (Grudin, 1994). Producing, co-authoring, storing or manipulating a data artefact in concurrency, within access or with some type of floor control are some types of cooperative actions. Cooperation in socio-technical model of Cruz et al. (2012) requires synchronous or asynchronous message exchange and capability of sharing, developing and manipulating documents.

The time/space category of the model refer to real time/asynchronous exchange of information at co-located or remote situations, with high or low levels of predictability, as explained in Grudin's (1994) time-space taxonomy.

Awareness is taken as a bound for collaboration cycle, but it is separately shown outside 3C model, although Steinmacher et al. (2010) considers awareness as "the element that intermediates each of the 3Cs, offering feedback to users actions and giving them information about other participants of a collaborative work". In words of Mittleman et al. (2008), awareness "is the perception of group about what each member develops, and the contextual knowledge that they have about what is happening within the group." Awareness is an important category to investigate and categorize a groupware application because "it characterizes space and atmosphere, activity, object, human, and meta-dimensions such as presence, influence, and abilities".

The application level classification could include a wide range of subcategories "according to its focus on the group level, covering work over a period of time". In addition to Mittleman's (2008) categories of 1) jointly authored pages (conversation tools, polling tools, group dynamics, and shared editors); 2) streaming technologies (desktop/application sharing, audio conferencing, and video conferencing); 3) information access tools (shared file repo-sitories, social tagging systems, search engines, and syndication tools); and 4) aggregated systems, Cruz et al. (2012) identify a large set of meta-domains like "message systems, information sharing technologies, GDSS, project, virtual workspaces, meeting minutes/records and electronic meeting rooms, process or event management systems, chat/instant messaging, notification systems, group calendars, collaboration laboratories, bulletin boards, data mining tools, e-mail, workflow systems, intelligent agents, and so on". Regulation capabilities of a groupware could help to distinguish it from others, as regulation allows participants to create and manipulate coordination methods to re-organize themselves and group members.

As coordination "allows the participants to function according to rules already in effect", "regulation relates to the implementation of these rules" (Ferraris et al., 2000). The participants find the "best way of working together", while they are "acting in accordance with the agreements reached in the preceding phase". Regulation tools let the participants to redefine the rules of working together to enhance the groupwork.

“The groupware application properties can be constituted by functional properties of collaboration tools: architecture, functional and quality properties, group processes support, collaboration interface (portal, devices, or physical workspace), relationships (collection, list, tree, and graph), core functionality, content (text, links, graphic, or data-stream), supported actions (receive, add, associate, edit, move, delete, or judge), identifiability, access controls, alert mechanisms, intelligent/semi-intelligent software components, awareness indicators, and platform.”

Hardware, software, organizationware and people support are GDSS elements. The first group work related category of the model is group characteristics, “such as: size (3 to 7, >7), composition, location, proximity, structure (leadership and hierarchy), formation, group awareness (low or high, and cohesiveness), behavior (cooperative or competitive), autonomy, subject, and trust” (Cruz et al.,2012). Individual differences are related with group members’ background: work experience, training, and educational), skills, motivation, attitude towards technology, previous experience, satisfaction, knowledge, and personality. Group tasks are referring to to McGrath’s (1984) categories of creativity, planning, intellective, decision-making (choosing, evaluation and analysis, search, report, and survey), cognitive-conflict, mixed-motive, contests/ battles/competitive and performances/psychomotor, having a specific complexity associated to each task. In addition; “cultural impact, goals, interdependency or information exchange needs, bottlenecks, or process gain and loss” can be considered as a part of group tasks in soci-technical model of Cruz et al. (2012).

The contextual or situational factors varies within “organizational support (rewards, budget, and training), cultural contexts (trust or equity), physical setting, environment (competition, uncertainly, time pressure, and evaluative tone), and business domain at an organizational way”.

Interaction variables are more interest of our study, as they relate to quality of use dimensions of teamwork: “1) interaction outcome variables, such as group outcomes (quality of group performance, collaboration processes, and group development), individual outcomes (expectations and satisfaction on system use, appreciation of group membership, and individual breakdowns in system use), and system outcomes (enhancements and affordances); 2) processes, including individual, interpretation, motivation and performance dimensions; and 3) results, specifically individual rewards,

group vitality, and organizational results)" (Cruz et al., 2012). Functional, technical, usability, and ergonomics variables are considered as independent from groupwork, and focused on classes of criteria. Scalability and orthogonality are taken as meta-criteria, as they, too, do not only depend on the groupware systems, but all kind of software products. "Work coupling, shared tasks and goals, information richness and type, control centralization, activities, division of labor, patterns, techniques, scripts, assistance, learning monitoring, interaction degree, assertion, events, strategy, social connectivity, content management, process integration, sharing (view/opinion, knowledge/information, and work/operation), protection, distributed processes loss, or depth of mediation" are proposed as "other dimensions" to study in domain of collaborative work and groupware, in the socio-technical model of collaboration.

We think that socio-technical model of Cruz et al. (2012) would serve us as a holistic approach, which covers prior approaches in the literature. 3C model, time-space approach and application level categories would be helpful to categorize the collaborative software that we would choose to apply our scale on its users. We would be able to identify the similarities and differences between several products and select discrete platforms to test the sensitivity of our scale. Interaction/outcome variables category would also support our basis of item construction for the scale, which is based on the literature review on evaluation of collaborative work systems, in the next chapter.

2.3 FRAMEWORKS PROPOSING AN EVALUATION APPROACH FOR QUALITY ASSESSMENT OF CSCW

The factors summarized above gives a broad view of collaborative work domain. From a larger perspective, they can be considered to be affecting the quality of teamwork. However, our study aims to focus on the dimensions which directly affect the teamwork. Those dimensions cannot be assessed neither by taskwork metrics of usability nor personal, emotional and organizational dimensions of group work. For this reason, we decided to make a review of studies that propose a set of measures, metrics or factors while defining a framework of CSCW regarding to the aspects of the collaborative applications attributes and interactions of team members occurring through the application.

2.4.1 Measures and metrics from EWG Framework

Damianos et al. (1999) suggests a framework for collaborative systems, focusing on work tasks, transition tasks, social protocol requirements, and group characteristics. Their study stands on the efforts of the Evaluation Working Group (EWG) in the Defense Advanced Research Projects Agency (DARPA) Intelligent Collaboration and Visualization (IC&V), which is also detailed in a technical report (Cugini et al., 1997).

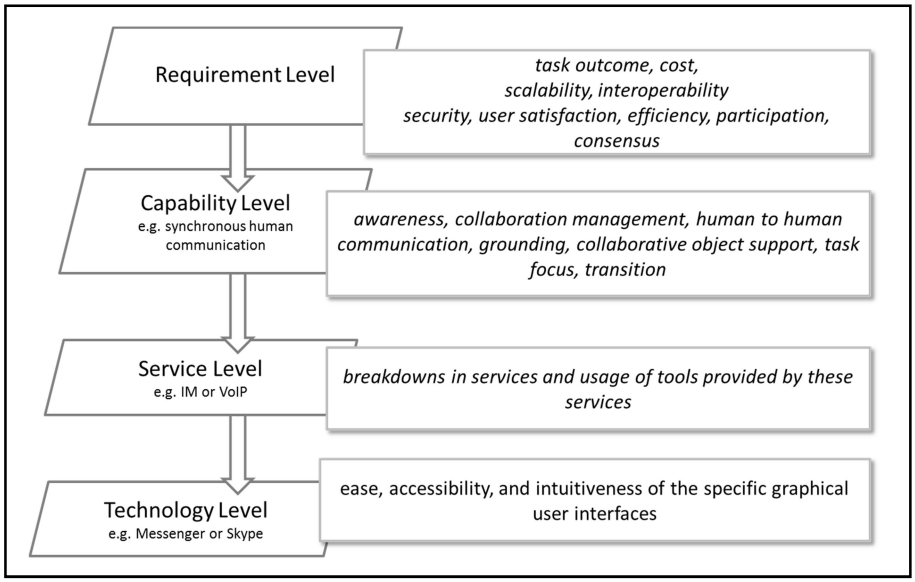
Work tasks are described based on the study of McGrath (1984) and aim to distinguish different types of task performed by the group. Transition tasks are "tasks used to move between work tasks", such as summarizing the outcomes of last task, taking roles or requesting changes to the agenda. Social protocol requirements are defined as "meeting conduct", "communication needs" and "awareness support". Group characteristics address the size, diversity or location of the group.

Tasks, social protocol requirements and group characteristics reflect upon four different levels of the described framework, as illustrated on Figure 2.8. These are requirement level, capability level, service level and technology level. Requirement level addresses the "requirements of the group with respect to the tasks being performed by the group and the support necessitated by the characteristics of the group". Capability level addresses the "relatively high-level requirements imposed upon a collaborative environment in order to support users in performing particular collaborative tasks". For example, "synchronous human communication" is a capability, while IM (instant messaging) or VoIP (voice over internet protocol) is a service that supports this capability and "Skype" is a software technology for executing both of IM and VoIP services.

Damianos et al. (1999) also define a set of measures to evaluate CSCW products, for each level of their framework. Requirement level measures are "task outcome, cost, user satisfaction, scalability, security, interoperability, participation, efficiency" and "consensus". Scalability, participation and consensus measures differ from the others since those metrics are mainly related to the group use requirements. Scalability "is the

measure of a system's accommodation for larger or smaller group size ". Metrics and measure components offered to determine scalability is to compare the number of users with time on task or resources needed to complete a task, and expert judgments.

Figure 2.8: Evaluation Working Group (EWG) framework



Participation "is the measure of an individual's involvement in a group activity". Referring to Tsai (1977), Damianos et al. (1999) suggest to use "countables" for metrics of participation. "Number of sentences, number of floor turns (regardless of length) or a unit based on the category of the act" was some of the offered countables. To calculate an individual's participation, Pi, total of any one of these unit acts, ti, divided by the total number of unit acts in the group, t1+t2+...+tn, where n is the number of group members. Formula is given as follows at Equation 2.1:

$$Pi = t_i / t_1 + t_2 + \cdots + t_n \quad \textbf{(2.1)}$$

Group participation can be calculated by the number of contributing participants divided by the number of total participants.

Besides countables, questions regarding to assess the "satisfaction with an individual's participation" and the "satisfaction with the group participation" are recommended to be used as a user ratings method. "Grounding", which is one of the capability level measures, is described as a related measure of group participation.

Consensus “is the measure of general agreement or group unity in outcome”. It is also related “grounding” and suggested to be measured by user ratings, asking “general questions about agreement with the task outcome”.

Capability level measures are “awareness, collaboration management, human to human communication, grounding, collaborative object support, task focus” and “transition”. Awareness is defined as “having realization, perception, or knowledge of other participants, their roles, actions (pointing, speaking, annotating, etc...), objects and object manipulations and social protocols”. It is offered to ask general questions to query the users’ awareness on other participants, actions and objects.

“The set of collaboration management measures assesses support for coordinating collaboration.” Coordination of collaborative work is supported by the functions of the software such as availability of multiple collaborations, floor control mechanisms, agenda support, document and collaborator access controls or synchronize feature. It is suggested to inspect the availability of such functions through expert judgments. Communication is the exchange of information between the people using the system. Exchange may occur verbally, visually or physically. Suggested metrics for communication are countables such as number of turns per participant and turn overlaps. Besides expert judgements, user ratings can be used to assessment, based on questions about goodness of communication, getting floor control, getting the attention of other participants and ability to interrupt. “Grounding is a measure of how well common understanding is established.” Besides the questions about “reaching common understanding with other participants”, number of turns, length of turns, turn overlaps and analysis conversational constructs could assess the level of grounding. “Collaborative object support measures are used to evaluate the software’s interface and interaction capabilities such as shared workspaces, object manipulation and management features. Analysis of tool usage by determining the optimal set of tools that is required to accomplish a task and comparing the users’ behaviour is a method for evaluating collaborative object support. Expert judgements is another measure. Task focus measures the ability to concentrate on the task at hand by calculating the ratio of time used on the task to overall time. Time used on the task can be specified by subtracting the time spent for transitional tasks from overall time. Transition measures

are the support for activities such as “collaboration start-up, summarization, playback, archiving, object exporting and importing, distribution of objects, translation between modalities” and “meeting notifications”. Although the listed activities are helpful for the execution of collaborative tasks, their presence is not a necessity for a collaborative environment. Transitional aspects of a collaborative system can be evaluated by expert judgements and analysis of conversational constructs as well as use of general questions about flow of transitions between tasks.

Service and technology level measures require a technical point of view instead of an approach that requires the inspection of group activities. Service level measures are breakdowns in services and usage of tools provided by these services. Technology level measures are usability and specific technology standards. Usability assessment focuses on ease, accessibility, and intuitiveness of the specific graphical user interfaces of the system tools and components. Besides the other methods such as expert judgements, use of standard questionnaires is proposed to evaluate usability. Tool usage, repair activities, breakdowns and awareness are also proposed as measures of usability in CSCW systems.

The technical report (Cugini et al., 1997) also emphasizes on “user ratings” as a method of assessing groupware systems. User ratings can be used to measure the product quality as (1)task outcome, (2)satisfaction with the group process, outcome or final solution, an individual's participation and group participation, (3)consensus on the solution and the task outcome, (4)awareness of other participants, objects, actions, (4)communication in terms of possibility and goodness, ability to get floor control ask a question / make a response, (5) grounding as establishing common understanding with other participants and understanding other’s. Users can also rate the smoothness of the transitions. Standardized user interface evaluation and usability questions can also be employed to understand the usability of the system. They propose several dimensions to identify satisfaction: satisfaction with the group process, satisfaction with task outcome or final solution, satisfaction with an individual's participation, satisfaction with the group participation. Participation can be evaluated in terms of an individual's participation to the ongoing work and (other members of) the group participation level. Efficiency relates to the group work. In this sense, it differs from single-user usability definition of

the term. To understand consensus, it is offered to investigate the consensus on the solution and task outcome separately. Awareness of other participants, objects and actions are sub-dimensions of awareness. To assess communication, it is offered to investigate whether communication was possible, the goodness of the communication, ability to get floor control and ability to ask a question / make a response. Grounding depends on establishing common understanding with other participants and understanding what other participants were talking about. Smoothness of the transitions from one job to another is considered as another dimension of quality. To assess usability, Cugini et al.(1997) offers to use the standard user interface evaluation and usability questions.

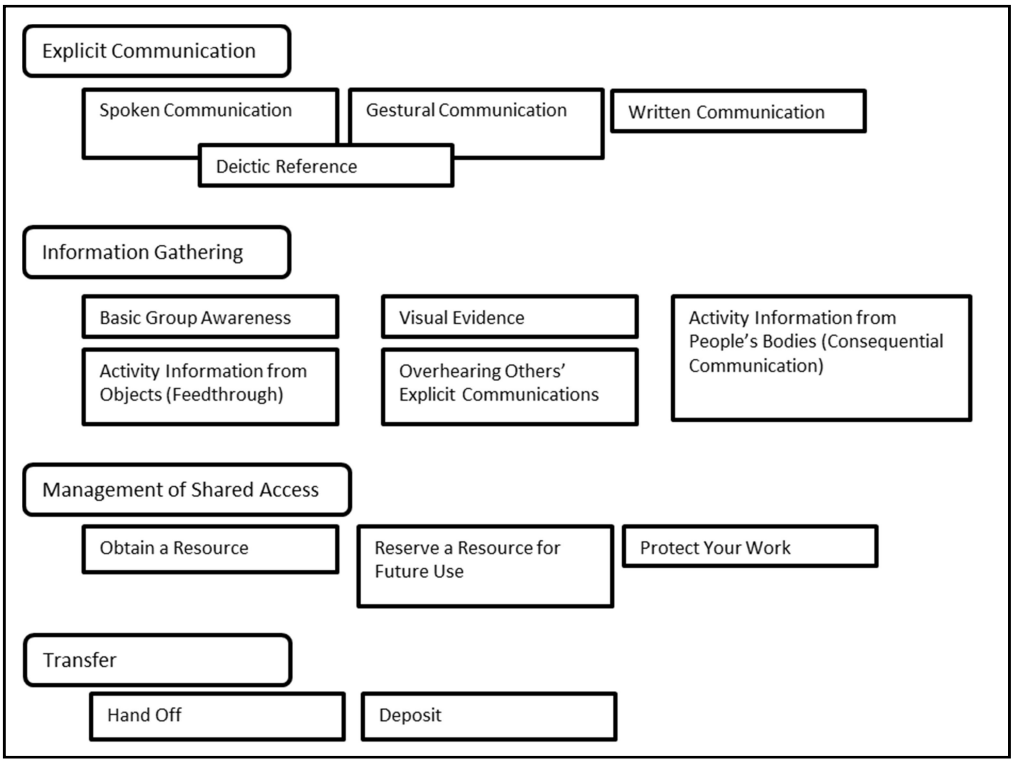
2.4.2 Mechanics of collaboration in CUA framework

Leaving the "social and affective elements of collaborative work" out of their research focus, Gutwin and Greenberg (1999) have listed seven items as "mechanics of collaboration": "explicit communication, consequential communication, coordination of action, planning, monitoring, assistance" and "protection". They offer a conceptual framework (Gutwin & Greenberg, 2000) that each of these items is evaluated in terms of efficiency, effectiveness and satisfaction. Depending on their framework, they offer to adopt discount usability methods for evaluation of groupware systems. These methods are heuristic evaluation (detailed in Baker et al., 2002), walkthroughs (detailed in Pinelle & Gutwin, 2002), usability testing through observations and user questionnaires. Although they supplied some questions as an example for user questionnaires, their studies did not lead to standardized scale. The mechanics of collaboration have evolved into a list of items in four categories and provide a basis for CUA (Collaborative Usability Analysis) framework (Pinelle et al., 2003), depicted in Figure 2.9.

Explicit communication refers to the analysis on verbal and non-verbal communications between parties, with an intention of communicating a message. Information gathering activities are based on awareness from other participants' presence, availability, actions and communications, and also the awareness of system status and ongoing work through the objects in the work environment. Management of shared access is the

abilities and limitations over the control of the resources to execute the tasks. Transfer is the exchange of objects and tools between participants. A direct exchange of a resource between two participants is called “hand-off”. “Deposit” is “an asynchronous type of transfer where one person leaves an object, file, or tool in a particular place for another person to retrieve later.

Figure 2.9: Mechanics of collaboration



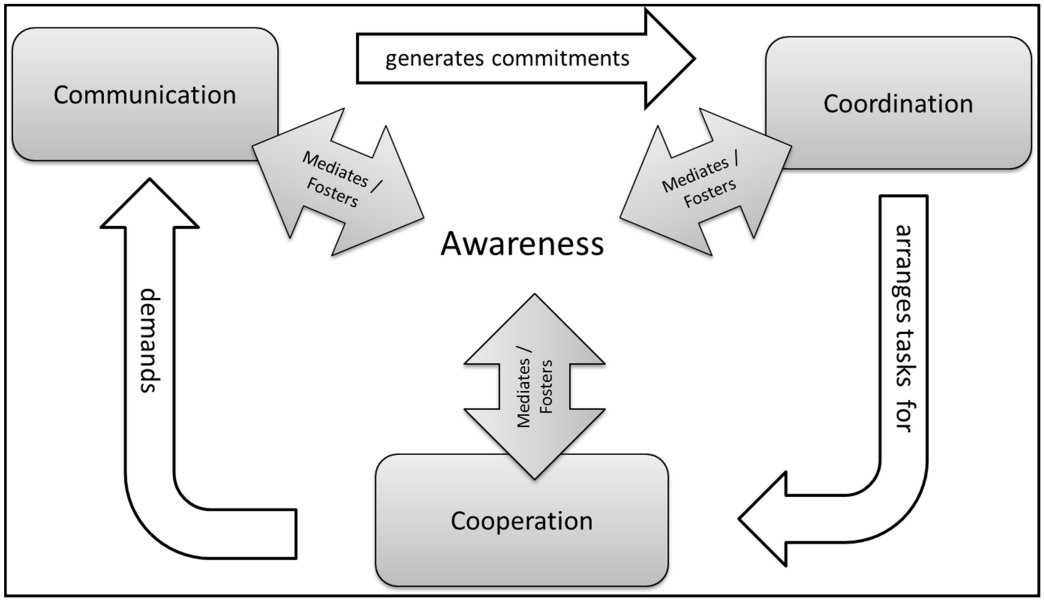
CUA framework “is based on a hierarchical task model that represents the procedural elements of a group task in a shared workspace”. The hierarchical task model of CUA includes “scenarios to describe high-level context of the collaborative situation”. Specific goals within the scenario are indicated as tasks. An instant of a task is a set of actions which can be carried out individually or collaboratively.

2.4.3 Awareness and the 3C collaboration model

The 3C collaboration model is based on the early study of Ellis et al.(1991) and extended by Fuks et al.(2005)(Steinmacher et al.,2010). The model is created with an intention of guiding the development process of CSCW originally, rather than evaluating the quality of collaboration. The 3C of collaboration; communication,

coordination and cooperation (collaboration); has a constant interplay with each other and a fourth element, awareness. As shown in Figure 2.10, Awareness is the element that intermediates each of the 3Cs, offering feedback to users actions and giving them information about other participants of a collaborative work (Steinmacher et al.,2010).

Figure 2.10: Interactions of 3C Model Elements



Source: Ellis, C. A., Gibbs, S. J., & Rein, G. (1991). Groupware: some issues and experiences. Communications of the ACM, 34(1), 39-58.

For the purpose of analyzing collaborative work, Neale et al. (2004) proposes “the term "activity awareness", incorporating the term activity from the very broad and muti-layered concept from activity theory” and describe an evaluation model for CSCW depending on “awareness”. Their model targets distributed applications and focuses on the central relationships underlying the processes of distributed group work. Communication, coordination, and work coupling form the basis for explaining how successful groups will perform. Each of the factors is heavily constrained by contextual factors, common ground, and awareness. Contextual factors are “comprised of the activities themselves” and develop “dynamically as part of normal interactions with others”. Small things, such as the presence of participants, interactions between participants, and the emotional state of participants or artefacts of interest help to understand the context. Work coupling is a concept for defining the intensity or demand of the work for information sharing or level of communication required. As the work coupling changes from loose to tight, demand for information increases. Neale et

al.(2004) propose five levels of communication within their framework: lightweight interactions, information sharing, coordination, collaboration and cooperation. Using their awareness model to evaluate collaborative work, they concentrated on the level of work coupling and the resulting communication. Using this approach let them to detect patterns that documented how demands on the communication and coordination process led to problems in common ground and awareness.

Carroll et al. (2006) focus on awareness as a quality dimension for collaborative work. Considering teamwork as an activity, they describe "a framework for understanding joint endeavour in terms of four facets of activity awareness: common ground, communities of practice, social capital, and human development." They define activity awareness based on the observation that "collaborators work in the same place for an extended period of time tend to align and integrate their activities seamlessly, without interrupting each other, as they work together" (Harper, Hughes and Shapiro, 1989). So, activity awareness is defined as "process of developing and maintaining this ability of monitoring and coordinating within long term collaboration".

The first facet of activity awareness, common ground, "recognizes that communicators have a mutual understanding of the content and process of their communication and further that they all know that they have this mutual understanding" (Convertino et al., 2011). The design goal related to common ground is to maintain public availability of shared information. It is suggested to measure the occurrences of "inferences, non-verbal communication, back channel utterances, anaphora and deixis" to evaluate common ground (Carroll et al.,2006).

Community of practices refers to "integration of team members' behaviour or decisions into best practices or patterns." This integration develops over time, as the team members continue to work together, as a tacit knowledge of community-specific reactions and patterns in specific situations. Carrol et al. (2006) suggest measuring "consensual behaviour or values and resource sharing" for evaluation.

"Aggregation of individual contributions into collective achievement" (Carrol et al., 2006) in collaborative work is related to social capital. Each people working in a group contribute to the ongoing work with their efforts, skills and prior knowledge. These

contributions lead them to become a valuable member of the group. Measuring “levels of trust and reciprocity” and “division of labor” within the group, it is possible to understand the social capital. “Community surveys, trust-creation or –usage experiments, longitudinal studies of social networks” are some suggested methods for measuring.

The last facet for awareness is human development. The group and its members expose some changes in their skills and abilities during the collaborative work process. Carrol et al.(2006) propose the measurement of “person perception, attributions of self and other, achievement outcomes” and “self/collective efficacy” to assess the human development facet. However, they emphasize that “it is most appropriately assessed via longitudinal research methods”, since it occurs over time.

2.4 CURRENT STANDARDIZED USABILITY SCALES AND THEIR DEVELOPMENT

Cairns (2013) characterized the evaluation of questionnaires as a series of questions within the context of usability. Validity can be characterized with the question, “Does the questionnaire really measure usability?” When searching for the face validity of a usability questionnaire, Cairns asked, “Do the questions look like sensible questions for measuring usability?” Convergent or concurrent validity seeks the answer to the question, “To what extent does the questionnaire agree with other measures of usability?” Building on convergent validity, the predictive validity of a questionnaire can be assessed by asking, “Does the questionnaire accurately predict the usability of systems?” Discriminant validity is the degree that the questionnaire differentiates "from concepts that are not usability, for example, trust, product support, and so on." Sensitivity, on the other hand, seeks to answer, “To what extent does the measure pick up on differences in usability between systems?” (p. 312).

Sauro and Lewis (2012) describe “24 standardized questionnaires designed to assess perceptions of usability or related constructs” which “fall into four broad categories: post-study, post-task, website, and other.” Out of these categories, there are some the early evaluation tools used in computer-related studies in 70’s, which aim to measure satisfaction (LaLoima & Sidowski, 1990). However, usability scales that are apropirate

for usability testing had appeared late 80's. Some questionnaires are administered at the end of a study, which are categorized as post-study questionnaires. Post-task questionnaires are used to gather more contextual quickly, and applied right after the user completes a task. Since a website shares many similar functions with a computer application, it is possible to use the same scale to assess both of them. However, there are some ways in which websites differ from computer applications, such as the importance of effective browsing and focus on commercial self-service, trust on service and the company on purchases you make and their treatment to your personal or financial data. For the assessment of such dimensions, there are also some usability questionnaires for website evaluation. Questionnaires from market research literature are also useful for evaluation of software as a product. We will focus on post-study and post –task questionnaires excluding website evaluation since our study focuses on quality of use in CSCW applications.

Table 2.1 gives a quick review of the post-study questionnaires, according to the number of items and factors. It is common to use Likert scale ratings to determine the level of user agreement to the items of the questionnaire. In development of standardized questionnaires, it is customary to use psychometric methods to identify the reliability, validity and sensitivity of the scale. Table also provides information about the psychometrics of the post-task questionnaires. The dimensions related with the subscales of the questionnaires are given in Figure 2.11. Psychometric methodology will be explained in detail in the following chapter.

The Questionnaire for User Interaction Satisfaction (QUIS) was developed as a 27-item, 9-point bipolar scale, representing five latent variables related to the usability construct. Chin, Diehl, and Norman (1988) developed the scale by assessing 150 QUIS forms that were completed for the evaluation of 46 different software programs. The study reported a significant difference in the QUIS results collected for menu-driven applications and command line systems that provided evidence for the scales' sensitivity.

The Software Usability Measurement Inventory (SUMI) consists of 50 items with a 3-point Likert scale representing five latent variables (Kirakowski, 1996). Kirakowski's

research provided evidence for construct validity and sensitivity by reporting on the collection of over 1,000 surveys that evaluated 150 different software products. Results affirm that the SUMI is sensitive, as it distinguished two different word processors in work and laboratory settings, while it also produced significantly different scores for two versions of the same product.

Table 2.1: Review of Post-Study Questionnaires

Scale name	No. of items	No. of subscales	Scale type	Reliability (Cronbach's	Evidence for	Evidence for sensitivity	Studies	Number of participants
QUIS	27	5	Bipolar (9)	.94	Yes	Yes	Chin et al., 1988	150
SUMI	50	5	Likert (3)	.92	Yes	Yes	Kirakowski, 1996	1,000+
PSSUQ	16	3	Likert (7) + N/A option	.94	Yes	Yes	Lewis, 1992	48
							Lewis, 2002	210
CSUQ	16	3	Likert (7) + N/A option	.89	Yes	Yes	Lewis, 1995	377
SUS	10	2	Likert (5)	.92	Yes	Yes	Lewis & Sauro, 2009	324
		-		.91	Yes	Yes	Bangor et al., 2008	2,324
UMUX	4	3	Likert (7)	.94	Yes	Yes	Finstad, 2010	558
		2		.81 .87	Yes	-	Lewis et al., 2013	402 389
				.83	Yes	Yes	Berkman & Karahoca , 2015	556
UMUX-LITE	2	-	Likert (7)	.81 .87	Yes	Yes	Lewis et al., 2013	402 389
				.77	Yes	Yes	Berkman & Karahoca , 2015	556

The Post-Study System Usability Questionnaire (PSSUQ) initially consisted of 19 items with a 7-point Likert scale and a not applicable (N/A) option. The Computer System Usability Questionnaire (CSUQ) is its variant for field studies (Lewis, 1992; 2002).

Three latent variables (subscales), represented by 19 items, are system quality (SysUse), information quality (InfoQual), and interface quality (IntQual). Lewis (2002) offered a 16-item short version that was capable of assessing the same sub-dimensions and used data from 21 different usability studies to evaluate the PSSUQ. He explored the sensitivity of the PSSUQ score for significance of difference to several conditions, such as the study during which the participants completed the PSSUQ, the company that developed the evaluated software, the stage of software development, the type of software product, the type of evaluation, the gender of participants, and the completeness of survey form. As a variant of PSSUQ, CSUQ is designed to assess the usability of a software product without conducting scenario-based usability tests in a laboratory environment (Lewis, 1992; 1995; 2002). Thus, CSUQ is useful across different user groups and research settings.

The System Usability Scale (SUS) was developed for a "quick and dirty" evaluation of usability (Brooke, 1996). Although "it had been developed at the same time period with PSSUQ, it had been less influential since there had been no peer-reviewed research published on its psychometric properties" (Lewis, 2002, p. 464) until the end of the 2000s. After it was evaluated through psychometric methods (Bangor, Kortum, & Miller, 2008; Lewis & Sauro, 2009), it was validated as a unidimensional scale, but some studies suggested that its items represent two constructs: usable and learnable (Borsci, Federici, & Lauriola, 2009; Lewis & Sauro, 2009). SUS consists of 10 items with a 5-point Likert scale. It is reported to provide significantly different scores for different interface types (Bangor et al, 2008) and for different studies (Lewis & Sauro, 2009). Although the SUS score is not affected by gender differences, there is a correlation between the age of participants and the score given to the evaluated applications. It is known that SUS items are not sensitive to participants' native language after a minor change in Item 8, where the word "cumbersome" is replaced with "awkward" (Finstad, 2006).

UMUX (Usability Metrics for User Experience) has four items with a 7-point Likert scale with a Cronbach's alpha coefficient of .94. Lewis, Utesch, and Maher (2013) reported the coefficient alpha as .87 and .81 for two different surveys. Finstad reported a single underlying construct that conformed to the ISO 9241 definition of usability.

However, Lewis et al. (2013) stated that "UMUX had a clear bidimensional structure with positive-tone items aligning with one factor and negative-tone items aligning with the other" (p. 2101). They also reported that UMUX significantly correlated with the standard SUS ($r = .90$, $p < .01$) and another version of SUS in which all items are aligned to have a positive tone ($r = .79$, $p < .01$). These values are lower than the correlation between SUS and UMUX reported in the original study by Finstad (2010; $r = 96$, $p < .01$). Berkman & Karahoca (2016) substantiated these results, and provided evidence on bi-dimensional construct of UMUX, through a structural equation modelling based CFA. However, moderate correlations (with absolute values as small as .30 to .40) are often large enough to justify the use of psychometric instruments (Nunnally, 1978). Accordingly, both studies provided evidence for the concurrent validity of UMUX. To investigate the sensitivity of UMUX to differences between systems, Finstad (2010) conducted a survey study of two systems ($n = 273$; $n = 285$). The t tests denoted that both UMUX and SUS produce a significant difference between the scores of the two systems.

The two-item variant of UMUX—UMUX-LITE (Lewis et al., 2013)—is based on the two positive tone items of UMUX, which are items 1 and 3. These items have a connection with the technology acceptance model (TAM) from the market research literature, which assesses usefulness and ease-of-use. UMUX-LITE has a reliability estimate of .82 and .83 on two different surveys, which is excellent for a two-item survey. These items correlated with standard and positive versions of SUS at .81 and .85 ($p < .01$). Correlation of UMUX-LITE with a likelihood-to-recommend (LTR) item was above .7. These findings indicated concurrent validity of UMUX-LITE. On the other hand, Lewis et al. (2013) reported a significant difference between SUS and UMUX-LITE scores that were calculated based on items 1 and 3 of UMUX. For this reason, they have adjusted the UMUX-LITE score with a regression formula to compensate for the difference. A recent study (Lewis, Utesch, & Maher, 2015) confirmed that the suggested formula worked well on an independent data set. Borsci, et al. (2015) also replicated previous findings of similar magnitudes for SUS and adjusted UMUX-LITE. They explored variation in outcomes of three standardized user satisfaction scales (SUS, UMUX, UMUX-LITE) when completed by users who had spent different amounts of time with a website. Results indicated that users' amount of exposure to the product

under evaluation affects the outcomes of each scale. UMUX provided a significant main effect on duration, frequency of use, and interaction of both. As the exposure to the product increased, participants noted higher scores in product evaluation through questionnaires.

As a variant of PSSUQ, CSUQ is designed to assess the usability of a software product without conducting scenario based usability tests in a laboratory environment. The mailed survey emerged same factors of PSSUQ. Thus, CSUQ is useful across different user groups and research settings.

Figure 2.11: Dimensions in Usability Qestionnaires

	QUIS	*SUMI*	*PSSUQ*	*CSUQ*	*SUS*	*USE*	*UMUX*
Efficiency		✓					✓
Affect		✓					
Helpfulness		✓					
Control		✓					
Learnability / Ease of Learning		✓				✓	
System Quality			✓	✓			
Information Quality			✓	✓			
Interface Quality			✓	✓			
Overall			✓	✓	✓		
Usable					✓		
Usefulness						✓	
Ease of Use						✓	
Effectiveness							✓
Satisfaction							✓

Although the listed questionnaires focus on the concept of usability, they vary in number of subscales or factors, since there was not a widely accepted definition of usability at the time they were developed. Figure 2.11 compares the factors and subscales of the post-study usability questionnaires. The latest UMUX questionnaire (Finstad, 2010) aims to develop a scale of usability according to ISO 9241 definition of usability. Efficiency, effectiveness and satisfaction are primary factors of usability that UMUX provides, as well as an overall assessment.

Post-task questionnaires listed in the Table 2.2 slightly differ from post-study questionnaires. They are applied following the users' involvement to the given task. They are shorter in form, at most 3 items. Instead of using a Likert scale to investigate agreement, some post-task questionnaires employ lineer methods of scaling.

Table 2.2: Post-task Usability Questionnares

		Items	Subscales	Reliability	Validity	Sensitivty
ASQ (After Scenario Questionnaire)	Lewis (1995)	3	3	0,9 – 0,96	Concurrent (scenario completion)	Evidence of sensitivity
ER (Expectation Ratings)	Albert and Dixon (2003)	1+1			Concurrent (after task question – task completion)	
SEQ (Single Ease Question)		1			Concurrent (SMEQ, UME, SUS)	
SMEQ (Subjective Mental Effort Question)	Zijlstra and van Doorn (1985)	1 (0-150 slider)			Concurrent (SEQ, UME, SUS)	
UME (Usability Magnitude Estimation)					Evidence of concurrent validity	Evidence of sensitivity

ASQ has three items with 7 Likert scale options. SEQ is only the first item of ASQ. SMEQ uses a 150 mm. scale on its paper version and asks the participants to draw a line to indicate the mental effort of completing tasks, or a slider on the online version. ER has a different approach that the users opinion on difficulty of the task is asked twice; before the user executes the task and after task completion. UME has a quite

complicated approach in usability evaluation that users are asked to evaluate the difficulty of the tasks according to a reference tasks that they were trained on at the beginning of the study.

Our review indicates that through the long history of usability questionnaires, researchers usually preferred Likert scale items to demonstrate the level of agreement in usability related items. Although some have missing or unpublished data on psychometric evaluation of the questionnaires, major questionnaires have high reliability scores over and checked for their validity and sensitivity.

2.5 PSYCHOMETRIC THEORY AND METHODS

According to Nunnaly (1975), psychometrics is as much a concern for experiments as it is for studies of individual differences. Over the decades, the methods of psychometrics are intensely used by researchers in the field of psychology and educational sciences. As those disciplines highly concentrate on development of standardized scales to identify individual differences, psychometric methods have been highly interested in related literature. Beginning from late 80's, psychometric method also became a matter of interest since standardized scales have become a part of usability testing process, to assess the quality of use for a software product, from the subjective point of user's view. Many of the standardized usability scales had been developed through psychometric methods.

Primary measures for a scale's quality are reliability and validity. Consistency of measurement is referred as reliability. The extent to which a scale measures what it claims to measure is the validity of a scale. Being reliable and valid, a scale should also be sensitive to experimental manipulations, such as manipulations made within the selection of participants or attributes of the assessed products. This is called sensitivity.

Reliability of a scale can be evaluated by three different approaches: test-retest reliability, different-form reliability and internal consistency reliability. In test-retest approach, scale items are applied to the same group of participants twice, leaving a time interval between two sessions. Alternate-form questionnaires are intended to measure the same concept with parallel items, with some changes in wording and order of the

items. A high correlation between test-retest or two alternative forms of a questionnaire indicate the reliability. However, such changes could affect the measurement.

Nunnaly and Bernstein (1994, p.249) suggest that each person has a particular probability of correctly answering each item, depending on person's true score and difficulty of item. Someone who is an average example of the population has a probability of .5 correctly answering a randomly chosen item from the domain. Such an error leads to variability between test scores. There are also other factors that produce errors: subjects intend to choose the correct answer but mark another one by mistake, clerical errors may occur in hand scored tests, subjects misread the questions due to confusing wording, fatigue on long tests and random errors of graders in essay tests. All such sources tend to lower the average correlation among items. Internal consistency estimates the average correlation among items within a test. If coefficient alpha, the indicator of correlation among items, is low, the test is either too short or items have very little in common. Thus, coefficient alpha is a highly rated indicator of reliability. It is reported that the coefficient alpha is highly similar to alternative forms correlation within tests applied to more than 300 subjects (Nunnaly and Bernstein, 1994, p.252).

Validity is discussed within four approaches: Face validity, content validity, criterion validity and construct validity.

The term face validity "reflects the extent to which test taker or someone usually not trained to look for formal evidence of validity feels that the test instrument measures what it is intended to measure" (Nunnaly and Bernstein, 1994 ,p.109-110). Content validity is similar to face validity for the reason that it still uses a qualitative approach but the evaluators of the scale items is a group of experts instead of untrained respondents. Both methods are useful at the design phase of a scale. However, they are subjective methods and require an objective validation.

Criterion validity seeks for of how well one instrument stacks up against another instrument or predictor, investigating the Pearson correlation between them. A standardized scale can be compared with a prior scale, or some other measurement methods. From an HCI point of view, survey results can be compared to the user performance data that gathered in usability test sessions. There are observable indicators

of teamwork quality, such as number of conflicts for evaluating coordination, spoken words or deictic references for investigating communication.

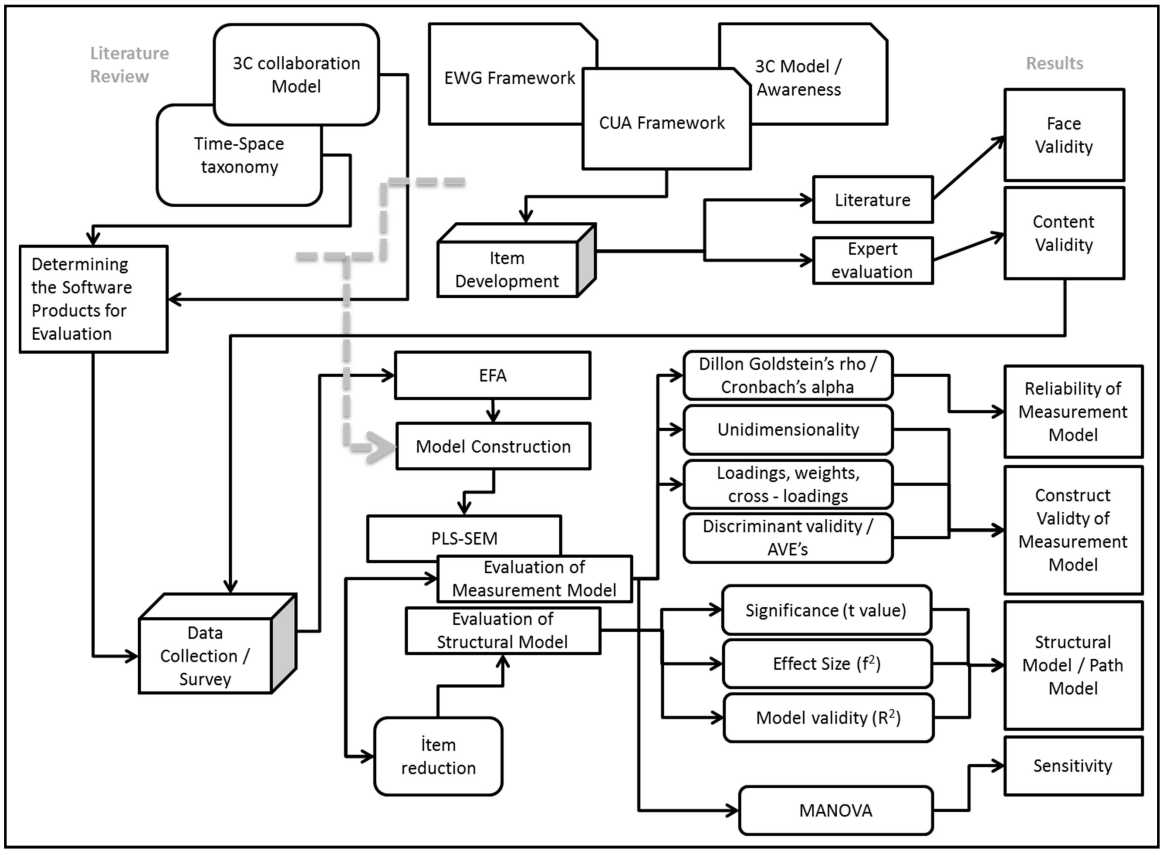
“To the extent that a variable is abstract and latent rather than concrete and observable, it is a construct” (Nunnaly and Bernstein, 1994, p.85). Construct validation requires the specification of domain of observables related to the construct at the first step. Among those observables, it should be determined the extent to which of them tend to measure the same thing, or several different things, from empirical research and statistical analysis. At the third step, subsequent individual differences studies or experiments are conducted to determine the extent to which supposed measures of the construct are consistent with “best guesses” about the construct (Nunnaly and Bernstein, 1994, p.86). Factor analysis is a statistical method for construct validation. Groups of variables acquired through exploratory factor analysis are the observables of a construct. If the researcher has a hypothesis about the factors of a construct, confirmatory factor analysis is used whether to determine the extent to which those factors are related to the construct. A general factor is one on which all measures are salients, and a group factor is one on which some but not all variables are salients. General and group factors are called common factors. A unipolar common factor’s salients have the same sign, negative or positive. Otherwise, it is a bipolar factor. Singlet factors have only one salient and a null factor has no salient. (Nunnaly and Bernstein, 1994, p.467-468)

Using the scale on evaluation of different systems, it is expected different results would emerge. This is an evidence for sensitivity. From an HCI point of view, an indirect measure of sensitivity is the minimum sample size needed to achieve a significant difference between the comparison of two products (Sauro and Lewis, 2012).

3. METHODOLOGY

The general methodology of the study is given at the Figure 3.1. Based on a literature review of collaborative work domain from a "quality of use" point of view and considering experiences in prior single-user usability scales development extracted from the related literature, we aim to construct an optimal amount of candidate questionnaire items as suggested by Nunnaly and Bernstein (1994. p. 300). By doing the literature review on collaborative work domain from a "quality of use" point of view, we will also be able to identify the measures and metrics of quality of use in CSCW domain to establish a reliability and validity for the measurement model that we aim to develop, besides examining its relation with concepts defined in literature through a structural model.

Figure 3.1: Methodology Overview



To determine the group of subjects (survey participants), the starting point is the determination the CSCW applications which's users will participate in the survey. A

review on taxonomic literature helped us to understand the efforts to define interaction in CSCW and classify applications. Based on the recent classification approaches (Cruz et al., 2012), we would be able to differentiate the properties of several commercial or free/libre software products and be able to select distinct representatives of different genres among them. Another problem here is to reach an adequate number of users of the selected software. Thus, the penetration of the product would be another factor effecting on the selection process, since the participants would be gathered from interest groups on several social networks. The scale items would be evaluated using the methods of the psychometric theory (Nunnaly, 1978).

Subsequent to the construction of items and selection of user groups, face validity will be questioned by asking a group of experts about the validity of the questions. To be sure about the content validity, the questions are developed according to the concepts and metrics mentioned in several studies related to the subject and verified by a group of experts.

As a rule of thumb (Nunnaly and Bernstein; 1994. p.301), number of participants that are going to be involved in the study was ten times the cancidate items. Based on the results, we were able to identify a suitable set of items with the highest reliability. Construct validity was assessed through factor analysis on response data. To understand the sensitivity of the scale, it will be applied to users of different groupware applications to investigate differences. In case of necessity, the items would be eliminated or reconstructed to achieve a higher validity. There are two outputs of the study: the measurement model, which is a scale to assess the quality of use for shared workspace applications, and a structural model, which is used to explain the interactions between latent variables of group work.

3.1 ITEM GENERATION AND THE RESEARCH INSTRUMENT

A set of candidate items was generated to examine the dimensions explained in three frameworks and models for the usability evaluation of collaborative applications. Each questionnaire item corresponds to a metric of usability proposed in an evaluation framework, or a component described in a model. Each metric or component explained in the previous studies is explored to form a sentence of statement. Those statements

investigate the user's attitude in relation to his experience of the examined collaborative system. Initially, 37 items were assembled. Table 3.1 shows these items and their relations to the aforementioned frameworks or models. 10 Items coded as "CUA" are based on the metrics in the framework of the Collaborative Usability Analysis (Pinelle, Gutwin & Greenberg, 2003). Definitions and measures proposed by the Evaluation Working Group (Cugini et al., 1997; Damianos et al., 1999) were used to design 19 EWG-coded items. 8 Items coded as "3CM" are based on the 3C Collaboration Model (Ellis, Gibbs & Rein, 1991; Fuks et al., 2005) and selected studies on awareness. The "order" column of the table indicates the order of the statement in question form.

Table 3.1: Candidate Questiionnaire Items and Literatural Foundations

Item Code	Order	Item and related definition in literature
3CM01	6	There is a mutual understanding of the ongoing work among participants. "(…) communicators have a mutual understanding of the content and process of their communication and (…) they all know that they have this mutual understanding." (Convertino et al.,2011)
3CM02	20	Other participants execute the actions that I expect from them. Community of practice as the "integration of team members' behaviour or decisions into best practices or patterns" (Carrol et al., 2006)
3CM03	3	I can trust the competence of other participants while they are contributing to the ongoing work. Social capital is a facet of awareness and a measure of the "levels of trust and reciprocity" within the group. (Carrol et al., 2006)
3CM04	29	I enhanced my skills in the ongoing work by using the system. Querying self-efficacy in group work (Carrol et al., 2006)
3CM05	18	Using the system enhances our capabilities of dealing with the ongoing work. Querying collective efficacy (Carrol et al., 2006)
3CM06	34	The means provided by the system for coordination among participants are adequate for the ongoing work. A general query on coordination
3CM07	16	The means provided by the system for communication between participants are adequate for the ongoing work. A general question querying communication
3CM08	14	The means provided by the system for cooperation are adequate for the ongoing work. A general question querying collaboration, referring to the "lightweight interactions, information sharing, coordination, collaboration and cooperation" level in work coupling by Neale et al. (2004)
CUA01	4	Using the system, I can communicate with other participants explicitly. Explicit communication. Spoken, gestural and written communication are not queried with different questions so that the scale can be used to assess a wide range of

		collaborative software by their properties at application level.
CUA02	21	I am aware of the presence of other participants. Information gathering – Basic Group Awareness
CUA03	1	I can see the activities of other participants. Information gathering from visual evidence
CUA04	8	I can distinguish the objects that have been manipulated by others. Information gathering from objects
CUA05	33	I can understand the intentions of others as a consequence of their actions. Information gathering – Consequential communication. "Bodies" changed to "actions" so that the scale can be used to assess different collaborative software categories at Time/Space level.
CUA06	12	I can access resources (tools, objects, data) whenever I need them. Management of shared access – Obtain a resource
CUA07	23	I can reserve resources (tools, objects, data) to use them later. Management of shared access – Reserve a resource for future use
CUA08	31	I can protect my work from undesired changes made by others. Management of shared access – Protect your work
CUA09	7	I can hand off a resource (tools, objects, data) to another participant when needed. Transfer – Hand-off
CUA10	2	I can deposit a reserved resource (tools, objects, data) for others to access when needed. Transfer – Deposit a resource
EWG01	13	It is satisfying to work together in the system. "satisfaction with the group process"
EWG02	25	The final outcome of the ongoing work is satisfying. "satisfaction with the final solution"
EWG03	5	I am satisfied with my participation in the ongoing work. "satisfaction with an individual's participation"
EWG04	32	I am satisfied with the participation of others in the ongoing work. "satisfaction with group participation"
EWG05	37	I can make contributions to the ongoing work to the extent that I projected. "satisfaction with the group process, outcome or final solution, an individual's participation and group participation"
EWG06	17	The contribution of other participants to the ongoing work is in line with my expectations. "satisfaction with the group process, outcome or final solution, an individual's participation and group participation."
EWG07	28	It is efficient to work together using the system. "efficiency of group work"
EWG08	15	Using the system, participants can reach a consensus on a solution.

		"consensus on the solution and the task outcome"
EWG09	22	**Using the system, participants can reach a consensus on the final outcome.** "consensus on the solution and the task outcome"
EWG10	30	**During the use of the system, I am aware of other participants.** "awareness of other participants"
EWG11	9	**While I am using the system, I am aware of the objects of work.** "having realization, perception, or knowledge of objects and object manipulations"
EWG12	36	**During the use of the system, I am aware of the actions that I can take.** "having realization, perception, or knowledge of objects and object manipulations"
EWG13	27	**Using the system, I can communicate with other participants.** "availability of communication"
EWG14	26	**During the use of the system, communication with other participants is good.** "the goodness of the communication"
EWG15	19	**I can take over the floor control to direct the others when necessary.** "communication" in terms of "ability to get floor control"
EWG16	24	**I can ask and answer questions when necessary.** "ability to ask a question/make a response"
EWG17	11	**It is possible to establish a common understanding with other participants.** "grounding as establishing a common understanding with other participants and understanding others"
EWG18	10	**I can understand what others are talking about.** "grounding as establishing a common understanding with other participants and understanding others"
EWG19	35	**Transition from one job to another is smooth.** Smoothness of the transitions from one job to another

In addition to 37 items querying collaborative use, demographic questions on age and gender were included in the question form. The following question about the user's prior experience in related software and its collaborative use is also added before the scale items:

How many times have you used [the system]'s collaborative functions to work on the same document with other people on [system]?

The response options are "Never", "Tried it once" "1- 4 times", "5-10 times", "11-15 times", "16-20 times" and" More than 20 times".

This question served to filter out inexperienced users. Participants who respond with “Never” were redirected to an exit page without seeing the rest of the survey.

Candidate items are evaluated through 7-point graphic scales, anchored at the end points with the response levels "Strongly disagree" for 1 and "Strongly agree" for 7.

3.2 EXPERT EVALUATION OF ITEMS FOR CONTENT VALIDITY

The candidate item set constructed according to literature was evaluated by independent experts. An online evaluation form was sent to 83 e-mail addresses of authors who have published on the journal ““Computer Supported Cooperative Work” in Volume 22 and 23, in 2013 and 2014. List of authors were gathered through the contact information on the articles. The evaluation form contains items and a bried description of their literatural foundations, as depicted on Table 3. Experts were asked to evaluate

evaluate the set of candidate items for their “content validity”, i.e. “to look for informal evidence of validity and express your opinion for the test instrument’s capability to measure what it is intended to measure”. Below each item, there is a quotation or explanation, which refers to the idea within the study that the item is based on. They were asked to indicate their opinion by checking one of the “Yes”, “No” or “Partially”. In case of "No" or "Partially", they were asked to add some comments and explain why they think that the item is not suitable. They were also invited to offer some changes on the items, or propose additional items, but explain how it is different from other items and indicate the theory/study that their suggestion depends on.

4 responses were acquired, anonymously. Two respondents partially agreed the content validity of item “3CM04 - I enhanced my skills in the ongoing work by using the system.”, One of the respondensts suggestes that “It is not always a matter of enhancing one's skills but rather of better exploiting them. One should perceive the higher efficacy achieved when performing the ongoing work by using the collaborative system.” The other respondent mentioned his doubt “that people actually spend as much time on self-reflection as we think they should.”

Item “3CM06 - The means provided by the system for coordination among participants are adequate for the ongoing work.” was partially agreed by one of the respondents who

suggests that “item appears quite vague” and it can be specified by “referring to synchronization issues and role based access.” Reflecting on this suggestion we decided that “role based access” is not a requirement for groupware systems. On the other hand, synchronization is a “sine qua non” for groupware and issues related with synchronization is a matter of awareness rather than coordination. Thus, we decided to keep item 3CM06 as it, to see if the users of groupware systems would response to this item coherently.

3CM07 and 3CM08 were partially agreed by one of the respondents, critizing that there are always other channels to communicate and cooperate. As we agree with that, we think that users responding to this survey would consider his use of other channels, like telephone calls for communication or deciding to meet in person to continiue working, while they are responding to these items.

Item CUA02 and CUA03 was partially agreed by one of the respondents, suggesting that awareness of presence or seeing others’ activities is “only necessary in certain circumstances.” However, within a groupware context, we think that these issues should be questioned, as other three respondents agreed with.

There was a partial agreement on items CUA06 and CUA07 by two respondents, as one stresses out that the definition of “resources” is not specific since the item included “tools, objects and data” altogether, while the other respondent emphasizes that “access to resources” may not be not “always the case for objects and data”, e.g. they might be locked for synchronization purposes or due to access privileges.

CUA08 was partially agreed by one of the respondents, as “some work necessitates shared editing”, while the item suggests protection.

Item CUA09 was partically agreed by two of the experts, one emphasized that “hand off” is a vague action that requires further definition, while other respondent asserted that the item’s statement is applicable only if the user has full access privileges to all resources, or users may not be informed about the resources that they have no access. We ignored the first suggestion to keep the relevant to its literatural foundations. The second suggestion was righteous in terms of privilege limitations, but we assume that

users will respond to this item according to their own experience, whether he has access privileges to see, edit or use some resources or not.

EWG01, EWG02, EWG03 and EWG04 were rejected by one of the experts, as she noticed that “work satisfaction is a vague and largely unmeasurable concept”, but other experts agreed with these statements as a measure of groupware usability evaluation.

Validity of the item EWG05 and EWG06 was partially agreed by one of the experts, as she notifies that item “assumes rationalistic goals” by considering that users had a projection of their contributions prior to work. On the contrary, we think that “having a goal” is an essential component of usability and users have a preassumption on their efforts to achieve their goals, either it is rationalistic or not. Whether the preassumed effort was comfortable, beyond or below the actual effort spent on the work, this would effect the users’ satisfaction. Based on their preassumptions for themselves, users can reflect on others’ contributions, as they have gathered together to work.

EWG08 is was partially accepted while EWG09 were rejected by the same expert, critizing these items for assuming that “consensus” is depending on functions of the system. On the other hand, the other experts agreed upon these items.

Item “EWG10 - During the use of the system, I am aware of other participants.” was partially agreed by one expert and critized for being too much depending on the circumstances, e.g. synchronous work highly depends on being aware of others but it is not a requirement for asynchronous work.

Item “EWG14 - During the use of the system, communication with other participants is good.” was critized by one of the respondents for the expression “good” being vague, but she partially accepted the item.

Item “EWG15 - I can take over the floor control to direct the others when necessary.” was partially accepted by all of the experts. This one is the most criticisized item among the others. One expert notices that she agrees the item but instead suggests using the phrase “when necessary” only, and removing the phrase 'to direct the others'. On the contrary, another expert suggest that “"floor control" is obsolete.” and offers to rephrase the item as "I can direct others when necessary". Another expert emphasized that floor

control can be taken over “Only if 'rights' are agreed”, remarking the access privileges. The last expert also points out that “floor control” is jargon, and cannot be clearly understood by users. There is a conflict on the ideas of experts. As two suggested removing the phrase “floor control” and keep “direct the others”, one suggests keeping the phrase “floor control” and removing “direct the others”. We decided to keep both phrases to cover both opinions.

Item “EWG17 - It is possible to establish a common understanding with other participants.” was disapproved by one of the respondents suggesting that “common understanding” is a “Too high level proposition to make a sensible judgement about.” but other experts agreed upon it.

Although they criticized or rejected some of the items, experts responded to the survey positively in general, suggesting that the items are suitable for evaluation of shared workspace groupware from the subjective perspective of users, providing the items content validity.

3.3 DETERMINING THE SOFTWARE PRODUCTS FOR EVALUATION

Based on recent classification approaches (Cruz et al., 2012), we were able to differentiate several products by their properties and select distinct representatives of different genres from among them. The penetration of the product was another point to be considered when determining the collaborative software platform since participants were gathered from interest groups on several social networks.

The “socio-technical model” taxonomy of collaborative software (Cruz et al., 2012) tries to combine different aspects from the 3C model, time/space taxonomy, awareness, application level attributes and group work related characteristics. Since we aimed to develop a measurement instrument that could evaluate the widest range of collaborative applications, the primary focus on determining the software product was on the 3C model (Ellis, Gibbs & Rein, 1991; Sauter, Mühlherr & Teufel, 1994; Sauter et al., 1995). The approach of the 3C model allows choosing a software product which has functions to support cooperation, coordination and communication through mechanisms for authorizing access, sending messages, indicating the user’s presence and

manipulations on data. Time/space (Grudin, 1994) was another dimension we considered while making our decision. Whether the application was going to be used in a co-spatial manner was another point in our discussion. The recent prevalence of cloud computing systems lead to a surge in the number of applications enabling collaborative work from different locations. Therefore, a remote collaboration software was preferred over a co-spatial application. The selected application also allowed both synchronous and asynchronous collaboration. The popularity of the application and the diversity of its users were considered important selection criteria as well at both application and group work level. Moreover, most computer users are familiar with individual word processing tasks as they also share text documents with others and edit documents created by someone else by exchanging files and using version-tracking mechanisms.

For the reasons given above, five web-based online word processors applications running on several personal cloud services were selected. When analyzed according to the 3C model, all of the selected applications support cooperation of multiple users working on the same text document; coordination by enabling users to allow or limit others' access to the whole document; and four of them have some commenting and chat tools for communication. As web-based online tools, they have the core functions of a word processor and can be used for synchronous or asynchronous collaboration. Although group tasks may vary depending on the purpose of the word processing, these softwares are simply used for creating a text document with meaningful content in collaboration. Robinson et al. (2016) suggest that the online wordprocessors do not "regulate the actual collaborative or meeting process, but rather" they "stimulate interaction among participants", providing a context for groupwork process. They "work well with flat team structures allowing members to swap roles (e.g., idea producers, text producers, and editors) and distribute responsibilities."

3.4 PARTICIPANTS

Participants were recruited among the members of online communities related to the selected applications. Primarily, participants were members of online communities formed on a widely known business-oriented social network website. The number of members in each community varies from a hundred to six thousand. The number of members listed on the community page is limited to five hundred. It is possible to send a personal message to these listed members. Besides an announcement posted on the community page that can be viewed by all members of each community, listed members were also sent a personal message inviting them to participate in the survey. The total number of members in the communities is more than 30,000. Nearly ten thousand personal messages were sent. There were more than 3,000 visits to the survey page and 501 completed responses. 103 responses were eliminated by an item based outlier analysis, in which respondents who scored an outlier value for more than 20 of 37 items were removed from data set.

Table 3.2: Participants' distribution according to evaluated groupware

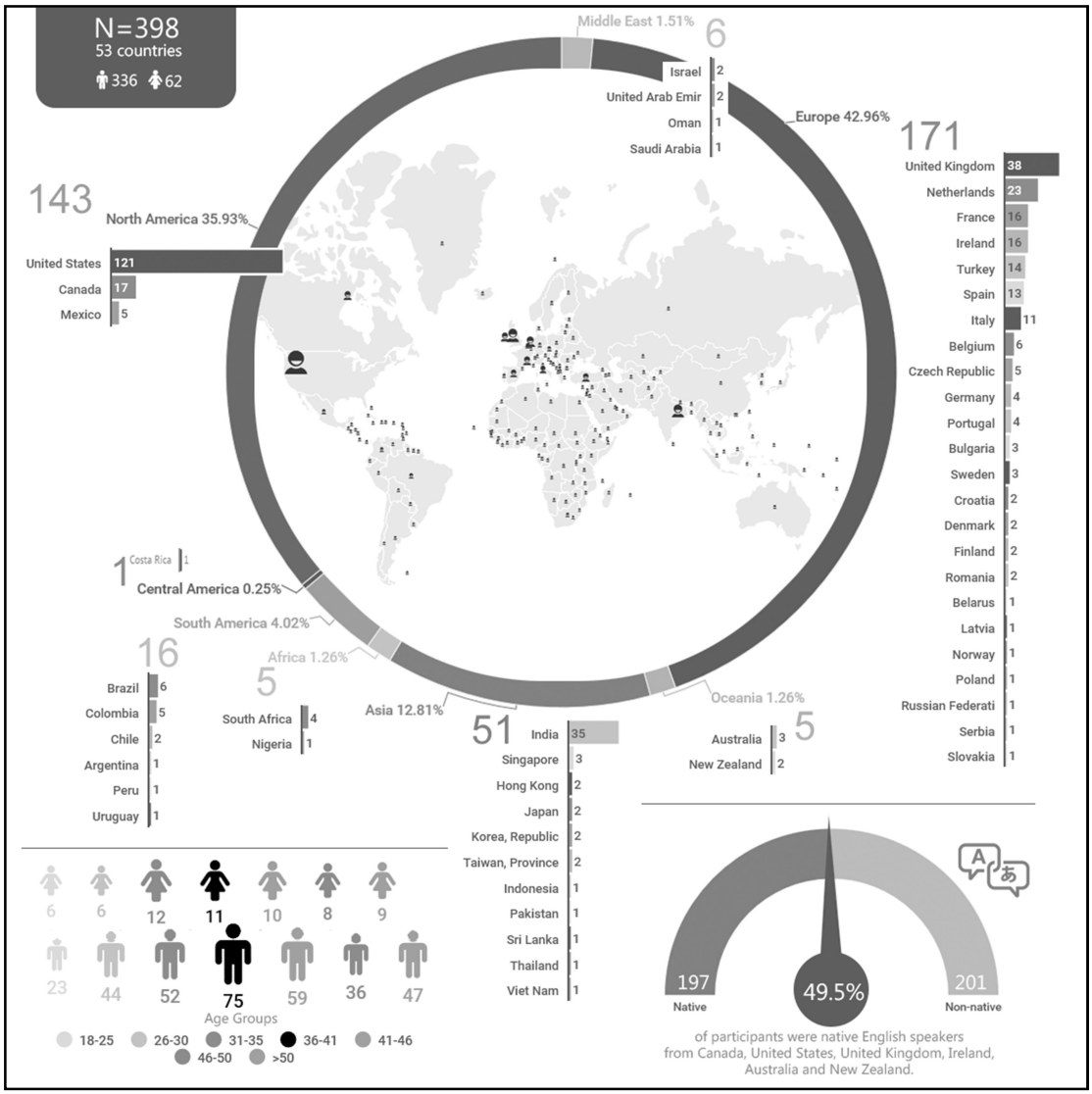
		Evaluated Groupware				
		#1	#2	#3	#4	#5
Level of Experience	Tried it once	3	3	5	3	3
	1-4 times	15	10	7	5	7
	5-10 times	17	7	5	6	3
	11-15 times	13	3	4	1	0
	16-20 times	5	1	2	2	1
	More than 20 times	226	19	11	7	4
# of respondents		279	43	34	24	18

There were 62 female and 336 male respondents, totaling 398. According to the IP address data of the participants, people from 53 countries participated in the survey. The majority of the participants were located in Western European countries and North America. The origins of the participants are given in Figure 13. 201 Participants from Canada, Australia, Great Britain, Ireland, the United States of America and New Zealand are considered native English speakers. Out of the remaining 197 non-native English speakers, 117 were located in Western Europe. The mean ages for both male

and females is 40 (SD=10 for both). Number of participants according to age groups is also given in Figure 3.2.

Participants were quite familiar with the evaluated software and collaborative use. 267 participants (67 percent) stated that their experience in collaborative use exceeded “20 times”. Following table presents the number of participants for each software and their level of experience with the software they evaluate. Their distributions according to experience levels are given on Table 3.2.

Figure 3.2: Participants by geographical location, gender, age groups and native language



3.5 ANALYSIS METHODS

The construct validity of the item set was inspected through an exploratory factor analysis (EFA) at the beginning, since reviewed literature offers various structures regarding to usability in groupware applications. However these establishments rely on authors' insights based on their experience, rather than empirical data. We used an oblimin rotation to enhance the interpretability of the EFA, but nearly half of the items primarily loaded on a single factor, which made this factor's conceptual content very complex to be interpreted. When those items were reviewed according to their content, we concluded that the set of items loading on the same complex factor have some subsets that represent different dimensions but EFA fell short to detect those dimensions. We reasoned three causes of this:

1) Majority of the survey participants who volunteered to respond the items were attached users of the software they evaluated, which caused a positive bias on their responses, thus the item scores are not distinctive to form separate dimensions. 2)
2) As a result of positive bias, item scores were skewed. 3)
3) The items loaded on the single factor have different natures, as some of them were formative while others were reflective.

We checked the items' normality through K-S (Kolmogorov-Smirnov) and the S-W (Shapiro-Wilk) tests, in which a p value <.05 suggests the assumption of normality has to be rejected (see Table 6). Field (2013: 185) suggests that both tests should be used d in conjunction with visual inspection of histograms and skewness and kurtosis measures. The skewness ratio of each item were inspected to be exceeding ±2, which indicates that one should consider the distribution is severely skewed, for a small or a medium sample. (Weinberg & Abromowitz, 2002:79). The visual inspection of histograms which can be seen on Appendix I verifies that our data were not normally distributed.

Descriptive statistics given on Table 5 suggests the positive bias forementioned and reflects the skewness on item scores.

We determined that there is a need to expand the diversity of dimensions in relation with conceptual content of items loaded on this complex factor. To do this, a partial

least squares (PLS) based approach is embraced over a covariance based (CB) approach, because data on each item presented a skewed distribution due to the positive bias of participants, and also some items detected to be formative on their latent variables. Besides, as we stated above, we needed to explain a complex structure with a limited theoretical and substantive knowledge. Thus, exploratory nature of PLS based methods is more convenient for our study. We used Addinsoft XLSTAT version 2016.05.34217 Statistical Software & Data Analysis Add-on for Excel to develop PLS based models and IBM Statistical Package for Social Sciences (SPSS) v.20 for other statistics.

We followed a two step approach for retrieving results, as suggested by Chin (2010:669). On the first step, our goal is to establish measurement model results and enhance the measurement model through item reduction or re-allocating items on more suitable constructs. We embraced PLS-CFA (partial least squares-confirmatory factor analysis) on this first step. On the second step, we identified a structural path model with partial least squares (PLS-PM), which represent the interaction between the dimensions with regard to theoretical considerations.

3.5.1 Measurement model

As stated by Chin (2010:670) "One approach to obtain the measurement results is to first draw all possible structural links among the constructs you plan to use and then set the PLS inner weighting option using the factorial scheme." Regarding to this approach, we employed PLS based confirmatory factor analysis (PLS-CFA) to detect the sources of poor model and reduce the number of items, to obtain reliability and validity of the measures used to represent each construct. PLS-CFA ignores "the directionality of the arrows among constructs and simply performs pair wise correlations to establish inner weights" (Chin, 1998; Henseler et al., 2009).

We followed the guidelines abridged by Hair et al. (2011) and Assaker et al. (2013) through a sequential process in which we ran a PLS-CFA on each step to select an item to drop from the scale or re-allocate an item on a different factor to achieve unidimensionality, internal reliability, convergent validity and discriminant validity (Straub et al. 2004; Lewis et al. 2005).

To achieve unidimensionality, each item should load with a high coefficient on only one factor, and this factor is the same for all items that are supposed to measure it. It is required to check all factors using EFA again to find out that items of the factor load highly and consonantly on a single factor. To determine whether a factor loads consonantly on a single factor, it should load with an eigenvalue exceeding 1. A factor load is considered high for above .6 and low for below .4.

One of the criteria for reliability is that each factor's Cronbach's alpha value to be at least .6. However, Dillon Goldstein's rho value, which also referred as composite reliability, is considered to be a better indicator than Cronbach's alpha, because Cronbach's alpha assumes that each manifest variable is equally important in defining the latent variable but Dillon-Goldstein's rho does not make this assumption as it is based on the results from the model (i.e. the loadings) rather than the correlations observed between the manifest variables in the dataset (Chin, 1998).

Compared to items measuring other constructs, a construct's items should assemble at a higher degree to determine convergent validity. This is inspected through the average variance extracted (AVE) index, which should exceed .5 for a valid construct (Fornell and Larcker, 1981) to indicate that the construct is able to explain more than half of the variance of its indicators (Chin, 1998). Higher the AVE is, the items are correctly representing the latent construct. In addition, we tested the significance of the indicator loadings to test convergent validity using the bootstrapping method (Efron and Tibshirani, 1993).

Another indicator of convergent validity is the approximation in magnitude of each item's load on the construct they intend to measure. In Chin's (2010:674) words, " how high are each of the loadings and are they more or less similar?". Measures with wide and varied range, such as .5 to .9 would raise a concern on their capability of capturing the phenomenon of interest as a homogenous set. Narrower the range and higher the lowest loading, such as .7 to .9, convergent validity can be assumed.

By calculating the shared variance between two constructs and verifying that the result is lower than the AVE for each individual construct (Fornell and Larcker, 1981), we determined the extent to which measures of a given construct differ from measures of

other constructs in the same model, i.e. discriminant validity through Fornell-Larcker criterion.

In addition, the discriminant validity of the model can be represented in more details when each indicator's loading is higher for its designated construct than it is for any of the other constructs, and each construct loads highest with its assigned items (Chin, 1998). Besides the EFA factor loads indicating unidimensionality, we also utilized cross-loadings to detect the items to be dropped to achieve discriminant validity. As suggested by Chin (2010:674), we employed the squares of cross-loadings because this representation provides "more intuitive interpretation since it represents the percentage overlap between an item and any construct".

To investigate formative variables, we examined each formative indicator's weight (relative importance) and loading (absolute importance), using bootstrapping with a sample of 5000 at 5 percent significance level (Hair et al. 2011). When both weight and loading were not significant, formative items were excluded.

3.5.2 Structural model

After we obtained a measurement model with unidimensionality, reliability and validity, we also developed a structural path model based on partial least squares (PLS-PM) which represent the interaction between the dimensions with regard to theoretical considerations. For the evaluation of structural model, at first, we explored the R^2 values for each factor to evaluate model validity.

R^2 represents the amount of an latent variable's explained variance to its total variance, for each endogenous latent variable, at a substantial level of above .67, at a moderate level of above .33 or a weak level of .19 (Chin, 1998). On the other hand Hair suggests describing the .75, .50 and .25 values "for endogenous latent variables in the structural model as substantial, moderate, or weak, respectively. A relatively simple model that includes one or two exogenous latent variables can be taken as valid even the R^2 values are moderate. More complex models require substantial values, but our model is relatively simple.

We figured 5000 bootstrapping samples with 398 cases, to assess the path coefficients' significance, considering two-tailed t values criterion as 1.65 for 10 percent, 1.97 for 5 percent and 2.58 for 1 percent significance levels (Hair, 2011). Significant paths which show signs contrary to hypothesized direction support the proposed causal relationship empirically. Otherwise, there is no empirical support for the hypothesized direction available on the data.

We also explore the Cohen's f^2 to explore the effect size, i.e. is the increase in R^2 values of the latent construct to which the path is connected, relative to the latent construct's proportion of unexplained variance. Cohen's f^2 values of 0.02, 0.15, and 0.35 signify small, medium, and large effects, respectively, on endogenous latent constructs (Chin, 1998; Cohen, 1988).

For formative variables, the recommended standardized path coefficients should be greater than .100 (Lohmöller, 1989) or .200 (Chin, 1998). We followed Lohmöller's recommendation with a more liberal approach, since many of our variables did not meet the criteria of Chin at the early steps of structural model development. Chin's recommendation was considered for latter iterations for evaluation of structural model.

The Goodness-of –Fit (GoF) Index (Tenenhaus et al. 2004) were used for the comparison of possible theoretically sound models in terms of their predictive performance as GoF presents the percentage of explained variance in the model as a whole.

3.5.2.1 Hypotheses

Our main latent variable is Usability, which we aim to explain through other variables. We hypothesized that all other variables have positive effect on Usability of a shared workspace groupware application.

Thus, following hypotheses were included in our model:

H1a 3C Capabilites has a positive effect on Usability

H1b Grounding has a positive effect on Usability

H1c Shared Access has a positive effect on Usability

H1d Team Integration has a positive effect on Usability

H1f Communication has a positive effect on Usability

H1g Awareness has a positive effect on Usability

Our model depends on our assumption that 3C Mechanisms and Grounding are exogenous latent variables.

The 3C Mechanisms depend on the evaluated software's given functions to support teamwork. Communication capabilities may vary from simple text-based chat tools to real time voice connections between participants. Examples of coordination capabilities can be lock mechanisms, access priorities, action limitations. Cooperation mechanisms can involve commenting tools or version tracking mechanisms. These capabilities are defined by the software's vendor and are not affected by the teamwork.

Grounding depends on the team members professional backgrounds, their knowledge on the work domain or social attributes of team members. Although differences among the participants may affect different tasks in a different manner, Grounding is established if there is a mutual understanding among the participants. Grounding is defined by common knowledge of participants and it is not affected by the work process.

Team Integration, as explained above, is the capability of working together, having pre-assumptions on others contribution to work, being satisfied from their contribution and developing solutions to problems together. We suggest that may depend on the system's capabilities, as well as the grounding of team members. Thus, we decided to test the following hypothesis:

H2a 3C Capabilites has a positive effect on Team Integration

H2b Grounding has a positive effect on Team Integration

Availability of communication mainly depends on the system's mechanisms. However, we suggest that a good communication also requires a common grounding among the participants. Hence:

H3a 3C Capabilites has a positive effect on Comminucation

H3b Grounding has a positive effect on Comminucation

Shared Access occurs on resources, tools and data represented on the system's interface, which makes this latent variable depend on system's capabilities only. It would be conceptually wrong to consider an effect of Grounding on Shared Access. Therefore, we only test the following hypothesis:

H4a 3C Capabilites has a positive effect on Shared Access

Awareness can be explained through system's mechanism and team's grounding. Besides, team members become aware of each others by communicating with each other. As they become aware of each other and the actions that they can make, we suggest that they would develop a consciousness of working as a team together, and mindfully access and share the resources. Our hypothesis regarding to Awareness were:

H5a 3C Capabilites has a positive effect on Awareness

H5b Grounding has a positive effect on Awareness

H5c Communication has a positive effect on Awareness

H2c Awareness has a positive effect on Team Integration

H4b Awareness has a positive effect on Shared Access

In addition, as a theoretical background for our study, 3C Model suggests an interplay with the latent variables of teamwork.

We hypothesized that Team Integration is not only affected by the endogenous variable Awareness, but also affected by Communication, since a change in Communication may lead to a change in how team members work together as a team. And also, changes

in how team members contribute to the work may lead to a change access to resources related with work. Hence, additional hypothesis are:

H2d Communication has a positive effect on Team Integration

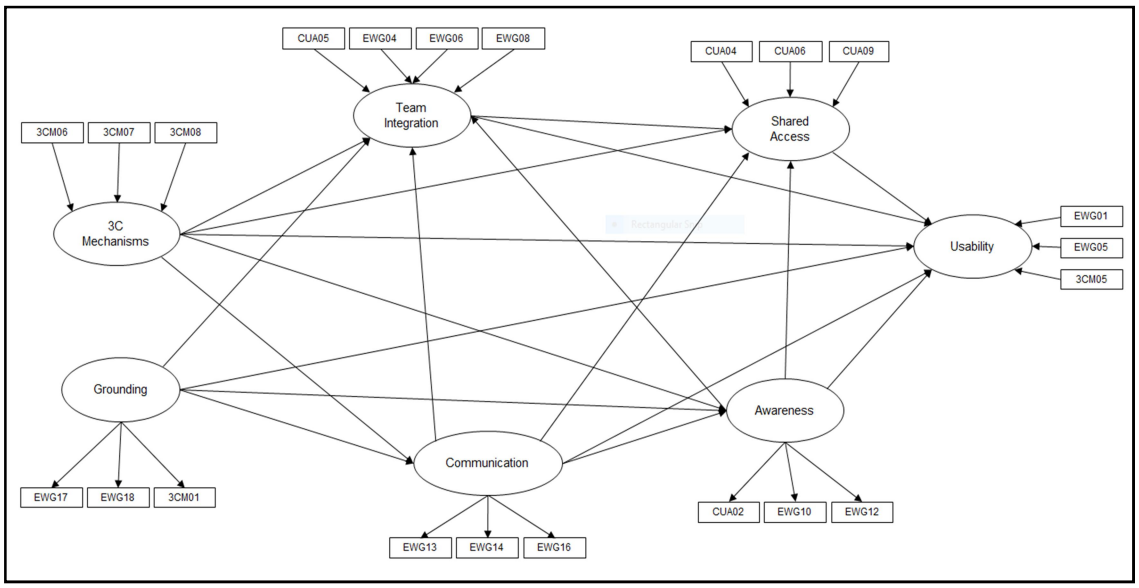
H2e1 Team Integration has a positive effect on Shared Access

Although we could not establish a sound conceptual interference between Shared Access and Communication, we decided to test the hypothesis that:

H4c Communication has a positive effect on Shared Access

These hypotheses are shown on Figure 3.3.

Figure 3.3: Hypotheses of Structural Model



3.5.3 Sensitivity

From the perspectives of other disciplines such as clinical psychology, patient care, education, or marketing, sensitivity is the changes in the responses to a questionnaire across different participants with different attributes. These disciplines are concerned with individual differences. However, from an HCI point of view, sensitivity mainly concerns with the answer the question “To what extent does the measure pick up on differences in usability between systems?” (Cairns, 2013). A usability scale is expected to be sensitive to different systems rather than differences of people who use the system.

For each of our latent variables, we executed a series of multivariate analysis of variance (MANOVA) to detect the effect of individual differences such as respondents' gender, age group, being a native English speaker and level of experience with software on latent variable mean score, as well as the evaluated system.

4. RESULTS

The descriptive statistics are presented in the beginning, to describe the basic features of the data in the study. As depicted on Table 4.1, all manifest variables, i.e items, were negatively skewed. According to skewness ratios exceeding the range ±2, most of the items were highly skewed, as CUA03 and EWG01, whike only one has a normal distribution, 3CM02. All items are leptokurtic except CUA03 and EWG01, which are mesokurtic.

Table 4.1: Descriptive statistics of items

			Mean				Skewness			Kurtosis	
	Min.	Max.		Std. Error	Std. Dev.	Variance	Statistic	Std. Error	Ratio	Statistic	Std. Error
CUA01	2	7	6,04	0,06	1,13	1,27	-0,99	0,12	-8,3	0,11	0,24
CUA02	3	7	6,24	0,05	0,97	0,94	-1,23	0,12	-10,3	0,85	0,24
CUA03	1	7	6,25	0,06	1,11	1,22	-1,63	0,12	-13,6	2,67	0,24
CUA04	1	7	5,69	0,07	1,37	1,89	-0,96	0,12	-8,0	0,36	0,24
CUA05	1	7	5,38	0,06	1,18	1,39	-0,42	0,12	-3,5	0	0,24
CUA06	2	7	6,02	0,06	1,12	1,26	-1,02	0,12	-8,5	0,36	0,24
CUA07	1	7	5,44	0,07	1,34	1,78	-0,45	0,12	-3,8	-0,69	0,24
CUA08	1	7	5,24	0,08	1,59	2,51	-0,56	0,12	-4,7	-0,57	0,24
CUA09	1	7	5,86	0,06	1,27	1,61	-0,93	0,12	-7,8	0,12	0,24
CUA10	1	7	5,9	0,06	1,27	1,61	-0,9	0,12	-7,5	-0,03	0,24
EWG01	1	7	6,19	0,05	1,1	1,2	-1,63	0,12	-13,6	3,02	0,24
EWG02	3	7	5,99	0,05	1	1	-0,69	0,12	-5,8	-0,42	0,24
EWG03	2	7	6,13	0,05	1,03	1,07	-1,12	0,12	-9,3	0,9	0,24
EWG04	3	7	5,64	0,05	1,05	1,1	-0,36	0,12	-3,0	-0,66	0,24
EWG05	2	7	5,96	0,05	1,05	1,11	-0,71	0,12	-5,9	-0,37	0,24
EWG06	3	7	5,56	0,06	1,14	1,29	-0,29	0,12	-2,4	-0,8	0,24
EWG07	2	7	6,1	0,06	1,11	1,22	-1,18	0,12	-9,8	0,78	0,24
EWG08	2	7	5,7	0,06	1,18	1,39	-0,66	0,12	-5,5	-0,2	0,24
EWG09	2	7	5,89	0,05	1,05	1,11	-0,76	0,12	-6,3	0,05	0,24
EWG10	2	7	6,15	0,05	1,03	1,06	-1,12	0,12	-9,3	0,62	0,24
EWG11	1	7	5,83	0,06	1,15	1,33	-0,82	0,12	-6,8	0,31	0,24

EWG12	2	7	5,97	0,05	1,04	1,08	-0,75	0,12	-6,3	-0,17	0,24
EWG13	2	7	6,18	0,05	1,04	1,07	-1,22	0,12	-10,2	0,93	0,24
EWG14	1	7	5,96	0,06	1,13	1,27	-1,08	0,12	-9,0	1,06	0,24
EWG15	1	7	5,42	0,06	1,26	1,6	-0,44	0,12	-3,7	-0,36	0,24
EWG16	1	7	6,02	0,06	1,14	1,31	-1,16	0,12	-9,7	1,08	0,24
EWG17	2	7	5,93	0,05	1,06	1,12	-0,83	0,12	-6,9	0,27	0,24
EWG18	2	7	5,94	0,05	1,01	1,02	-0,78	0,12	-6,5	0,33	0,24
EWG19	2	7	5,6	0,06	1,18	1,4	-0,47	0,12	-3,9	-0,56	0,24
3CM01	2	7	5,78	0,06	1,13	1,29	-0,54	0,12	-4,5	-0,66	0,24
3CM02	2	7	5,31	0,06	1,11	1,23	-0,13	0,12	-1,1	-0,5	0,24
3CM03	2	7	5,46	0,07	1,3	1,68	-0,44	0,12	-3,7	-0,58	0,24
3CM04	1	7	5,81	0,06	1,17	1,37	-0,82	0,12	-6,8	0,31	0,24
3CM05	3	7	6,07	0,05	1,03	1,07	-0,92	0,12	-7,7	0,11	0,24
3CM06	2	7	5,64	0,06	1,15	1,33	-0,49	0,12	-4,1	-0,54	0,24
3CM07	2	7	5,77	0,06	1,16	1,34	-0,79	0,12	-6,6	0,2	0,24
3CM08	2	7	5,92	0,06	1,11	1,22	-1,01	0,12	-8,4	0,93	0,24

Furthermore, the K-S and S-W tests suggest a non-normal distribution for all variables, as depicted on Table 4.2, none of the items have a significance value above .05.

Table 4.2: Test of normality results for each item

	Kolmogorov-Smirnov			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
3CM06	,194	398	,000	,885	398	,000
3CM07	,203	398	,000	,865	398	,000
3CM08C	,215	398	,000	,835	398	,000
EWG17	,214	398	,000	,847	398	,000
EWG18	,211	398	,000	,848	398	,000
3CM01	,207	398	,000	,861	398	,000
EWG01	,299	398	,000	,741	398	,000
EWG05	,239	398	,000	,835	398	,000
3CM05	,265	398	,000	,811	398	,000
CUA05	,177	398	,000	,907	398	,000
EWG04	,210	398	,000	,890	398	,000
EWG06	,171	398	,000	,892	398	,000

EWG08	,207	398	,000	,873	398	,000
CUA02	,305	398	,000	,760	398	,000
EWG10	,286	398	,000	,785	398	,000
EWG12	,233	398	,000	,838	398	,000
CUA04	,211	398	,000	,845	398	,000
CUA06	,259	398	,000	,810	398	,000
CUA09	,250	398	,000	,824	398	,000
EWG13	,296	398	,000	,771	398	,000
EWG14	,233	398	,000	,823	398	,000
EWG16	,257	398	,000	,804	398	,000
CUA01	,280	398	,000	,799	398	,000
CUA03	,346	398	,000	,709	398	,000
CUA07	,187	398	,000	,891	398	,000
CUA08	,180	398	,000	,891	398	,000
CUA10	,277	398	,000	,808	398	,000
EWG02	,226	398	,000	,839	398	,000
EWG03	,284	398	,000	,790	398	,000
EWG07	,281	398	,000	,783	398	,000
EWG09	,228	398	,000	,852	398	,000
EWG11	,208	398	,000	,854	398	,000
EWG15	,171	398	,000	,900	398	,000
EWG19	,193	398	,000	,887	398	,000
3CM02	,187	398	,000	,910	398	,000
3CM03	,168	398	,000	,891	398	,000
3CM04	,210	398	,000	,855	398	,000

Histograms provided at Appendix I illustrates that our data were not distributed normally.

4.1 FACTORS EMERGED THROUGH EXPLORATORY FACTOR ANALYSIS

Prior to an exploratory factor analysis, we investigated our data for indicators of potential factor structures. The Kaiser-Meyer-Olkin Measure of Sampling Adequacy of .97 shows that correlations between variables can be explained by other variables. Thus, our 37 item data set has a potential of explaining factors. Bartlett's Test of Sphericity

indicates the existence of correlations between variables as well ($\chi 2$ (666) = 13866.8, $p < .001$). The diagonals of the Pearson correlation matrix, which can be investigated on Appendix II, contain values greater than .5 for any of the variables, supporting the use of all items in the factor analysis. Cronbach's alpha value of .976 indicates a high reliability within the items. Given these overall indicators, the analysis was conducted with all 37 items which were generated by authors.

An EFA emerged four oblimin rotated dimensions within the 37 items. Items on the fourth dimension mostly refer to the understanding between the participants employing 6 items. Third dimension refers to reaching and controlling the shared work elements as objects, tools and data through 6 items. Second dimension emphasizes on user's anticipation of others intentions and actions via 7 items. However, there are 18 items on first dimension, referring several concepts. This makes it difficult to interpret, as we stated above. Furthermore, first factor is explaining the 53.4 percent of variance, while second, third and fourth factors are explaining 3.4 percent, 2.9 percent and 2 percent respectively. Four factors explains 61.6 percent of shared variance cumulatively. Eigenvalue of first factor is 19.74, while others' eigenvalues are 1.25, 1.05 and .76. Item loads on each dimension is given on Table 4.3.

Therefore, we expanded the diversity of dimensions in relation with conceptual content of items loaded on this complex factor, as seen on Table 4.3 at MM (Measurement Model) Latent Variable column. On this measurement model, we administered a PLS based approach to explore reliability and validity. There are seven latent variables within the model which four of them were expanded from the first complex EFA dimension as Usability, Awareness, Communication and 3C Mechanisms based on items' conceptual content and three were explored within the data as other EFA dimensions highly referring to Grounding, Shared Access and Team Integration.

Table 4.3: Dimension loads for EFA Results

MM Latent Variable	Item Code	Item	EFA Dimension Load			
			D1	D2	D3	D4
Usability	EWG07	It is efficient to work together using the system.	.978	-.047	-.074	.017
	3CM04	I enhanced my skills in the ongoing work by using the system.	.678	.041	.130	-.149
	EWG02	The final outcome of the ongoing work is satisfying.	.673	.192	-.022	.075
	3CM05	Using the system enhances our capabilities of dealing with the ongoing work.	.623	.098	.025	.247
	EWG01	It is satisfying to work together in the system.	.613	.008	.005	.250
	EWG05	I can make contributions to the ongoing work to the extent that I projected.	.561	.189	.105	.139
	EWG09	Using the system, participants can reach a consensus on the final outcome.	.462	.424	-.023	.017
	EWG19	Transition from one job to another is smooth.	.411	.395	.144	-.034
3C Capabilites	3CM07	The means provided by the system for communication between participants are adequate for the ongoing work.	.492	.261	.015	.173
	3CM06	The means provided by the system for coordination among participants are adequate for the ongoing work.	.460	.301	.172	-.021
	3CM08	The means provided by the system for cooperation are adequate for the ongoing work.	.456	.181	.122	.161
Awareness	EWG10	During the use of the system, I am aware of other participants.	.827	-.060	.085	-.002
	CUA02	I am aware of the presence of other participants.	.646	-.034	.165	.088

	EWG12	During the use of the system, I am aware of the actions that I can take.	.609	.113	.153	.057
	CUA03	I can see the activities of other participants.	.359	-.218	.258	.294
Communication	EWG14	During the use of the system, communication with other participants is good.	.876	.126	-.068	-.079
	EWG13	Using the system, I can communicate with other participants.	.843	.019	.000	-.016
	EWG16	I can ask and answer questions when necessary.	.756	-.055	.119	-.009
Team Integration	3CM02	Other participants execute the actions that I expect from them.	.033	.737	.082	.037
	EWG04	I am satisfied with the participation of others in the ongoing work.	.205	.654	.059	.006
	CUA05	I can understand the intentions of others as a consequence of their actions.	.107	.599	.183	-.025
	EWG06	The contribution of other participants to the ongoing work is in line with my expectations.	.192	.553	.003	.209
	EWG08	Using the system, participants can reach a consensus on a solution.	.301	.464	-.047	.161
	3CM03	I can trust the competence of other participants while they are contributing to the ongoing work.	-.008	.461	.118	.289
	EWG15	I can take over the floor control to direct the others when necessary.	.106	.405	.318	-.100
Shared Access	CUA10	I can deposit a reserved resource (tools, objects, data) for others to access when needed.	.176	-.158	.657	.083
	CUA09	I can hand off a resource (tools, objects, data) to another participant when needed.	-.040	.118	.650	.147
	CUA04	I can distinguish the objects that have been	-	.288	.619	.059

		manipulated by others.	.105			
	CUA07	I can reserve resources (tools, objects, data) to use them later.	.182	.122	.543	-.195
	CUA08	I can protect my work from undesired changes made by others.	.073	.302	.422	-.281
	CUA06	I can access resources (tools, objects, data) whenever I need them.	.357	-.109	.405	.269
Grounding	EWG18	I can understand what others are talking about.	.174	.270	.137	.470
	EWG17	It is possible to establish a common understanding with other participants.	.163	.297	.144	.425
	3CM01	There is a mutual understanding of the ongoing work among participants.	.083	.396	.106	.405
	EWG03	I am satisfied with my participation in the ongoing work.	.336	.053	.247	.371
	EWG11	While I am using the system, I am aware of the objects of work.	.166	.035	.346	.364
	CUA01	Using the system, I can communicate with other participants explicitly.	.280	.072	.241	.302

4.2 DEVELOPMENT OF MEASUREMENT MODEL

We employed a series of PLS-CFA iteratively, to evaluate the contribution of each item to measurement model dimensions. In each PLS-CFA iteration, composite reliability of retaining items was inspected at first. Next, factors were detected for unidimensionality, by checking each item to be heavily loading on their intended factor, with a load that does not exceed .6. If an item loaded heavily on a factor other than its intended factor, the cross loadings of that item is detected for a second highest load, suggesting to relocate the item to another latent variable. Relative and absolute importances of items were checked regarding to their weights and loadings for formative latent variable structures. Cross-loadings were examined to have a difference of .1 between intended factors and the second highest loading. Item reduction was continued until discriminant validity has been achieved, while unidimensional factors became available for each

latent variable, which consist of manifest variables that have significant weight and loading. Results for each iteration are given as tables for Composite Reliability, Variables Factors Correlation, Weights, Correlations and Discriminant Validity at Appendix III. Iterations are indicated by letters from A to Q.

When the correlations of manifest variables with factors were inspected for unidimesionality, results suggested that item CUA03 and CUA08 loaded heavily to another factor, rather than their primary factors. Other items had a high loading on their intended latent variables, as depicted on Variables/Factors Correlation at Appendix III - A.

CUA03 was intended to be a reflective manifest variable of Awareness while CUA08 was intended to be a formative manifest variable of Shared Access. We decided to relocate CUA03 to another latent variable at first, since Awareness is a reflective measure and it is more critical to achieve unidimensionality of reflective variables at first. Based on the Cross Loadings given at Appendix III - A, the second best latent variable for this item to be loaded was Usability.

However, as seen on Variables/Factors Correlation Appendix III - B, CUA03 did not heavily load on its intended factor when it is allocated as a manifest variable of Usability.

The next possible solution was to load CUA03 on Shared Access, depending on its cross-loadings and conceptual content. When this was done, CUA03 heavily loaded on the intended primary factor of Shared Access, as depicted on Variables/Factors Correlation at Appendix III - C.

We began item reduction through an evaluation of formative variables on the next step, primarily based on their weights.

3CM02 was dropped since its weight is low (see Weights at Appendix III-D).

3CM04 was dropped for the same reason. Besides, it violated unidimensionality, by loading with a value above .6 on a factor different form its intended latent variable, Usability (see Weights and Variables/Factors Correlation at Appendix III - E).

EWG02 was discarded due to its low weight on Usability. (see Weights at Appendix III - F).

As the weights for other items were exceeding .1, we decided to eliminate CUA03 since it does not load heavily load on its intended factor Shared Access (see Variables/Factors Correlation at Appendix III - G). It the next iteration, CUA08 was dropped out for the same reason (see Variables/Factors Correlation at Appendix III - H).

Item EWG15 on Team Integration was eliminated since it violated unidimensionality, by loading with a value above .6 on a factor different form its intended latent variable (see Variables/Factors Correlation at Appendix III - I).

EWG07 was dropped out to enhance discriminant validity of the measurement model, because it has a difference below .1 between intended factors and the second highest loading (see Cross-loadings at Appendix III - J). EWG09 was eliminated for the same reason in the next iteration (see Cross-loadings at Appendix III - K).

CUA07 was excluded from the model to achieve Unidimensionality of Shared Access (see Variables/Factors Correlation at Appendix III - L).

We eliminated EWG11 on the next step, for interpretability reasons. This item did not seem to fit soundly to the concept of Grounding. Item is stated as “While I am using the system, I am aware of the objects of work.”, referring to user’s “having realization, perception, or knowledge of objects and object manipulations”. However we suspected that participants have acquired the term “objects of work” as “objectives of work” referring to goals and aims of the team. Although this item was intended to query the user’s awareness of the tools, data and other shared components to be used within the work process, participants might have taken this as “the common goals to be achieved through the process”. However, there was not a significant difference between the scores of native English speakers (M=5.90, SD=1.15) and non-natives (M=5.75, SD=1.15) due to the results of a student’s t-test comparing two groups; ; t(396)=-1.32, p = <.1. Whereas the initial exploratory factor analysis suggested this item to be primarily loading on D4 with a load of .364, it was also loaded on D3 at .346 (See Table 7). Consequently, we have decided to exclude this item from the measurement model

since the evidence shows that item has a potential to be misunderstood. Another reason that we did not hesitate to eliminate this item was that the item's weight was below the standardized path coefficient .2, recommended by Chin (1998) for formative manifest variables (see Weights at Appendix III - M).

Up to this point, we could not achieve a sound discriminant validity, as it can be followed from related tables on appendices III - A to III-L. As seen on Appendix III - M, there is still a problem on latent variable Team Integration, since its squared correlation with Usability exceeds its average variance explained. Thus, the next item to be removed should be a manifest variable of either Team Integration or Usability. When the cross-loadings of items designated for Team Integration, the highest cross-loaded item to Usability was EWG06, with load of .51. On the other hand, among the items designated for Usability, EWG19 cross-loaded on Team Integration with a load of .55. We decided to eliminate the manifest variable with the highest cross-load. Having a higher cross-load to Team Integration compared to any Team Integration item's cross-load on Usability, EWG19 was dropped off the measurement model (see Cross-loadings at Appendix III - N).

When the retaining items were checked in the next iteration, the reliability and validity criteria were almost met, with two exceptions. As 3CM03 had a lower weight, this manifest variable was excluded to enhance the validity of measurement model (see Weights at Appendix III - O).

Statistically, measurement model and retaining items met all the criteria explained in the measurement model part of the methodology section. When the number of items was reduced, we took the chance of analysing them once again, based on their conceptual content. EWG03 was designated as a manifest variable of Grounding according to factors emerged through an EFA and further quantitative evidence did not disprove its relevancy on this concept. However, when it is evaluated among eith other manifest variables of Grounding, which put an emphasis to common understanding, EWG08 is not conceptually relevant with others, since it expresses one's satisfaction of participation to the ongoing work. According to the results of the initial EFA, the item loaded on D1 at .336 despite its load on D4 at .371 as depicted in Table 7. We decided

that Grounding would be more coherent without EWG03.(Appendix III – O can be viewed for other results)

When the PLS-PM algorithm was iterated for one more time, we detected that CUA01, which was intended to be a part of Grounding loaded on a secondary factor at .62. The keep Grounding unidimensional, CU01 was also exculuded from the scale based on the results given in Appendix III – P. Appendix III - Q shows the results based on retained 22 items. These results are also rementioned as tables in the text to enable readers a more fluent experience.

Table 4.4: Reliability Metrics

Latent variable	Dimensions	Cronbach's alpha	D.G. Rho	Condition number	Critical value	Eigenvalues
Grounding	3	0,862	0,916	3,226	1	2,355
						0,419
						0,226
3C Capabilites	3	0,866	0,918	2,824	1	2,365
						0,338
						0,297
Usability	3	0,858	0,914	2,859	1	2,337
						0,377
						0,286
Teaming	4	0,862	0,906	3,173	1	2,829
						0,501
						0,389
						0,281
Shared Access	3	0,797	0,881	2,479	1	2,135
						0,518
						0,347
Communication	3	0,897	0,936	3,641	1	2,488
						0,324
						0,188
Awareness	3	0,884	0,929	3,584	1	2,438
						0,373
						0,190

Finally, after excluding 15 items, retaining 22 manifest variables formed a thoroughly reliable measurement model consists of 7 latent variables; either the reliability criterion is taken as Cronbach's alpha or Dillon-Goldsteins rho. Table 4.4 demonstrates the reliability metrics, besides the evidence of unidimensionality, as factors have loaded on a single dimension consonantly, with eigenvalue exceeding 1.

Table 4.5: Unidimensionality and reliability of measurement model

	Variables/Factors correlations					Cronbach's alpha	D.G.'s rho
Grounding		F1	F2	F3			
	EWG17	0,912	-0,220	0,347		0,862	0,916
	EWG18	0,903	-0,281	-0,324			
	3CM01	0,841	0,540	-0,028			
Eigenvalues		2,355	0,419	0,226			
3C Mechanisms		F1	F2	F3			
	3CM06	0,884	-0,406	-0,232		0,866	0,918
	3CM07	0,897	-0,009	0,442			
	3CM08	0,883	0,416	-0,217			
Eigenvalues		2,365	0,338	0,297			
Usability		F1	F2	F3			
	EWG01	0,875	-0,415	-0,249		0,858	0,914
	EWG05	0,870	0,452	-0,196			
	3CM05	0,902	-0,034	0,431			
Eigenvalues		2,337	0,377	0,286			
Team Integration		F1	F2	F3	F4		
	CUA05	0,821	-0,404	0,379	-0,136	0,862	0,906
	EWG04	0,866	-0,226	-0,270	0,354		
	EWG06	0,870	0,126	-0,326	-0,346		
	EWG08	0,804	0,520	0,256	0,133		
Eigenvalues		2,829	0,501	0,389	0,281		
Shared Access		F1	F2	F3			
	CUA04	0,842	-0,426	-0,333		0,797	0,881
	CUA06	0,808	0,569	-0,156			
	CUA09	0,880	-0,115	0,461			
Eigenvalues		2,135	0,518	0,347			

Communication		F1	F2	F3			
	EWG13	0,926	-0,215	0,310		0,897	0,936
	EWG14	0,924	-0,235	-0,302			
	EWG16	0,881	0,472	-0,009			
Eigenvalues		2,488	0,324	0,188			
Awareness		F1	F2	F3			
	CUA02	0,913	-0,292	-0,285		0,884	0,929
	EWG10	0,928	-0,181	0,326			
	EWG12	0,862	0,504	-0,048			
Eigenvalues		2,438	0,373	0,190			

On Table 4.5, further evidence is provided for unideminsionality of each latent variable as each items loaded with a high coefficient on only one factor, and factor loads exceeded |.6| only for the first factor of each variable.

The squares of cross-loadings represent the percentage overlap between an item and any construct. The square of cross-loadings on the designated construct is at least 10 percent higher than the next highest squared cross-loading of the same item, providing evidence for discriminant validity. Squared cross-loadings are given on Table 4.6.

Table 4.6: Squared Cross-loading of measurement model items

	Grounding	3C Capabilites	Usability	Team Integration	Shared Access	Communication	Awareness
EWG17	0,830	0,423	0,507	0,422	0,429	0,410	0,410
EWG18	0,818	0,415	0,566	0,435	0,421	0,397	0,446
3CM01	0,707	0,358	0,419	0,448	0,350	0,344	0,342
3CM06	0,390	0,797	0,514	0,508	0,378	0,459	0,490
3CM07	0,432	0,801	0,560	0,499	0,351	0,500	0,415
3CM08	0,380	0,767	0,554	0,423	0,406	0,427	0,444
EWG01	0,402	0,487	0,642	0,354	0,386	0,428	0,437
EWG05	0,539	0,548	0,832	0,525	0,414	0,547	0,668
3CM05	0,511	0,572	0,825	0,510	0,472	0,559	0,579
CUA05	0,343	0,382	0,354	0,627	0,265	0,304	0,332
EWG04	0,396	0,444	0,452	0,753	0,283	0,393	0,414
EWG06	0,432	0,457	0,485	0,748	0,291	0,369	0,339
EWG08	0,390	0,426	0,434	0,692	0,249	0,357	0,338

CUA04	0,306	0,300	0,264	0,295	0,593	0,233	0,270
CUA06	0,425	0,388	0,500	0,274	0,843	0,371	0,430
CUA09	0,316	0,308	0,316	0,267	0,611	0,247	0,265
EWG13	0,418	0,503	0,566	0,422	0,327	0,857	0,574
EWG14	0,438	0,540	0,596	0,485	0,369	0,858	0,578
EWG16	0,359	0,415	0,497	0,354	0,356	0,773	0,494
CUA02	0,383	0,407	0,532	0,362	0,403	0,493	0,820
EWG10	0,373	0,458	0,610	0,406	0,361	0,593	0,852
EWG12	0,481	0,523	0,664	0,458	0,412	0,525	0,764

Weights are given on Table 4.7. When they are inspected for formative latent variables 3C capabilies, Team Integration, Shared Access and Usability, all manifest variables were significant at 95 percent confidence interval, suggesting each variable has a significant importance on its designated latent variable.

Table 4.7: Item Weights for Measurement Model

LV	MV	Outer weight	Bootstrap OW	S.E.	Critical ratio (CR)	LB (95%)	UB (95%)
Grounding	EWG17	0,383	0,383	0,009	42,619	0,366	0,401
	EWG18	0,388	0,388	0,010	38,776	0,369	0,409
	3CM01	0,357	0,356	0,011	33,132	0,335	0,378
3C Capabilites	3CM06	0,401	0,401	0,053	7,601	0,299	0,508
	3CM07	0,373	0,372	0,063	5,963	0,245	0,493
	3CM08	0,352	0,350	0,065	5,443	0,220	0,471
Usability	EWG01	0,187	0,187	0,032	5,919	0,125	0,249
	EWG05	0,495	0,495	0,032	15,241	0,429	0,559
	3CM05	0,439	0,438	0,035	12,671	0,369	0,505
Team Integration	CUA05	0,225	0,227	0,058	3,861	0,116	0,344
	EWG04	0,332	0,330	0,067	4,953	0,201	0,465
	EWG06	0,282	0,280	0,062	4,522	0,155	0,401
	EWG08	0,349	0,347	0,055	6,337	0,237	0,456
Shared Access	CUA04	0,324	0,325	0,061	5,281	0,206	0,446
	CUA06	0,640	0,637	0,062	10,337	0,511	0,751
	CUA09	0,208	0,208	0,068	3,066	0,075	0,341
Communication	EWG13	0,369	0,368	0,009	42,890	0,352	0,386

	EWG14	0,382	0,382	0,009	42,043	0,365	0,401
	EWG16	0,347	0,347	0,011	32,730	0,326	0,368
Awareness	CUA02	0,355	0,355	0,006	54,814	0,343	0,368
	EWG10	0,369	0,368	0,007	55,456	0,356	0,382
	EWG12	0,387	0,387	0,009	41,670	0,370	0,406

Loadings depicted on Table 4.8 suggest a significant absolute importance for formative variables at 95 percent confidence interval. The magnitudes of each item's load on the construct they intend to measure were approximate, providing evidence for convergent validity.

Table 4.8: Item loadings for Measurement Model

LV	MV	Standardized loadings	Loadings	Communalities	Redundancies	Standardized loadings (Bootstrap)	S.E.	Critical ratio (CR)	LB (95 %)	UB (95 %)
Grounding	EWG17	0,911	0,911	0,830	0,582	0,911	0,010	88,767	0,889	0,930
	EWG18	0,904	0,904	0,818	0,573	0,904	0,011	83,441	0,881	0,924
	3CM01	0,841	0,841	0,707	0,496	0,841	0,020	41,759	0,798	0,876
3C Capabilites	3CM06	0,893	0,893	0,797	0,599	0,891	0,020	44,523	0,849	0,928
	3CM07	0,895	0,895	0,801	0,602	0,894	0,020	44,730	0,850	0,930
	3CM08	0,876	0,876	0,767	0,576	0,874	0,025	35,468	0,820	0,917
Usability	EWG01	0,801	0,801	0,642	0,549	0,800	0,027	30,032	0,745	0,849
	EWG05	0,912	0,912	0,832	0,712	0,912	0,014	66,857	0,883	0,936
	3CM05	0,908	0,908	0,825	0,705	0,908	0,013	70,500	0,881	0,931
Team Integration	CUA05	0,792	0,792	0,627	0,438	0,790	0,035	22,475	0,717	0,856
	EWG04	0,868	0,868	0,753	0,525	0,866	0,024	35,686	0,815	0,909
	EWG06	0,865	0,865	0,748	0,522	0,862	0,024	35,340	0,812	0,906

	EWG 08	0,832	0,832	0,692	0,483	0,829	0,028	29,681	0,769	0,880
Shared Access	CUA 04	0,770	0,770	0,593	0,361	0,768	0,040	19,476	0,686	0,842
	CUA 06	0,918	0,918	0,843	0,514	0,915	0,024	38,295	0,862	0,955
	CUA 09	0,782	0,782	0,611	0,372	0,780	0,039	19,878	0,699	0,852
Communication	EWG 13	0,926	0,926	0,857	0,629	0,926	0,011	82,177	0,901	0,946
	EWG 14	0,926	0,926	0,858	0,629	0,926	0,009	102,435	0,907	0,943
	EWG 16	0,879	0,879	0,773	0,567	0,879	0,017	50,597	0,842	0,910
Awareness	CUA 02	0,905	0,905	0,820	0,642	0,905	0,011	81,231	0,882	0,926
	EWG 10	0,923	0,923	0,852	0,668	0,923	0,009	98,635	0,903	0,940
	EWG 12	0,874	0,874	0,764	0,599	0,874	0,014	64,333	0,846	0,899

Following, Table 4.9 provides evidence of discriminant validity through Fornel-Larcker criterion construct (Fornell and Larcker, 1981). Shared variance between all construct pairs is lower than the AVE for each individual construct.

Furthermore, the AVE exceeding .5 for each construct (Fornell and Larcker, 1981) indicate that the constructs are able to explain more than half of the variance of its indicators (Chin, 1998), as an evidence of construct validity.

Table 4.9: Shared variances and AVE on constructs for measurement model

	Grounding	3C Capabilites	Usability	Team Integration	Shared Access	Communication	Awareness
Grounding	1	0,508	0,633	0,553	0,509	0,489	0,509
3C Capabilites	0,508	1	0,687	0,606	0,479	0,586	0,571
Usability	0,633	0,687	1	0,613	0,542	0,667	0,743
Team Integration	0,553	0,606	0,613	1	0,383	0,507	0,504
Shared Access	0,509	0,479	0,542	0,383	1	0,422	0,483
Communication	0,489	0,586	0,667	0,507	0,422	1	0,662
Awareness	0,509	0,571	0,743	0,504	0,483	0,662	1
Mean Communalities (AVE)	0,785	0,788	0,766	0,705	0,682	0,829	0,812

4.3 STRUCTURAL MODEL

In this section, we build and evaluate a structural path model based on partial least squares (PLS-PM) which represent the interaction between the dimensions with regard to theoretical considerations. Following, the indicators of reliability and validty of the model is assessed, besides the hypotheses which are based on theoretical considerations, were tested through the model.

4.3.1 Evidence for Reliability and Construct Validity of the Model

The reliability indicators of latent variables are given at Table 4.10. As previously illustrated on Table 8, both Cronbach's alpha values and Dillon-Goldstein's rho (D.G. rho) values suggest that our model is reliable.

The R^2 values indicate that latent variable's explained variance to its total variance is at a substantial level for latent variables Team Integration, Awareness and Usability according to Chin (1998), while only the Usability latent variable is substantial

according to Hair (2012). However, for a relatively simple model with at most 2 exogenous variables, moderate level R^2 values can be acquired as an evidence for model construct validity. All the R^2 values were above .5 threshold, which is suggested as a moderate level thresohold by Hair (2012). All R^2 values are significant at 95 percent confidence interval.

Table 4.10: Validity indicators for Structural Model

Latent variable	Type	R^2	Adjusted R^2	Mean Communalities (AVE)	Mean Redundancies	D.G. rho
Grounding	Exogenous			0,714		0,909
3C Capabilites	Exogenous			0,788		0,918
Communication	Endogenous	0,647	0,646	0,829	0,537	0,936
Awareness	Endogenous	0,724	0,722	0,812	0,588	0,928
Team Integration	Endogenous	0,682	0,679	0,705	0,481	0,905
Shared Access	Endogenous	0,553	0,549	0,681	0,377	0,864
Usability	Endogenous	0,855	0,853	0,767	0,656	0,908
Mean		0,692		0,753	0,527	

Mean communalities for latent variables exceeding .6 also provides evidence for reliability of the latent variable.

Table 4.11: Squared cross-loadings of items for Structural Model

	Grounding	3C Capabilites	Usability	Team Integration	Shared Access	Communication	Awareness
EWG17	0,828	0,422	0,507	0,422	0,429	0,410	0,410
EWG18	0,818	0,414	0,566	0,435	0,421	0,397	0,446
3CM01	0,708	0,357	0,419	0,448	0,350	0,344	0,342
3CM06	0,390	0,802	0,514	0,509	0,378	0,459	0,490
3CM07	0,432	0,792	0,560	0,499	0,351	0,500	0,415
3CM08	0,380	0,770	0,554	0,423	0,406	0,427	0,444
EWG01	0,402	0,488	0,642	0,354	0,387	0,428	0,437
EWG05	0,540	0,548	0,832	0,525	0,414	0,547	0,668
3CM05	0,511	0,570	0,824	0,509	0,472	0,559	0,579
CUA05	0,344	0,383	0,354	0,627	0,265	0,304	0,332
EWG04	0,396	0,446	0,452	0,753	0,283	0,393	0,414

EWG06	0,432	0,457	0,485	0,748	0,291	0,369	0,339
EWG08	0,390	0,423	0,434	0,691	0,249	0,357	0,338
CUA04	0,306	0,301	0,264	0,295	0,591	0,233	0,270
CUA06	0,425	0,389	0,500	0,274	0,845	0,371	0,430
CUA09	0,317	0,309	0,316	0,267	0,608	0,247	0,265
EWG13	0,418	0,502	0,566	0,422	0,327	0,857	0,574
EWG14	0,438	0,540	0,596	0,485	0,369	0,858	0,578
EWG16	0,359	0,413	0,497	0,354	0,356	0,772	0,494
CUA02	0,383	0,407	0,532	0,362	0,403	0,493	0,820
EWG10	0,373	0,459	0,610	0,406	0,361	0,593	0,852
EWG12	0,481	0,525	0,664	0,458	0,413	0,525	0,764

The squares of cross-loadings seen on Table 4.11 have slightly differentiated from the measurement model which was developed through a PLS-CFA approach. The difference was due to the theory-driven conceptual hypotheses, affected any varibles squared cross-loading value between -.009 to .005. This issue did not afeect the discriminat validity of the model, while squared cross-loadings still have the highest value on the designated constructs, at least with a 10 percent difference from the next highest squared cross-loading of the same item.

Weights have changed slightly on some manifest variables, compared to measurement model. The changes are small, from -.017 to .010, while all the weights are still significant at 95 percent confidence interval. Highest differences compared to measurement model were on manifest variables of 3C Mechanisms, as listed in Table 4.12.

Table 4.12: Weights of items for Strcutural Model

LV	MV	Standardized loadings	Loadings	Communalities	Redundancies	Standardized loadings (Bootstrap)	S.E.	Critical ratio (CR)	LB (95%)	UB (95%)
Grounding	EWG 17	0,910	0,910	0,828		0,910	0,010	86,847	0,888	0,929
	EWG 18	0,905	0,905	0,818		0,905	0,011	85,237	0,882	0,924
	3CM 01	0,841	0,841	0,708		0,842	0,020	42,025	0,799	0,877
3C Capabilites	3CM 06	0,896	0,896	0,802		0,894	0,019	46,131	0,855	0,930
	3CM 07	0,890	0,890	0,792		0,889	0,021	42,884	0,845	0,926
	3CM 08	0,877	0,877	0,770		0,876	0,025	35,397	0,822	0,919
Usability	EWG 01	0,801	0,801	0,642	0,549	0,801	0,027	29,702	0,744	0,851
	EWG 05	0,912	0,912	0,832	0,712	0,912	0,014	65,746	0,884	0,937
	3CM 05	0,908	0,908	0,824	0,705	0,908	0,013	70,364	0,881	0,932
Team Integration	CUA 05	0,792	0,792	0,627	0,433	0,790	0,036	22,302	0,715	0,857
	EWG 04	0,868	0,868	0,753	0,520	0,865	0,024	35,657	0,815	0,910
	EWG 06	0,865	0,865	0,748	0,516	0,862	0,024	35,469	0,811	0,907
	EWG 08	0,831	0,831	0,691	0,477	0,829	0,028	29,679	0,770	0,878
Shared Access	CUA 04	0,769	0,769	0,591	0,327	0,766	0,041	18,759	0,682	0,841
	CUA 06	0,919	0,919	0,845	0,467	0,917	0,025	36,854	0,861	0,959
	CUA 09	0,780	0,780	0,608	0,336	0,777	0,042	18,476	0,692	0,855
Communication	EWG 13	0,926	0,926	0,857	0,543	0,926	0,011	84,273	0,902	0,945

	EWG 14	0,926	0,926	0,858	0,543	0,926	0,009	101,435	0,907	0,943
	EWG 16	0,879	0,879	0,772	0,489	0,879	0,018	50,059	0,842	0,910
Awareness	CUA 02	0,905	0,905	0,820	0,592	0,905	0,011	80,731	0,882	0,926
	EWG 10	0,923	0,923	0,852	0,616	0,923	0,009	99,040	0,903	0,940
	EWG 12	0,874	0,874	0,764	0,552	0,875	0,014	64,072	0,845	0,899

There was a minor change on loadings, from -.005 to .003, compared to measurement model, with the highest differentiation on manifest variables of 3C Mechanisms. For formative variables, loading are still suggesting a significant absolute importance at 95 percent confidence interval (see Table 4.3). The magnitudes of each item's load on the construct they were designated to measure were approximate, providing evidence for convergent validity.

Discriminant validity through Fornel-Larcker criterion (Fornell and Larcker, 1981) is supported, while shared variance between all construct pairs is lower than the AVE for each individual construct (see Table 4.14).

Table 4.13: Loadings of items for Structural Model

LV	MV	Standardized loadings	Loadings	Communalities	Redundancies	Standardized loadings (Bootstrap)	S.E.	Critical ratio (CR)	LB (95 %)	UB (95 %)
Grounding	EWG 17	0,910	0,910	0,828		0,910	0,011	86,108	0,888	0,929
	EWG 18	0,905	0,905	0,818		0,905	0,011	85,143	0,883	0,924
	3CM 01	0,841	0,841	0,708		0,841	0,020	42,373	0,799	0,877
3C Capabilites	3CM 06	0,896	0,896	0,803		0,894	0,019	46,750	0,855	0,930
	3CM 07	0,889	0,889	0,791		0,888	0,020	43,479	0,845	0,924
	3CM 08	0,878	0,878	0,770		0,876	0,024	35,945	0,823	0,920
Usability	EWG	0,801	0,801	0,642	0,549	0,800	0,0	30,06	0,7	0,8

	01						27	5	44	49
	EWG 05	0,913	0,913	0,833	0,712	0,912	0,014	65,275	0,883	0,937
	3CM 05	0,908	0,908	0,824	0,705	0,908	0,013	70,817	0,881	0,932
Team Integration	CUA 05	0,792	0,792	0,628	0,433	0,790	0,035	22,550	0,718	0,854
	EWG 04	0,868	0,868	0,754	0,520	0,866	0,024	35,894	0,814	0,909
	EWG 06	0,865	0,865	0,748	0,516	0,863	0,025	34,460	0,809	0,907
	EWG 08	0,831	0,831	0,691	0,477	0,828	0,028	29,607	0,769	0,878
Shared Access	CUA 04	0,775	0,775	0,600	0,331	0,772	0,040	19,525	0,692	0,846
	CUA 06	0,915	0,915	0,837	0,461	0,913	0,025	36,895	0,858	0,955
	CUA 09	0,783	0,783	0,614	0,338	0,782	0,042	18,647	0,692	0,856
Communication	EWG 13	0,926	0,926	0,858	0,544	0,926	0,011	85,905	0,904	0,946
	EWG 14	0,927	0,927	0,860	0,545	0,927	0,009	106,673	0,909	0,943
	EWG 16	0,877	0,877	0,770	0,488	0,877	0,018	49,929	0,840	0,909
Awareness	CUA 02	0,905	0,905	0,819	0,520	0,905	0,011	80,126	0,881	0,926
	EWG 10	0,922	0,922	0,850	0,540	0,922	0,010	96,512	0,901	0,939
	EWG 12	0,876	0,876	0,767	0,487	0,876	0,013	65,425	0,848	0,900

As an evidence of construct validity, the AVE is exceeding .5 for a each construct (Fornell and Larcker, 1981; Chin, 1998). There is small difference or no difference when the AVE values seen on Table 4.14 are compared to AVE at measurement model. The difference is -.001 to .001 if there is any. Mean communalities are only different for Communication, where it .001 less than measurement model value.

Table 4.14: Shared variances and AVE on constructs for strcutural model

	Grounding	3C Capabilites	Communication	Awareness	Team Integration	Shared Access	Usability	Mean Communalities (AVE)
Grounding	1	0,507	0,489	0,509	0,553	0,509	0,633	0,785
3C Capabilites	0,507	1	0,585	0,572	0,606	0,479	0,686	0,788
Communication	0,489	0,585	1	0,662	0,507	0,422	0,667	0,829
Awareness	0,509	0,572	0,662	1	0,504	0,484	0,743	0,812
Team Integration	0,553	0,606	0,507	0,504	1	0,382	0,613	0,705
Shared Access	0,509	0,479	0,422	0,484	0,382	1	0,542	0,682
Usability	0,633	0,686	0,667	0,743	0,613	0,542	1	0,766
Mean Communalities (AVE)	0,785	0,788	0,829	0,812	0,705	0,682	0,766	0

4.3.2 Hypotheses' testing

Assessing the path coefficients' significance through 5000 bootstrapping samples with 398 cases, we detected that our data does not provide empirical evidence for some of our hypothesis. Although the reliability and validity indicators of the model were acceptable, some of the hypothesis did not provide significant or remarkable path coefficients.

Given at Table 4.15, we defined the supported and unsupported hypothesis according to severall criteria. First criterion was the significance of path coefficients, according to t value. The effect size is determined by the magnitude of f^2 value. According to Chin (1998), the standardized path coefficients exceeding .100 were considered as the hypotheses were supported by the model. On the other hand, according to the Hair's (2011) criterion, the hypothesis is not supported unless standardized path coefficient exceeds .200.

Table 4.15: Hypotheses Tests Results

Hypothesis	Path	Path Coefficient	Std. error	t	f^2	Standardized Path	Std. Error	(Critical ratio (CR	(Lower bound (95%	(Upper bound (95%	Significance (% CI)	Effect Size	Support Criterion
H3 b	Grounding -> Communication	.313	.043	7,220	.132	.310	.048	6,460	.214	.404	99	small	Hair's
H3 a	3C Capabilites -> Communication	.542	.043	12,486	.395	.546	.041	13,140	.464	.625	99	large	Hair's
H5 b	Grounding -> Awareness	.200	.040	4,982	.063	.200	.053	3,777	.094	.303	99	small	Hair's
H5 a	3C Capabilites -> Awareness	.238	.045	5,339	.072	.238	.059	4,038	.122	.356	99	small	Hair's
H5 c	Communication -> Awareness	.491	.044	11,212	.319	.492	.054	9,112	.384	.599	99	medium	Hair's
H2 b	Grounding -> Team Integration	.317	.044	7,230	.133	.317	.049	6,487	.222	.411	99	small	Hair's
H2 a	3C Capabilites -> Team Integration	.397	.049	8,119	.168	.400	.062	6,444	.280	.522	99	medium	Hair's
H2 d	Communication -> Team Integration	.109	.053	2,054	.011	.112	.062	1,773	-.006	.237	95	-	Chin's
H2 c	Awareness -> Team Integration	.095	.053	1,773	.008	.091	.060	1,585	-.026	.205	90	-	-
H4 a	3C Capabilites -> Shared Access	.319	.063	5,066	.065	.319	.069	4,603	.183	.453	99	small	Hair's
H4 c	Communication -> Shared Access	.078	.064	1,222	.004	.079	.082	.946	-.080	.242	-	-	-
H4	Awareness -	.33	.06	5,34	.07	.33	.07	4,50	.18	.47	99	small	Hair'

b	> Shared Access	7	3	8	3	5	5	9	3	7			s
H2e	Team Integration -> Shared Access	.075	.057	1,319	.004	.079	.059	1,271	-.035	.199	-	-	-
H1b	Grounding -> Usability	.181	.034	5,330	.073	.182	.044	4,162	.097	.270	99	small	Chin's
H1a	3C Capabilites -> Usability	.206	.037	5,564	.079	.207	.043	4,755	.123	.292	99	small	Hair's
H1f	Communication -> Usability	.126	.037	3,432	.030	.128	.045	2,782	.040	.218	99	small	Chin's
H1g	Awareness -> Usability	.347	.037	9,252	.219	.343	.048	7,214	.249	.435	99	medium	Hair's
H1d	Team Integration -> Usability	.105	.035	3,019	.023	.105	.042	2,495	.024	.188	99	small	Chin's
H1c	Shared Access -> Usability	.077	.031	2,504	.016	.077	.033	2,301	.011	.142	95	-	-

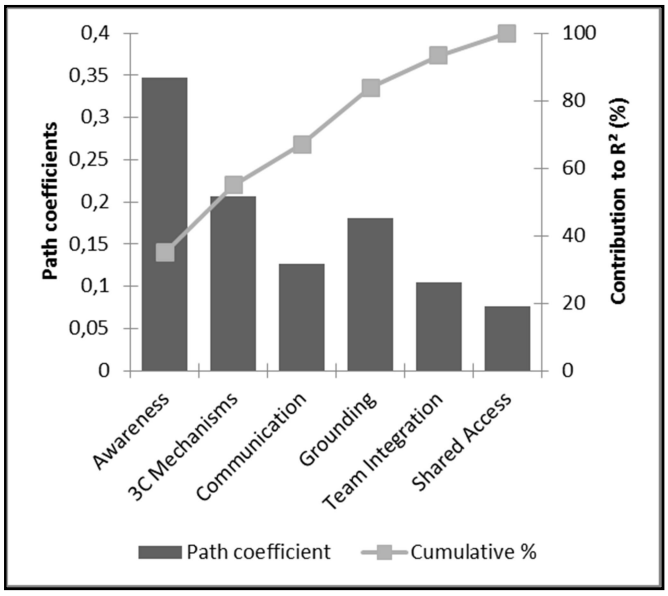
4.3.3 Interactions between latent variables

Our results on the final model are capable of explaining the effect of other latent variables on Usability as follows, suggesting evidence for Awareness to have a higher impact on Usability compared to other latent variables. The equation for Usability is:

$$Usability = .181 * Grounding + .206 * 3C\ Mechanisms + .126 * Communication + .347 * Awareness + .105 * Teaming + .077 * Shared\ Access \quad \textbf{(4.1)}$$

Figure 4.1 illustrates the impact and contribution of other latent variables on Usability.

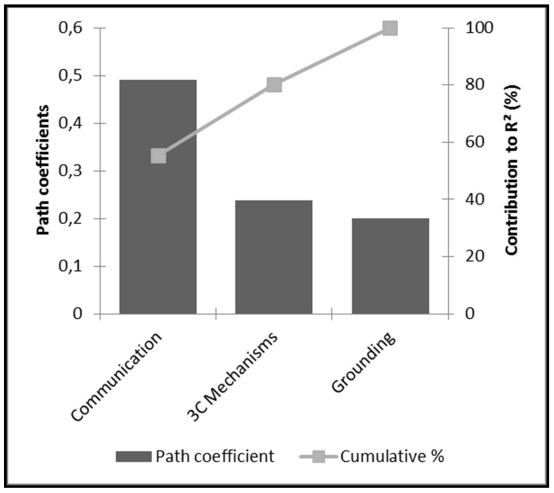
Figure 4.1: Impact and contribution of the variables to Usability



Awareness is highly affected by Communication compared to other latent variables (see Figure 4.2 for a visual representation):

$$Awareness = .2 * Grounding + .238 * 3C\ Mechanisms \quad .49 * Communicatio \quad \textbf{(4.2)}$$

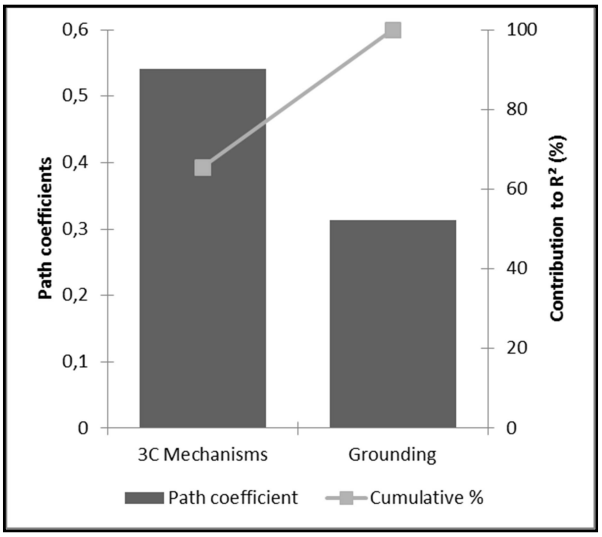
Figure 4.2: Impact and contribution of the variables to Awareness



Communication can be explained through 3C Mechanisms of the system and Grounding according to following equation visualized in Figure 4.3:

$$Communication = .313 * Grounding \quad .542 * 3C\ Mechanims \quad \textbf{(4.3)}$$

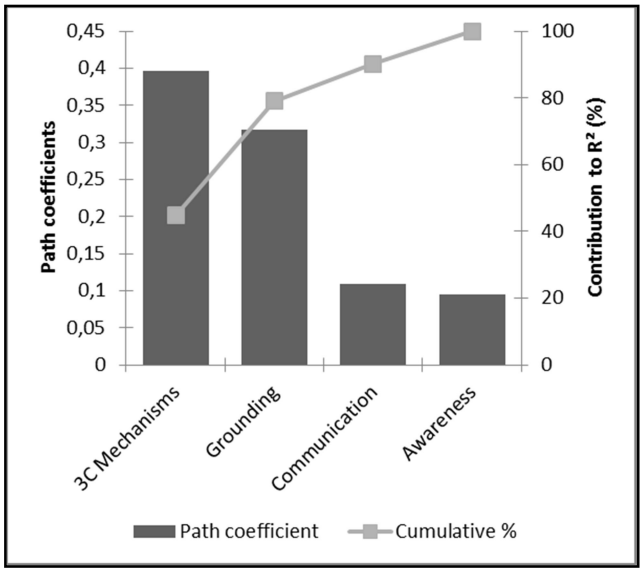
Figure 4.3: Impact and contribution of the variables to Communication



The path coefficients for Team Integration are providing evidence that it is affected 3C Mechanisms strongly, but also Grounding has an important role in Team Integration (see Figure 4.4).

$$Team\ Integration\ = .317 * Grounding + .397 * 3C\ Mechanisms\quad .109 * Communication + .095 * Awareness \qquad \textbf{(4.4)}$$

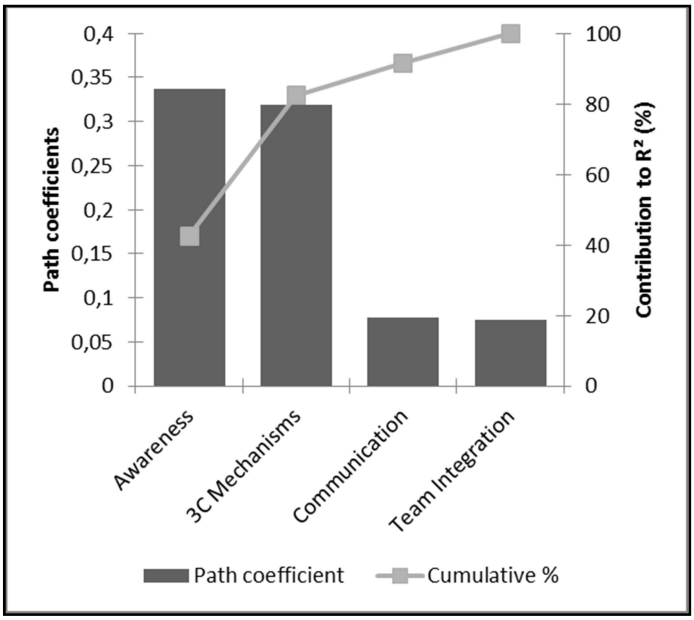
Figure 4.4: Impact and contribution of the variables to Team Integration



Both 3C Capabilites of the system and Awareness have a positive impact on Shared Access, as seen on Figure 4.5.

$Sha \quad Access = .319 * 3C\ Mechanisms \quad .078 * Communication \quad .337 * Awareness \quad .075 * Team\ Integration$ **(4.5)**

Figure 4.5: Impact and contribution of the variables to Shared Access



4.4 EVIDENCE OF SENSITIVITY

Employing a multivariate analysis of variance, we tested the sensitivity of the latent variables for the evaluated software; the participants' level of experience with the software; and the differences between participants' age, gender, and English as participant's native language.

Participant's gender (F (7,234) = .97 , p > .05; Wilk's Λ = .972, partial η2 = .028) and being a native English speaker (F (7,234) =.658 , p > .05; Wilk's Λ = .981, partial η2 = .019) did not reveal a significant effect on the latent variables. Gronding, 3C Mechanisms, Team Integration, Communication, Shared Access, Awareness and Group Usabilitiy were not sensitive to these differences between the participants.

There was a significant effect of level of experience with the software (F (35,986.8) =1.504 , p < .05; Wilk's Λ = .804, partial η2 = .043) on latent variables. The observed effect was not significant on latent variables, since the effect size was small. Post hoc comparisons w,th Bonferroni correction indicated that mean score of participants who experienced software more than 20 times are significantly higher than those who used the up to 10 times for all latent variables that is significantly affected by user's level of

experience with the software. Mean scores and standard deviations for each latent variable according to users' level of experience are given on Table 4.16.

Table 4.16: Mean scores and standard deviations for each latent variable according to users' level of experience

		Grounding	3C Mechanisms	Usability	Team Integration	Awareness	Shared Access	Communication
Tried it once	M	5,35	5,16	5,39	5,01	5,43	5,16	5,51
	SD	1,13	,97	,89	,99	,87	1,08	1,16
1-4 times	M	5,32	5,23	5,44	5,16	5,65	5,25	5,46
	SD	1,00	1,04	1,11	1,04	1,06	1,12	1,17
5-10 times	M	5,48	5,31	5,50	5,22	5,62	5,32	5,48
	SD	,94	1,06	,99	,98	,87	1,04	1,14
11-15 times	M	5,73	5,46	6,00	5,25	5,98	5,57	6,14
	SD	,82	,96	,66	,85	,96	1,16	,89
16-20 times	M	5,61	5,58	5,52	5,57	5,79	5,52	5,70
	SD	,99	1,21	1,26	,87	1,17	1,04	1,14
> 20 times	M	6,09	6,00	6,34	5,75	6,34	6,11	6,27
	SD	,86	,92	,78	,89	,79	,95	,86

We observed a significant effect of age group ($F(42,1101) = 1.878$, $p = .05$; Wilk's $\Lambda = .723$, partial $\eta 2 = .053$) on latent variables. Effect was significant only on Shared Access ($F(6, 240) = 1.913$, $p < .05$). Post hoc test revealed that the effect was due to the mean difference between participants over 50 years old (M=6, SD=1.08) and participants aged 18-25 (M=5.35, SD=1.32). Elder participants provided higher mean scores.

We detected significant effect of the different evaluated software on respondent's' score for latent variables, $F(28,845.1) = 2.53$, $p < .05$; Wilk's $\Lambda = .746$, partial $\eta 2 = .071$. The observed effect was statistically significant on Grounding ($F(4, 240) = 2.08$, $p < .05$),

Team Integration ($F(4, 240) = 1.95$, $p < .05$), Shared Access ($F(4, 240) = 1.5$, $p < .05$) and Communication ($F(4, 240) = 2.12$, $p < .05$).

Table 4.17: Mean scores and standard deviations for each latent variable according to evaluated software

		3C Mechanisms	Group Usability	Team Integration	Awareness	Shared Access	Communication
Software #1	M	5,97	6,30	5,72	6,31	6,08	6,26
	SD	.89	.76	.87	.80	.92	.82
Software #2	M	5,51	5,70	5,40	5,81	5,40	5,77
	SD	1,08	1,03	1,16	1,07	1,26	1,17
Software #3	M	5,27	5,53	5,17	5,58	5,40	5,32
	SD	1,03	.96	.98	.90	1,07	1,19
Software #4	M	5,17	5,44	5,00	5,57	5,25	5,71
	SD	1,26	1,28	.96	1,07	1,32	1,26
Software #5	M	5,11	5,39	5,26	5,69	5,22	5,39
	SD	1,26	1,21	1,06	1,00	1,04	1,23

Bonferroni-corrected multiple comparisons show that except Team Integration, the users of the wordprocessor software #1 provided significantly higher mean scores compared to other software's users for all latent variables. For Team Integration, software #1 users mean scores were significantly higher than software #3 and #4 users, but not the software #2 and #5 users. Mean scores and standard deviations are depicted on Table 4.17.

5. DISCUSSION

The reliability score of measurement model's latent variables indicate that there is a consistency of measurement between the manifest variables of each latent variable. The Cronbach's alpha value for each latent variable highly exceeds the threshold of .6 suggested by Chin (1998). As the Cronbach's alpha value is based on the observed correlations of manifest variables in the dataset, magnitude of these values portray a high correlation between the items, although Cronbach's alpha indicator is based on the assumption that each manifest variable is equally important in defining the latent variable. The other indicator of reliability for PLS-SEM based models, Dillon Goldstein's rho, does not make such an assumption since it is based on the loadings rather than the correlations. A block is considered homogenous if this index is larger than.7, a threshold that our results had highly exceeded. The high reliability indicator values were not surprising, while the previous literature of usability scales reported similar values (see Table ÖÖ in 2.5 Current standardized usability scales and their development). As the conceptual content of items in usability scales id framed to users' reflection on their experience with computer systems, high reliability is not an unexpected issue.

In the formative latent variables, each manifest variable or each sub-block of manifest variables represents a different dimension of the underlying concept (Vinzi et al, 2010) and do not assume neither homogeneity nor unidimensionality of the block. The latent variable is defined as a linear combination of the corresponding manifest variables. Thus, manifest variables of formative latent variables do not need to covary, as changes in one indicator do not imply changes in the others. However, providing have high Cronbach's alpha and Dillon Goldstein's rho indicators, our formative latent variables, 3C Mechanisms, Team Integration, Shared Access and Usability are appearing to have covariance within their manifest variables.

As one may become suspicious that these variables consist of reflective items rather than formative, through an inspection of conceptual content for each manifest variable, we are sure that they indicate a different dimension of underlying concept. For 3C Mechanisms, these dimensions are means provided by the system for i) coordination ii)

communication and iii) cooperation. Manifest variables of Team Integration emphasize on other participants i) intentions, ii) participation iii) contribution and iv) consensus among participants. Shared Access is based on the dimensions of i) distinguishing manipulated objects ii) accessing resources and iii) exchanging resources. Usability postulates three different dimensions: i) satisfaction from working together ii) effectiveness in terms of reaching goals in contributing the work iii) efficiency, as an improvement in team members' capabilities.

The variables/factor correlations given on Table 8 provides strong evidence that our Shared Workspace Usability Scale is capable of measuring what it claims to measure, i.e. the construct validity of the scale (Nunnally and Bernstein, 1994) referred also as unidimensionality in PLS-SEM studies (Straub et al. 2004; Lewis et al. 2005). Even some reflective items load on the factors other than their designated latent variables at a moderate level; we do not consider it as a problem since the variable loads on designated variables are quite high. In addition, the AVE exceeding .5 for a each construct (Fornell and Larcker, 1981) indicate that the constructs are able to explain more than half of the variance of their indicators (Chin, 1998).
The lowest mean communality observed is .68 for Shared Access. AVEs of other latent variables explain between 70 percent to 80 percent of the variance of their indicators, providing further evidence on construct validity of SWUS. As items weighted significantly on their designated latent variables, we can also say that SWUS measures what it claims to measure, in corcondance with Nunnaly and Berstein's (1975) definition of validity.

The cross-loadings of items are high on their designated latent variables and shared variance between all construct pairs is lower than the AVE for each individual construct are addressing the measurement model's discriminant validity. Manifest variables are capable of measuring their designated latent variables at a greater degree rather than interacting with other latent variables.

Items that were constructed on the suggested measures in the groupware and CSCW literature convey the conceptual context of latent variables.

The final itemset of Grounding contains 3 manifest variables. Two of them were based on measures suggested in the EWG Framework (Cugini et al., 1997; Damianos et al., 1999), while one was based on Convertino et al.'s (2011) conceptualization of common ground as a facet of activitiy awareness.

Convertino et al. (2011) point out to the "mutual understanding of the content and process" that participants "all know that they have this mutual understanding". The item was stated as "3CM01 -There is a mutual understanding of the ongoing work among participants." The phrase articulated as "mutual understanding of ongoing work" reflects "mutual understanding of the content and process" and the phrase "among the participants" was regarding to participants's knowledge of mutual understanding. Like other scales, SWUS is only capable of assessing a subjective notion. Thus, querying the participants clearly on others's knowledge of mutual understanding was not possible. On the other hand, the effort of others is required to establish a common understanding as the item "EWG17 - It is possible to establish a common understanding with other participants." implies. The item was established sinceit is suggested to ask questions about "reaching common understanding with other participants" (Damianos et al., 1999) within the EWG framework. The item "EWG18 - I can understand what others are talking about." was intended to reflect on Grounding too, as Cugini et al. (1997) suggests "understanding other's" as a measure of Grounding. When we analysed these retaining items of Grounding, it is possible to claim them "Grounding" is mainly conceptualized as "understanding" through the viewpoint of shared workspace groupware users. Howbeit, the elimination of two of the 6 initial items of Grounding was based on our decision depending on the interpretability. And the third item was eliminated due to unidimensionality. Even though, it should be considered the initial items were constructed together through an EFA based on their covariances, rather than researcher's conceptualization.

Grounding was allocated as an exogenous variable to elucidate the characteristic of human factor relevant to teamwork. It is deemed that Grounding depends on the participants' background and is is not altered during the process of working together.

The other exogenous variable of the model is taken as the capabilities of the system relevant to group work. Thus, these capabilities are also static during the work process. We derived the indicators build upon the 3C model (Ellis, 1991), as 3C's were "often

been used in the literature to classify collaborative tools" (Steinmacher et al., 2010). From this point of view, to the extent that a system provides means for communication, cooperation and coordination, it can be used to work in collaboration.

Team Integration is another latent variable that had emerged through the initial EFA. 3 of the 4 retaining items are grounded from the measures suggested in EWG. Item "EWG06 - The contribution of other participants to the ongoing work is in line with my expectations." refers to phrase "satisfaction from group process". Besides, this item relates with "Aggregation of individual contributions into collective achievement" (Carrol et al., 2006). "EWG06 - I am satisfied with the participation of others in the ongoing work." relates to phrase "satisfaction from other's participation". While these are suggested were measures of participation, item "EWG08 - Using the system, participants can reach a consensus on a solution." refers to "consensus on the solution", which is a separate dimension that is offered in EWG framework (Cugini et al., 1997; Damianos et al., 1999) and also a suggested measure of "consensual behaviour" by Carrol et al. (2006), depending on his definition of "community of practices" refers to "integration of team members' behaviour or decisions into best practices or patterns.". Item "CUA05 - I can understand the intentions of others as a consequence of their actions." based on their "Information gathering activities" dimesion, which provides awareness other participant's actions through the work environment (Gutwin and Greenberg, 1999; Gutwin & Greenberg, 2000; Pinelle et al., 2003). While each item was intended to measure a different concept; our suggestion is, they can be considered as dimensions of work-coupling as a whole. Work-coupling defines the intensity or demand of the work for information sharing or level of communication required (Neale et al., 2004). This means that there is an "integration of team members" when people come together "cooperate" to achieve the same goal in a shared workspace, referring to cooperation dimension of 3C Model (Fuks, 1991; Ellis, 2005). We decided to use the name "Team Integration" as it covers the majority of ideas explained above. We decided to develop it as a formative variable since it is resembled conceptually different dimensions.

Items constructing Shared Access were completely based on "management of shared access" and "transfer" dimensions in CUA Framework (Gutwin and Greenberg, 1999;

Gutwin & Greenberg, 2000; Pinelle et al., 2003). Although the framework was mainly suggested for same time/same place type of groupware, we considered that this dimension is applicable to shared workspace groupware as they allow working simultaneously. As users act all users act on the same workspace using a highly similar interface, shared workspace groupware also provide a high sense of being in the same place. As those items had been evaluated as formative components of Shared Access latent variable through responcences of users, the difference between "hand off" and "deposit" type of transfer was not distinguished by the participants. A direct exchange of a resource between two participants is called "hand-off". "Deposit" is "an asynchronous type of transfer where one person leaves an object, file, or tool in a particular place for another person to retrieve later. The item " CUA09 - I can hand off a resource (tools, objects, data) to another participant when needed." was retained as an indicator of "transfer" dimension in CUA Framework. Item "CUA06 - I can access resources (tools, objects, data) whenever I need them." Clearly represents "obtaining a resource". Although the item "CUA 04 - I can distinguish the objects that have been manipulated by others." resembles to "Activity Information from Objects (Feedthrough)", and this information leads to "management of shared access". However, items intended to query "protection" and "reserving a resource" were not retained. CUA10 was excluded due its low weight on its designated latent variable, while CUA07 and CUA08 were dropped based on unidimensionality. These to items were referring to "protection" related issues, which related mechanisms were not implemented in any of the evaluated software. Although we decided to drop these items, we are concerned that if protection shall be investigated as a separate dimension. In shared workspace groupwares, there are not obvious constraining mechanisms to support coordination but users need to avoid collisions and interference when they are acting on the shared resources, by being aware of the workspace and other participants.

Communication is represented for its availability and quality, through items based on the definitions regarding to EWG Framework framework (Cugini et al., 1997; Damianos et al., 1999). Items also refer to the communication dimension in 3C Model (Fuks, 1991; Ellis, 2005). Item "EWG16 - I can ask and answer questions when necessary." associates with "information sharing" suggested by Neale et al.(2004) and

“spoken communication” in CUA Framework (Gutwin and Greenberg, 1999; Gutwin & Greenberg, 2000; Pinelle et al., 2003).

All the models and frameworks addressed in our study appoint awareness as an essential concept for evaluation of team work. Indicators of Awareness were designated to represent an “element that intermediates each of the 3Cs, offering feedback to users actions and giving them information about other participants of a collaborative work (Steinmacher et al., 2010)”, emphasizing on participants, actions and objects, but final measurement model fell short to include the awareness of objects. Our model seems to include only the communication from the 3C model, but as we suggested above, Shared Access is associated with coordination and Team Integration is associated with cooperation. Accordingly, our model examines the interplay between these three constructs and Awareness. Our results provide evidence for a strong effect of Communication on Awareness. On the contrary, the effect of Awareness and Communication on Team Integration was not supported. Although the effects of Team Integration and Communication on Shared Access were not supported by the model, there is strong evidence that Awareness positively affects Shared Access.
It is not possible to claim that our model highly matches to 3C Model. But our results adduce empirical proof that Awareness is a dominant and nuclear construct in CSCW. On the other hand, our model also involves 3C components as collaborative mechanisms provided by the software, i.e. 3C Mechanisms; besides using them as classification of user experiences during the collaborative work: Communication, Team Integration and Shared Access. When 3C Model components are considered as collaboration mechanisms as they are addressed as “requirements of the group with respect to the tasks being performed by the group and the support necessitated by the characteristics of the group” the requirement level (Damianos et al. 1999), the 3C Mechanisms construct declare a significant effect significant effect on all other constructs.

Usability of groupware systems is indicated by three variables in our model; each of them associating with the ISO 9241-11 definition of usability. As the standard defines, usability is “Extent to which a product can be used by specified users to achieve specified goals with effectiveness, efficiency and satisfaction in a specified context of

use." The specified context of use for groupware is working together, as the specified users are people trying to integrate as a team to achieve a common goal. Satisfaction is framed as "Freedom from discomfort, and positive attitudes towards the use of the product." as the item "EWG01 - It is satisfying to work together in the system." refers it within a group work context. Effectiveness is described as "Accuracy and completeness with which users achieve specified goals." Efficiency is defined as "Resources expended in relation to the accuracy and completeness with which users achieve goals.", where the item "3CM05 - Using the system enhances our capabilities of dealing with the ongoing work." Refers to an enhancement in teams' capability of deling with work. As the team's capability increase, they become more efficient.
Effectiveness is the "accuracy and completeness with which users achieve specified goals." Item "EWG05 - I can make contributions to the ongoing work to the extent that I projected." approaches the effectiveness as one's accuracy and completeness to reach the pre-defined amount of contribution to the work. The Groupware Usability construct indicated through these items was significantly affected by all other latent variables, except Shared Access. Our study fell short to explain the reasons of this result. Nevertheless, results provide significant evidence that Awareness has a relatively higher effect on Group Usability, compared to other latent variables. It should be noted that Awareness also has the largest effect size on Shared Access.

SWUS measurement model provides an answer to the question "To what extent does the measure pick up on differences in usability between systems?" (Cairns, 2013). Effect of using different systems was significant on users's experience based on Grounding, Shared Access, Team Integration and Communication. On the other hand, we could not detect a significant effect of software on 3C Mechanisms, Awareness and Group Usability, based on the respondents mean scores on these latent variables. Resembling the previous studies on other usability scales (Borsci et al., 2015; Berkman & Karahoca, 2016), SWUS components are sensitive to users level of experience with the software. Being insensitive to native language of respondents, SWUS can be employed to assess collaboration experiences of international teams through shared workspace groupware. On the other hand, based on SWUS' sensitivity to age groups, we suggest that it should be used with teams compeering in terms of age.

6. CONCLUSION

This study indicated that a reduced set of variables can be used to assess the usability of shared workspace groupware. Sharing a common variance, these variables referred to 7 latent constructs: 3C Mechanisms of the evaluated software, Grounding among the team members, Team Integration to work as a group, Communication between participants, Shared Access to work objects and system resources, Awareness of others, and Usability of the system in terms of satisfaction, effectiveness and efficiency of the proces. These constructs are different from usability measures offered for usability evaluation in the single user paradigm, but we do not suggest that this scale should replace existing usability scales when evaluating shared workspace groupware. Usability questionnaires that evaluate software from a single user's perspective are still applicable to shared workspace groupware to assess usability with a role-based approach.

Our study offers a summative measurement instrument to assess the usability of the shared workspace groupware applications with regards to the software's usability in supporting teamwork, in accordance with the rule-based evaluation approach. Results provide evidence that our model is capable of explaining the usability in teamwork.

Further research on the subjective evaluation of quality of use in shared workspace groupware has the potential of providing stronger evidence for a revision of our measurement and structural model through data-driven arguments. On the other hand, a data set from users of another groupware applicationis essential for a confirmatory factor analysis to obtain more evidence for the reliability, validity and sensitivity of the questionnaire.

The study provides evidence for criterion validity based on UMUX, but further research is required for the assessment of other criteria, especially for the objective measures of usability, so that the psychometric evaluation of the questionnaire can be considered complete. Through a controlled experiment that provides data on objective variables of teamwork, such as number of words communicated per task, number of collisions or

number inter-corrections across the users' contributions, our measurement model can be evaluated for its criterion validity.

Further comparative research could also provide more evidence for the sensitivity of the questionnaire by investigating its ability to distinguish the quality of use in groupware applications. The questionnaire should also be evaluated for its sensitivity to differences in field research and scenario-based usability evaluation studies. As our dataset only consisted of volunteering participants who were mostly experienced users of the software they evaluated, our manifest variables were skewed through a positive bias. With normally distributed data, our model can be confiemed via covariance based structural equation modelling methods

Through this study, we also illustrated a detailed methodology for using the PLS-SEM method for scale development purposes. Although there are many studies that employs PLS-SEM for developing models, the studies that uses PLS-SEM approach for item reduction are rare in the current literature.

We believe that our scale for the rule-based evaluation of usability would be a valuable component of a standardized toolkit for the evaluation of subjective user experience. This study contributes to the field of CSCW by offering an item set for a shared workspace groupware usability scale. Our structural model attempts to integrate several frameworks and models of Usability for CSCW environments and provides an empirical evidence for its reliability, validity based on subjective responses from users of shared workspace groupwares.

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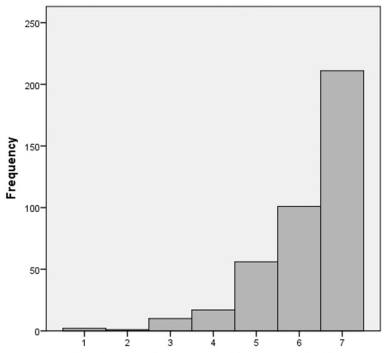
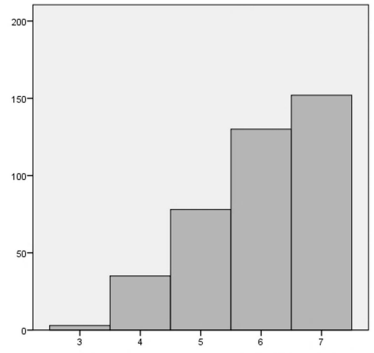
APPENDICES

APPENDIX I: DISTRIBUTION OF PARTICIPANT RESPONSES ON EACH VARIABLE

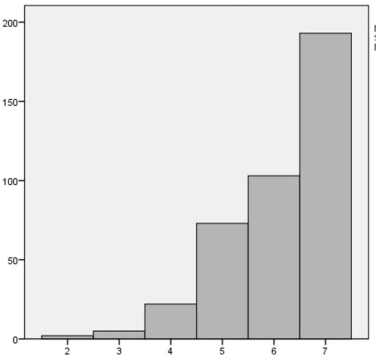
Histogram 1 EWG01



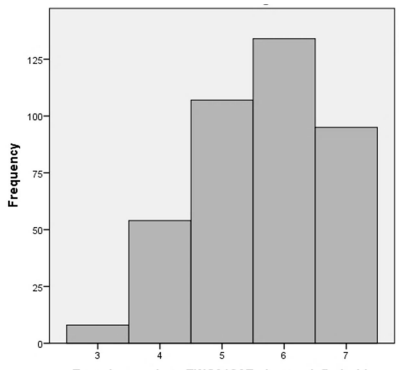
Histogram 2 EWG02



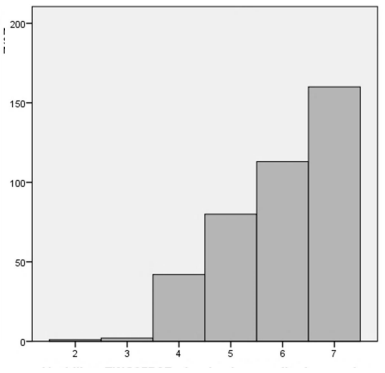
Histogram 3 EWG03



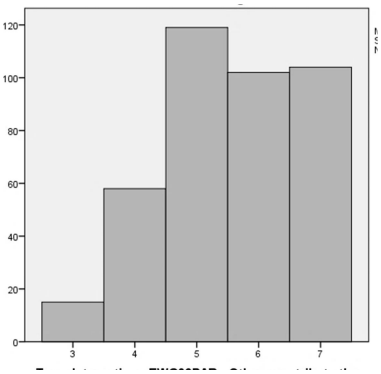
Histogram 4 EWG04



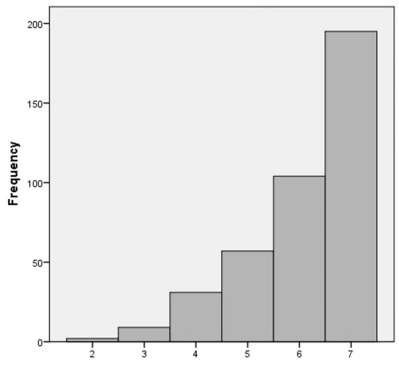
Histogram 5 EWG05



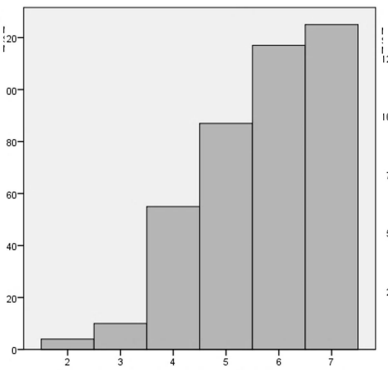
Histogram 6 EWG06



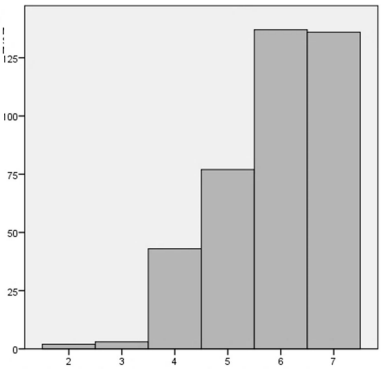
Histogram 7 EWG07



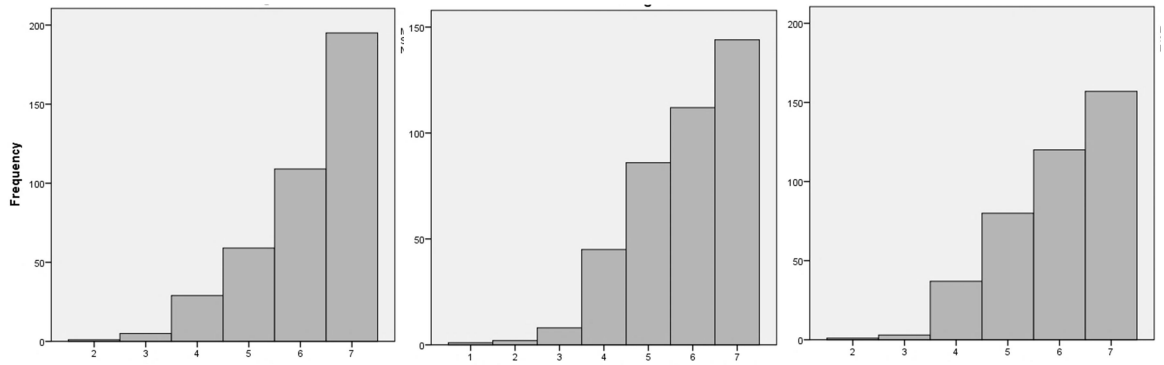
Histogram 8 EWG08



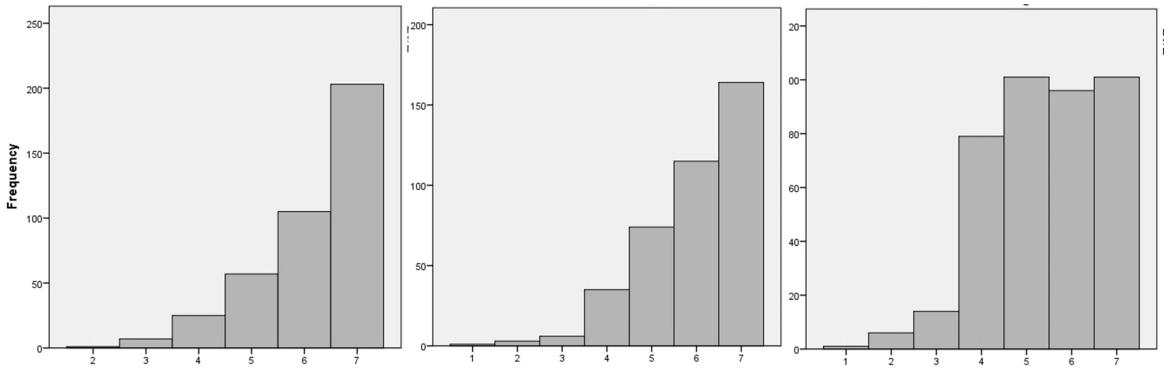
Histogram 9 EWG09



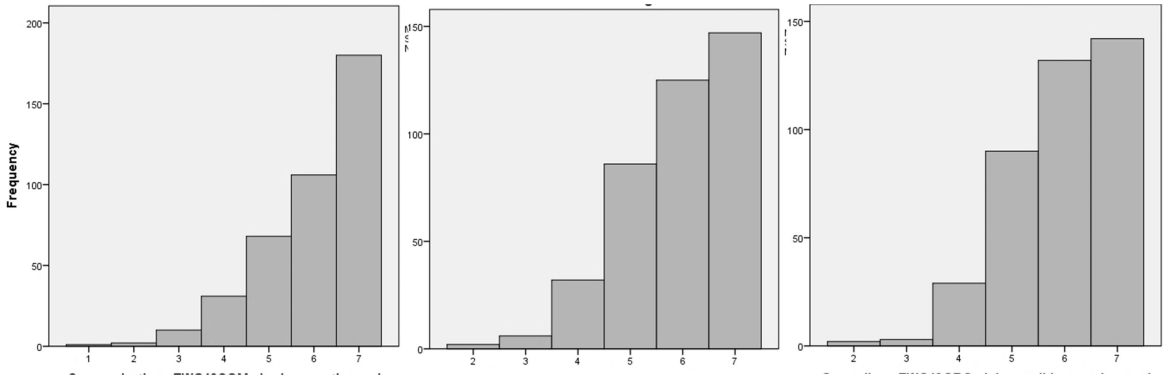
Histogram 10 EWG01 **Histogram 11 EWG11** **Histogram 12 EWG12**



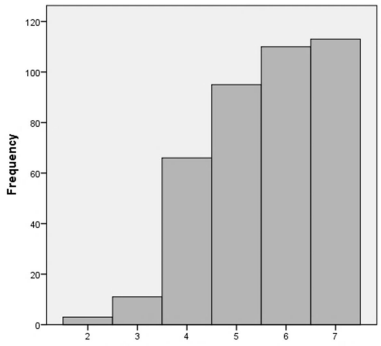
Histogram 13 EWG13 **Histogram 14 EWG14** **Histogram 15 EWG15**



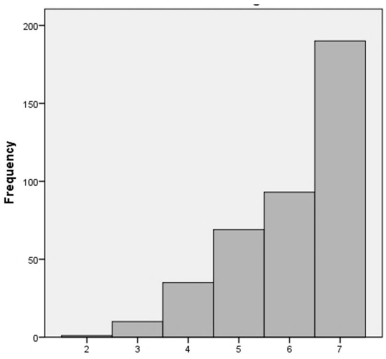
Histogram 16 EWG16 **Histogram 17 EWG17** **Histogram 18 EWG18**



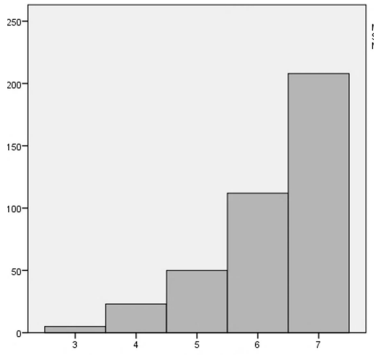
Histogram 19 EWG19



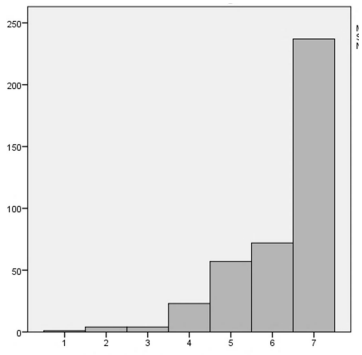
Histogram 20 CUA01



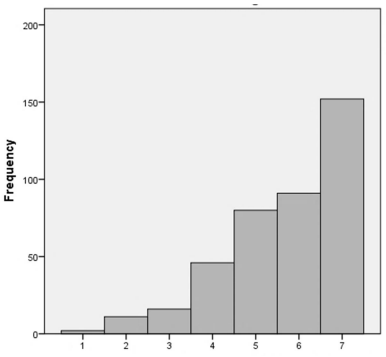
Histogram 21 CUA02



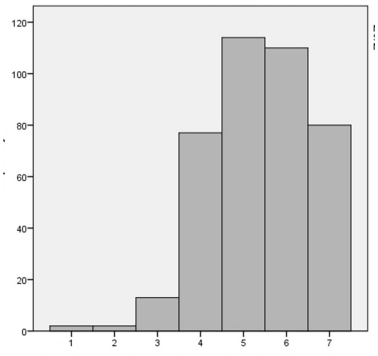
Histogram 22 CUA03



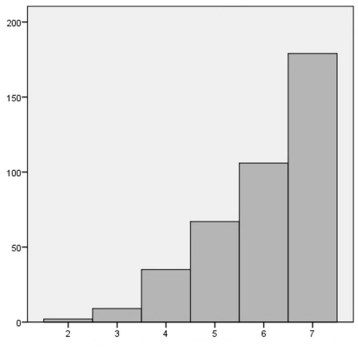
Histogram 23 CUA04



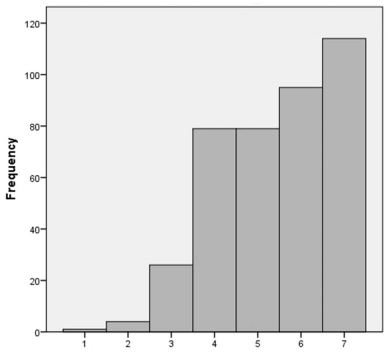
Histogram 24 CUA05



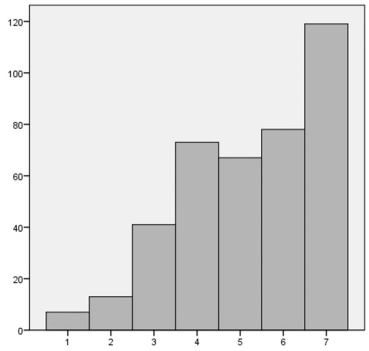
Histogram 25 CUA06



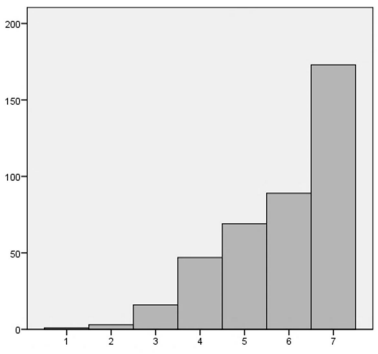
Histogram 26 CUA07



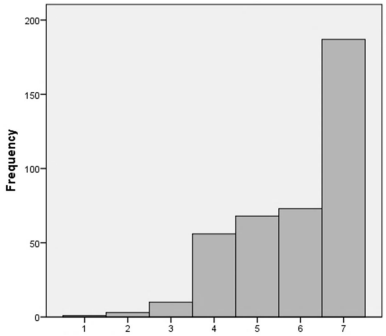
Histogram 27 CUA08



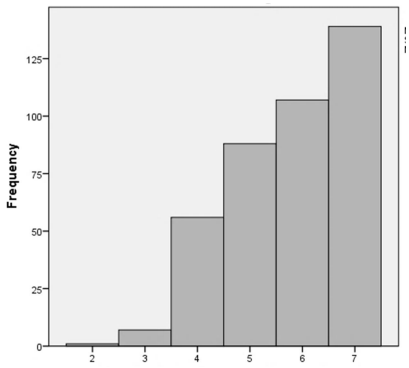
Histogram 28 CUA09



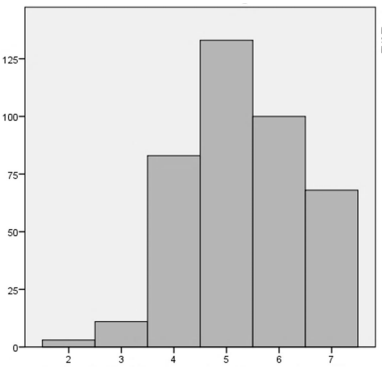
Histogram 29 CUA10



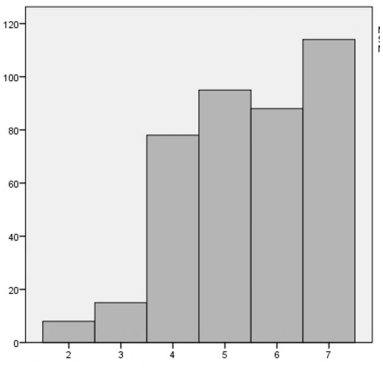
Histogram 30 3CM01



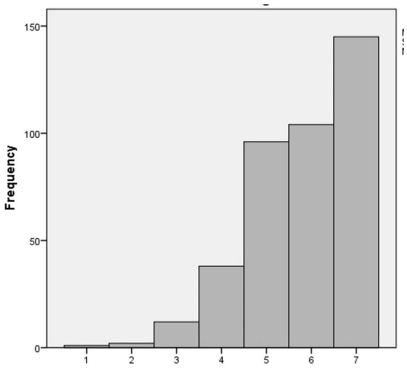
Histogram 31 3CM02



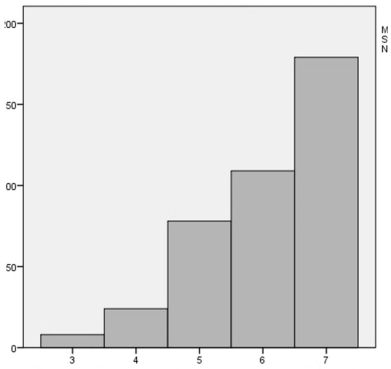
Histogram 32 3CM03



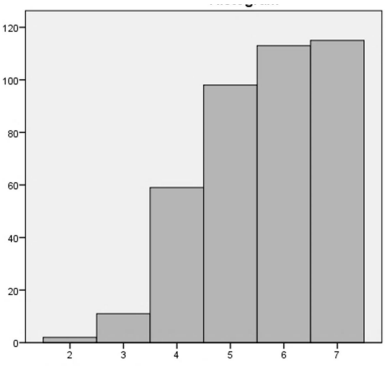
Histogram 33 3CM04



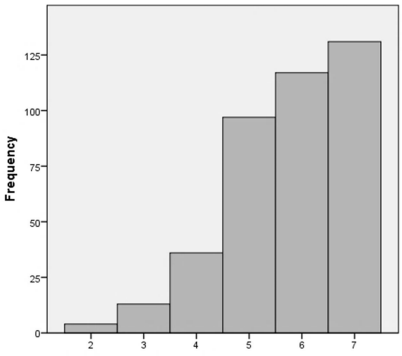
Histogram 34 3CM05



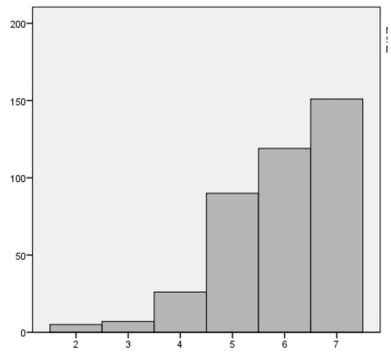
Histogram 35 3CM06



Histogram 36 3CM07



Histogram 37 3C08



APPENDIX II: PEARSON CORRELATIONS OF VARIABLES

Variables	CUA 01	CUA 02	CUA 03	CUA 04	CUA 05	CUA 06	CUA 07	CUA 08	CUA 09	CUA 10	EWG 01	EWG 02	EWG 03	EWG 04	EWG 05	EWG 06	EWG 07	EWG 08	EWG 09	EWG 10	EWG 11	EWG 12	EWG 13	EWG 14	EWG 15	EWG 16	EWG 17	EWG 18	EWG 19	3CM 01	3CM 02	3CM 03	3CM 04	3CM 05	3CM 06	3CM 07	3CM 08
CUA01	1	.536	.430	.458	.420	.502	.377	.282	.481	.453	.550	.510	.644	.471	.582	.499	.561	.442	.455	.569	.539	.522	.578	.576	.410	.547	.566	.562	.468	.541	.413	.524	.430	.565	.525	.558	.540
CUA02	.536	1	.496	.481	.479	.595	.377	.332	.469	.451	.557	.605	.628	.553	.673	.507	.681	.479	.604	.807	.549	.653	.648	.653	.422	.616	.532	.592	.545	.521	.472	.444	.524	.666	.577	.555	.567
CUA03	.430	.496	1	.350	.281	.476	.233	.180	.337	.550	.459	.424	.521	.309	.444	.380	.486	.385	.340	.517	.493	.436	.429	.382	.231	.427	.392	.410	.380	.387	.246	.360	.376	.507	.363	.423	.453
CUA04	.458	.481	.350	1	.509	.490	.457	.476	.636	.444	.403	.428	.492	.505	.464	.439	.451	.392	.460	.448	.458	.475	.424	.476	.422	.417	.503	.488	.495	.481	.474	.440	.344	.476	.481	.446	.534
CUA05	.420	.479	.281	.509	1	.419	.387	.421	.393	.374	.429	.556	.498	.653	.575	.587	.502	.529	.572	.507	.460	.567	.499	.537	.515	.468	.504	.512	.619	.545	.629	.488	.485	.524	.626	.517	.494
CUA06	.502	.595	.476	.490	.419	1	.434	.274	.574	.567	.633	.580	.637	.427	.601	.471	.613	.445	.499	.571	.580	.604	.526	.565	.448	.574	.606	.612	.526	.510	.403	.386	.456	.663	.552	.543	.566
CUA07	.377	.377	.233	.457	.387	.434	1	.370	.472	.477	.351	.449	.395	.387	.428	.400	.406	.383	.411	.406	.407	.442	.405	.426	.484	.486	.390	.392	.434	.337	.401	.318	.507	.411	.460	.422	.367
CUA08	.282	.332	.180	.476	.421	.274	.370	1	.319	.303	.277	.307	.290	.454	.356	.302	.327	.276	.309	.341	.242	.403	.348	.394	.411	.281	.301	.287	.428	.257	.374	.277	.285	.283	.407	.287	.380
CUA09	.481	.469	.337	.636	.393	.574	.472	.319	1	.582	.411	.443	.554	.458	.520	.461	.441	.421	.449	.433	.457	.487	.467	.442	.406	.451	.499	.475	.467	.525	.411	.383	.399	.519	.509	.481	.487
CUA10	.453	.451	.550	.444	.374	.567	.477	.303	.582	1	.401	.460	.501	.342	.516	.385	.446	.334	.387	.491	.471	.479	.453	.378	.311	.431	.421	.432	.460	.382	.348	.347	.429	.464	.478	.405	.397
EWG01	.550	.557	.459	.403	.429	.633	.351	.277	.411	.401	1	.642	.643	.488	.623	.537	.747	.531	.515	.603	.504	.623	.593	.647	.396	.545	.562	.588	.546	.534	.478	.403	.511	.696	.559	.589	.722
EWG02	.510	.605	.424	.428	.556	.580	.449	.307	.443	.460	.642	1	.611	.614	.695	.640	.753	.604	.650	.644	.521	.650	.671	.733	.465	.685	.594	.615	.667	.615	.546	.474	.616	.743	.657	.668	.582
EWG03	.644	.628	.521	.492	.498	.637	.395	.290	.554	.501	.643	.611	1	.527	.652	.578	.654	.502	.507	.615	.557	.618	.596	.595	.416	.593	.605	.613	.551	.652	.467	.523	.519	.659	.570	.612	.627
EWG04	.471	.553	.309	.505	.653	.427	.387	.454	.458	.342	.488	.614	.527	1	.646	.691	.597	.556	.630	.594	.429	.590	.580	.633	.498	.494	.558	.540	.652	.577	.675	.603	.481	.596	.639	.548	.584
EWG05	.582	.673	.444	.464	.575	.601	.428	.356	.520	.516	.623	.695	.652	.646	1	.622	.719	.590	.648	.741	.569	.788	.693	.700	.456	.625	.648	.712	.712	.589	.573	.514	.578	.685	.676	.652	.641
EWG06	.499	.507	.380	.439	.587	.471	.400	.302	.461	.385	.537	.640	.578	.691	.622	1	.576	.636	.587	.516	.447	.548	.557	.583	.446	.516	.572	.570	.594	.608	.666	.529	.514	.657	.609	.630	.559
EWG07	.561	.681	.486	.451	.502	.613	.406	.327	.441	.446	.747	.753	.654	.597	.719	.576	1	.529	.628	.745	.485	.714	.787	.810	.431	.686	.601	.585	.641	.582	.510	.458	.646	.782	.684	.679	.675
EWG08	.442	.479	.385	.392	.529	.445	.383	.276	.421	.334	.531	.604	.502	.556	.590	.636	.529	1	.718	.517	.454	.571	.539	.576	.473	.516	.544	.586	.614	.528	.571	.451	.485	.610	.540	.661	.539
EWG09	.455	.604	.340	.460	.572	.499	.411	.309	.449	.387	.515	.650	.507	.630	.648	.587	.628	.718	1	.621	.433	.607	.621	.672	.483	.582	.583	.565	.657	.535	.623	.469	.511	.639	.594	.652	.536
EWG10	.569	.807	.517	.448	.507	.571	.406	.341	.433	.491	.603	.644	.615	.594	.741	.516	.745	.517	.621	1	.503	.693	.734	.722	.402	.645	.545	.564	.596	.514	.486	.476	.570	.686	.628	.580	.591
EWG11	.539	.549	.493	.458	.460	.580	.407	.242	.457	.471	.504	.521	.557	.429	.569	.447	.485	.454	.433	.503	1	.563	.520	.458	.432	.547	.589	.664	.491	.513	.387	.411	.416	.566	.485	.529	.483
EWG12	.522	.653	.436	.475	.567	.604	.442	.403	.487	.479	.623	.650	.618	.590	.788	.548	.714	.571	.607	.693	.563	1	.665	.677	.440	.637	.647	.647	.693	.545	.514	.455	.583	.702	.682	.603	.639
EWG13	.578	.648	.429	.424	.499	.526	.405	.348	.467	.453	.593	.671	.596	.580	.693	.557	.787	.539	.621	.734	.520	.665	1	.812	.415	.712	.602	.577	.599	.538	.511	.452	.579	.680	.639	.638	.610
EWG14	.576	.653	.382	.476	.537	.565	.426	.394	.442	.378	.647	.733	.595	.633	.700	.583	.810	.576	.672	.722	.458	.677	.812	1	.447	.706	.608	.582	.656	.570	.527	.482	.615	.693	.669	.656	.630
EWG15	.410	.422	.231	.422	.515	.448	.484	.411	.406	.311	.396	.465	.416	.498	.456	.446	.431	.473	.483	.402	.432	.440	.415	.447	1	.478	.428	.418	.493	.402	.572	.359	.421	.469	.474	.487	.420
EWG16	.547	.616	.427	.417	.468	.574	.486	.281	.451	.431	.545	.685	.593	.494	.625	.516	.686	.516	.582	.645	.547	.637	.712	.706	.478	1	.536	.563	.568	.490	.435	.380	.598	.669	.537	.639	.541
EWG17	.566	.532	.392	.503	.504	.606	.390	.301	.499	.421	.562	.594	.605	.558	.648	.572	.601	.544	.583	.545	.589	.647	.602	.608	.428	.536	1	.773	.554	.639	.530	.510	.442	.653	.570	.599	.563
EWG18	.562	.592	.410	.488	.512	.612	.392	.287	.475	.432	.588	.615	.613	.540	.712	.570	.585	.586	.565	.564	.664	.647	.577	.582	.418	.563	.773	1	.611	.617	.519	.533	.455	.661	.546	.596	.577
EWG19	.468	.545	.380	.495	.619	.526	.434	.428	.467	.460	.546	.667	.551	.652	.712	.594	.641	.614	.657	.596	.491	.693	.599	.656	.493	.568	.554	.611	1	.528	.593	.511	.571	.597	.668	.629	.615
TCM01	.541	.521	.387	.481	.545	.510	.337	.257	.525	.382	.534	.615	.652	.577	.589	.608	.582	.528	.535	.514	.513	.545	.538	.570	.402	.490	.639	.617	.528	1	.563	.543	.439	.583	.545	.550	.496
TCM02	.413	.472	.246	.474	.629	.403	.401	.374	.411	.348	.478	.546	.467	.675	.573	.666	.510	.571	.623	.486	.387	.514	.511	.527	.572	.435	.530	.519	.593	.563	1	.524	.445	.539	.548	.539	.519
TCM03	.524	.444	.360	.440	.488	.386	.318	.277	.383	.347	.403	.474	.523	.603	.514	.529	.458	.451	.469	.476	.411	.455	.452	.482	.359	.380	.510	.533	.511	.543	.524	1	.335	.488	.499	.473	.489
TCM04	.430	.524	.376	.344	.485	.456	.507	.285	.399	.429	.511	.616	.519	.481	.578	.514	.646	.485	.511	.570	.416	.583	.579	.615	.421	.598	.442	.455	.571	.439	.445	.335	1	.558	.529	.516	.494
TCM05	.565	.666	.507	.476	.524	.663	.411	.283	.519	.464	.696	.743	.659	.596	.685	.657	.782	.610	.639	.686	.566	.702	.680	.693	.469	.669	.653	.661	.597	.583	.539	.488	.558	1	.633	.719	.665
TCM06	.525	.577	.363	.481	.626	.552	.460	.407	.509	.478	.559	.657	.570	.639	.676	.609	.684	.540	.594	.628	.485	.682	.639	.669	.474	.537	.570	.546	.668	.545	.548	.499	.529	.633	1	.694	.662
TCM07	.558	.555	.423	.446	.517	.543	.422	.287	.481	.405	.589	.668	.612	.548	.652	.630	.679	.661	.652	.580	.529	.603	.638	.656	.487	.639	.599	.596	.629	.550	.539	.473	.516	.719	.694	1	.692
TCM08	.540	.567	.453	.534	.494	.566	.367	.380	.487	.397	.722	.582	.627	.584	.641	.559	.675	.539	.536	.591	.483	.639	.610	.630	.420	.541	.563	.577	.615	.496	.519	.489	.494	.665	.662	.692	1

APPENDIX III: RESULTS IN MEASUREMENT MODEL DEVELOPMENT PROCESS

A.

Composite reliability (Monofactorial manifest variables):						
Latent variable	**Dimensions**	**Cronbach's alpha**	**D.G. rho (PCA)**	**Condition number**	**Critical value**	**Eigenvalues**
Grounding	6	.902	.925	4.330	1.000	4.030
						.560
						.497
						.387
						.311
						.215
3C Mechanisms	3	.866	.918	2.824	1.000	2.365
						.338
						.297
Usability	8	.935	.946	5.353	1.000	5.511
						.589
						.514
						.376
						.308
						.279
						.231
						.192
Team Integration	7	.897	.920	4.018	1.000	4.352
						.674
						.548
						.461
						.386
						.309
						.270
Shared Access	6	.835	.880	3.297	1.000	3.320
						.838
						.597
						.510
						.430
						.306
Communication	3	.897	.936	3.641	1.000	2.488
						.324
						.188
Awareness	4	.857	.905	3.861	1.000	2.823
						.619
						.369
						.189

Variables/Factors correlations (Grounding):						
	F1	**F2**	**F3**	**F4**	**F5**	**F6**
CUA01	.779	.397	-.346	-.274	-.200	.031
EWG03	.828	.338	.013	.171	.413	-.025
EWG17	.853	-.231	.204	-.295	.041	-.297
EWG18	.865	-.314	.066	-.157	.090	.341
3CM01	.806	.170	.419	.248	-.290	.032
EWG11	.782	-.328	-.395	.331	-.082	-.090

Variables/Factors correlations (3C Mechanisms):			
	F1	**F2**	**F3**
3CM06	.884	-.406	-.232
3CM07	.897	-.009	.442
3CM08	.883	.416	-.217

Variables/Factors correlations (Usability):								
	F1	**F2**	**F3**	**F4**	**F5**	**F6**	**F7**	**F8**
EWG01	.797	.453	-.084	-.176	-.296	-.095	-.111	-.116
EWG02	.872	.018	-.003	.128	.316	-.226	-.266	-.032
EWG05	.855	-.127	-.090	-.256	.118	.385	-.120	-.044
3CM04	.746	-.102	**.639**	.088	-.098	.045	.014	-.073
EWG07	.895	.217	.038	.023	.007	.034	.064	.379
EWG19	.811	-.373	-.055	-.328	-.009	-.250	.171	.007
3CM05	.863	.222	-.130	.190	.164	.059	.310	-.163
EWG09	.789	-.348	-.264	.333	-.264	.039	-.065	.009

Variables/Factors correlations (Team Integration):							
	F1	**F2**	**F3**	**F4**	**F5**	**F6**	**F7**
CUA05	.802	.079	-.119	.404	.399	.049	-.106
EWG04	.856	-.155	-.087	.161	-.117	-.285	.340
EWG06	.834	-.145	.281	.090	-.249	-.166	-.327
EWG08	.764	.055	.510	-.275	.239	.057	.131
EWG15	.690	**.607**	-.259	-.254	-.036	-.138	-.069
TCM02	.847	.094	-.037	.103	-.287	.414	.086
TCM03	.711	-.492	-.344	-.336	.102	.062	-.081

Variables/Factors correlations (Shared Access):						
	F1	**F2**	**F3**	**F4**	**F5**	**F6**
CUA04	.793	.204	-.346	-.311	-.005	-.336
CUA06	.760	-.337	-.097	.239	.492	.004
CUA09	.823	-.187	-.248	-.210	-.185	.385
CUA10	.766	-.304	.149	.351	-.381	-.171
CUA07	.716	.072	**.620**	-.299	.093	.010
CUA08	.580	**.741**	-.011	.315	.013	.121

Variables/Factors correlations (Communication):			
	F1	**F2**	**F3**
EWG13	.926	-.215	.310
EWG14	.924	-.235	-.302
EWG16	.881	.472	-.009

Variables/Factors correlations (Awareness):				
	F1	**F2**	**F3**	**F4**
CUA02	.894	-.163	-.307	-.281
CUA03	.702	**.710**	.063	-.012
EWG10	.913	-.151	-.191	.328
EWG12	.835	-.256	.484	-.047

Cross-loadings (Monofactorial manifest variables):							
	Grounding	3C Mechanisms	Usability	Team Integration	Shared Access	Communication	Awareness
CUA01	**.780**	.609	.630	.587	.581	.623	.615
EWG03	**.833**	.677	.728	.649	.680	.653	.710
EWG17	**.852**	.650	.714	.666	.651	.640	.640
EWG18	**.864**	.644	.743	.678	.648	.630	.668
3CM01	**.805**	.599	.666	.681	.578	.586	.591
EWG11	**.779**	.562	.613	.559	.621	.557	.626
3CM06	.660	**.894**	.756	.718	.652	.677	.685

3CM07	.702	**.896**	.776	.719	.604	.707	.650
3CM08	.671	**.873**	.749	.660	.641	.653	.676
EWG01	.689	.696	**.784**	.601	.622	.654	.672
EWG02	.706	.718	**.845**	.722	.629	.765	.702
EWG05	.765	.740	**.886**	.728	.668	.740	.804
3CM04	.551	.579	**.704**	.584	.541	.656	.621
EWG07	.707	.765	**.879**	.662	.646	.837	.792
EWG19	.653	.719	**.815**	.743	.633	.668	.673
3CM05	.752	.756	**.883**	.721	.684	.748	.769
EWG09	.628	.671	**.792**	.748	.579	.687	.661
CUA05	.598	.618	.644	**.780**	.551	.551	.560
EWG04	.632	.666	.716	**.848**	.565	.627	.624
EWG06	.668	.677	.718	**.844**	.558	.607	.587
EWG08	.623	.653	.708	**.816**	.517	.597	.587
EWG15	.509	.520	.544	**.681**	.559	.490	.456
3CM02	.587	.603	.654	**.761**	.529	.540	.526
3CM03	.620	.548	.563	**.711**	.481	.482	.519
CUA04	.586	.547	.540	.566	**.749**	.483	.527
CUA06	.703	.623	.698	.553	**.890**	.609	.672
CUA09	.609	.555	.564	.538	**.757**	.498	.519
CUA10	.541	.483	.541	.442	**.702**	.461	.576
CUA07	.467	.472	.499	.498	**.660**	.481	.444
CUA08	.338	.403	.389	.443	**.539**	.376	.385
EWG13	.695	.709	.785	.652	.601	**.925**	.749
EWG14	.691	.735	.823	.699	.632	**.926**	.741
EWG16	.667	.645	.740	.612	.623	**.880**	.702
CUA02	.684	.638	.741	.614	.643	.702	**.892**
CUA03	.535	.462	.520	.423	.497	.452	**.683**
EWG10	.674	.676	.793	.643	.629	.770	**.913**
EWG12	.722	.723	.823	.678	.674	.725	**.851**

Weights:							
Latent variable	Manifest variables	Outer weight	Outer weight (Bootstrap)	Standard error	Critical ratio (CR)	Lower bound (95%)	Upper bound (95%)
Grounding	CUA01	.194	.194	.007	27.467	.179	.210
	EWG03	.218	.218	.007	3.780	.206	.233
	EWG17	.210	.208	.006	35.063	.195	.222
	EWG18	.213	.213	.006	35.680	.200	.226
	3CM01	.197	.197	.007	27.198	.180	.212
	EWG11	.188	.189	.008	23.883	.172	.204
3C Mechanisms	3CM06	.405	.405	.055	7.397	.303	.538
	3CM07	.378	.377	.063	6.023	.218	.480
	3CM08	.343	.343	.063	5.448	.204	.459
Usability	EWG01	.117	.112	.031	3.790	.035	.182
	EWG02	.073	.076	.036	2.022	.004	.154
	EWG05	.260	.264	.039	6.645	.165	.338
	3CM04	.069	.067	.028	2.471	.009	.124
	EWG07	.115	.118	.048	2.409	.023	.223
	EWG19	.159	.158	.029	5.530	.101	.223
	3CM05	.256	.250	.036	7.053	.183	.328

	EWG09	.140	.143	.026	5.338	.081	.199
Team Integration	CUA05	.168	.165	.055	3.086	.068	.314
	EWG04	.221	.223	.057	3.868	.115	.348
	EWG06	.244	.244	.061	3.985	.124	.401
	EWG08	.293	.296	.053	5.501	.180	.413
	EWG15	.186	.189	.046	4.005	.112	.305
	3CM02	-.025	-.028	.065	-.382	-.179	.133
	3CM03	.181	.173	.053	3.426	.063	.276
Shared Access	CUA04	.207	.210	.057	3.632	.069	.342
	CUA06	.544	.533	.066	8.188	.365	.686
	CUA09	.126	.127	.071	1.788	-.020	.272
	CUA10	.104	.106	.075	1.386	-.075	.245
	CUA07	.161	.158	.059	2.739	.018	.274
	CUA08	.159	.164	.050	3.165	.057	.273
Commu nication	EWG13	.368	.368	.008	43.907	.351	.386
	EWG14	.379	.379	.010	38.940	.361	.404
	EWG16	.350	.351	.009	39.229	.332	.368
Awareness	CUA02	.307	.306	.009	34.799	.289	.325
	CUA03	.221	.221	.016	13.561	.187	.258
	EWG10	.320	.320	.008	39.019	.303	.335
	EWG12	.332	.332	.012	27.084	.306	.358

Correlations:										
Latent variable	Manifest variables	Standardized loadings	Loadings	Communalities	Redundancies	Standardized loadings (Bootstrap)	Standard error	Critical ratio (CR)	Lower bound (95%)	Upper bound (95%)
Grounding	CUA01	0,780	0,780	0,608	0,463	0,779	0,024	31,992	0,722	0,818
	EWG03	0,833	0,833	0,693	0,528	0,833	0,018	45,223	0,796	0,867
	EWG17	0,852	0,852	0,727	0,553	0,848	0,020	43,620	0,805	0,883
	EWG18	0,864	0,864	0,746	0,567	0,862	0,018	47,447	0,825	0,896
	3CM01	0,805	0,805	0,648	0,493	0,806	0,022	36,326	0,757	0,851
	EWG11	0,779	0,779	0,607	0,462	0,780	0,028	28,296	0,711	0,840
3C Mechanisms	3CM06	0,894	0,894	0,799	0,607	0,892	0,020	44,855	0,853	0,939
	3CM07	0,896	0,896	0,803	0,610	0,894	0,020	45,561	0,831	0,928
	3CM08	0,873	0,873	0,762	0,579	0,870	0,026	33,195	0,807	0,916
Usability	EWG01	0,784	0,784	0,615	0,553	0,779	0,028	28,416	0,708	0,827
	EWG02	0,845	0,845	0,714	0,643	0,841	0,022	38,110	0,792	0,882
	EWG05	0,886	0,886	0,784	0,706	0,885	0,017	51,571	0,847	0,918
	3CM04	0,704	0,704	0,495	0,445	0,701	0,034	20,983	0,627	0,765
	EWG07	0,879	0,879	0,772	0,695	0,876	0,018	50,213	0,831	0,910
	EWG19	0,815	0,815	0,664	0,597	0,814	0,021	39,579	0,768	0,852
	3CM05	0,883	0,883	0,779	0,701	0,879	0,014	62,801	0,847	0,911
	EWG09	0,792	0,792	0,627	0,564	0,792	0,024	33,009	0,742	0,840
Team Integration	CUA05	0,780	0,780	0,608	0,449	0,774	0,034	22,683	0,703	0,845
	EWG04	0,848	0,848	0,718	0,531	0,846	0,024	34,650	0,792	0,888
	EWG06	0,844	0,844	0,712	0,526	0,841	0,027	31,571	0,773	0,895
	EWG08	0,816	0,816	0,665	0,492	0,814	0,026	31,316	0,770	0,864
	EWG15	0,681	0,681	0,463	0,342	0,678	0,043	15,672	0,577	0,773
	3CM02	0,761	0,761	0,579	0,428	0,756	0,031	24,467	0,689	0,820

	3CM03	0,711	0,711	0,506	0,374	0,704	0,036	19,903	0,632	0,784
Shared Access	CUA04	0,749	0,749	0,562	0,365	0,747	0,039	19,014	0,645	0,819
	CUA06	0,890	0,890	0,792	0,516	0,882	0,024	37,417	0,822	0,922
	CUA09	0,757	0,757	0,573	0,373	0,748	0,043	17,518	0,651	0,837
	CUA10	0,702	0,702	0,493	0,321	0,698	0,043	16,210	0,604	0,787
	CUA07	0,660	0,660	0,436	0,284	0,658	0,042	15,640	0,552	0,728
	CUA08	0,539	0,539	0,290	0,189	0,541	0,054	9,945	0,430	0,648
Communication	EWG13	0,925	0,925	0,856	0,648	0,924	0,012	77,590	0,896	0,949
	EWG14	0,926	0,926	0,857	0,648	0,924	0,010	94,433	0,899	0,939
	EWG16	0,880	0,880	0,775	0,586	0,879	0,019	46,622	0,834	0,914
Awareness	CUA02	0,892	0,892	0,796	0,625	0,892	0,012	71,952	0,863	0,917
	CUA03	0,683	0,683	0,467	0,366	0,683	0,047	14,451	0,580	0,766
	EWG10	0,913	0,913	0,833	0,653	0,913	0,010	92,394	0,895	0,930
	EWG12	0,851	0,851	0,724	0,568	0,852	0,017	49,127	0,806	0,889

Mean Communalities		
Latent variable	Type	Mean Communalities
Grounding	Endogenous	.672
3C Mechanisms	Endogenous	.788
Usability	Endogenous	.681
Team Integration	Endogenous	.607
Shared Access	Endogenous	.524
Communication	Endogenous	.829
Awareness	Endogenous	.705
Mean		.664

Discriminant validity (Squared correlations < AVE):							
	Grounding	3C Mechanisms	Usability	Team Integration	Shared Access	Communication	Awareness
Grounding	**1**	.581	**.697**	.606	**.586**	.564	.615
3C Mechanisms	.581	**1**	**.733**	**.622**	.508	.586	.570
Usability	**.697**	**.733**	**1**	**.700**	**.579**	.740	**.756**
Team Integration	.606	**.622**	**.700**	**1**	.466	.518	.509
Shared Access	**.586**	.508	**.579**	.466	**1**	.461	.537
Communication	.564	.586	.740	.518	.461	**1**	.644
Awareness	.615	.570	**.756**	.509	.537	.644	**1**
Mean Communalities (AVE)	.672	.788	.681	.607	.524	.829	.705

B.

Composite reliability (Monofactorial manifest variables):						
Latent variable	Dimensions	Cronbach's alpha	D.G. rho (PCA)	Condition number	Critical value	Eigenvalues
Grounding	6	.902	.925	4.330	1.000	4.030
						.560
						.497
						.387
						.311
						.215
3C Mechanisms	3	.866	.918	2.824	1.000	2.365
						.338
						.297
Usability	9	.929	.942	5.506	1.000	5.816
						.758
						.533
						.514
						.375
						.307
						.278
						.227
						.192
Team Integration	7	.897	.920	4.018	1.000	4.352
						.674
						.548
						.461
						.386
						.309
						.270
Shared Access	6	.835	.880	3.297	1.000	3.320
						.838
						.597
						.510
						.430
						.306
Communication	3	.897	.936	3.641	1.000	2.488
						.324
						.188
Awareness	3	.884	.929	3.584	1.000	2.438
						.373
						.190

Variables/Factors correlations (Grounding):						
	F1	F2	F3	F4	F5	F6
CUA01	.779	.397	-.346	-.274	-.200	.031
EWG03	.828	.338	.013	.171	.413	-.025
EWG17	.853	-.231	.204	-.295	.041	-.297
EWG18	.865	-.314	.066	-.157	.090	.341
3CM01	.806	.170	.419	.248	-.290	.032
EWG11	.782	-.328	-.395	.331	-.082	-.090

Variables/Factors correlations (3C Mechanisms):

	F1	F2	F3
3CM06	.884	-.406	-.232
3CM07	.897	-.009	.442
3CM08	.883	.416	-.217

Variables/Factors correlations (Usability):

	F1	F2	F3	F4	F5	F6	F7	F8	F9
EWG01	.799	.176	.421	-.042	-.194	-.285	-.087	-.110	-.115
EWG02	.866	-.099	.082	.008	.119	.328	-.201	-.265	-.024
EWG05	.852	-.107	-.099	-.100	-.250	.111	.395	-.100	-.044
3CM04	.742	-.106	-.124	**.631**	.087	-.100	.042	.013	-.074
EWG07	.895	.047	.210	.060	.015	.010	.040	.086	.374
EWG19	.804	-.259	-.290	-.083	-.323	-.005	-.258	.159	.004
3CM05	.867	.099	.194	-.112	.191	.157	.048	.309	-.174
EWG09	.779	-.297	-.194	-.282	.333	-.267	.031	-.070	.013
CUA03	.589	**.726**	-.347	-.045	.034	-.017	-.031	-.042	.013

Variables/Factors correlations (Team Integration):

	F1	F2	F3	F4	F5	F6	F7
CUA05	.802	.079	-.119	.404	.399	.049	-.106
EWG04	.856	-.155	-.087	.161	-.117	-.285	.340
EWG06	.834	-.145	.281	.090	-.249	-.166	-.327
EWG08	.764	.055	.510	-.275	.239	.057	.131
EWG15	.690	**.607**	-.259	-.254	-.036	-.138	-.069
3CM02	.847	.094	-.037	.103	-.287	.414	.086
3CM03	.711	-.492	-.344	-.336	.102	.062	-.081

Variables/Factors correlations (Shared Access):

	F1	F2	F3	F4	F5	F6
CUA04	.793	.204	-.346	-.311	-.005	-.336
CUA06	.760	-.337	-.097	.239	.492	.004
CUA09	.823	-.187	-.248	-.210	-.185	.385
CUA10	.766	-.304	.149	.351	-.381	-.171
CUA07	.716	.072	**.620**	-.299	.093	.010
CUA08	.580	**.741**	-.011	.315	.013	.121

Variables/Factors correlations (Communication):

	F1	F2	F3
EWG13	.926	-.215	.310
EWG14	.924	-.235	-.302
EWG16	.881	.472	-.009

Variables/Factors correlations (Awareness):

	F1	F2	F3
CUA02	.913	-.292	-.285
EWG10	.928	-.181	.326
EWG12	.862	.504	-.048

Cross-loadings (Monofactorial manifest variables):

	Grounding	3C Mechanisms	Usability	Team Integration	Shared Access	Communication	Awareness
CUA01	**.780**	.608	.635	.586	.581	.623	.602
EWG03	**.833**	.676	.735	.648	.679	.653	.689

EWG17	**.853**	.650	.714	.666	.651	.640	.640
EWG18	**.864**	.644	.743	.677	.647	.630	.668
3CM01	**.805**	.599	.668	.681	.578	.586	.585
EWG11	**.779**	.562	.625	.559	.620	.557	.598
3CM06	.660	**.897**	.753	.719	.653	.677	.700
3CM07	.702	**.895**	.776	.718	.605	.707	.644
3CM08	.671	**.871**	.749	.660	.641	.653	.666
EWG01	.689	.695	**.779**	.601	.622	.654	.661
EWG02	.706	.719	**.843**	.721	.629	.765	.704
EWG05	.765	.740	**.885**	.728	.667	.740	.817
3CM04	.551	.579	**.702**	.584	.542	.656	.622
EWG07	.707	.765	**.876**	.662	.646	.837	.792
EWG19	.653	.719	**.814**	.743	.634	.668	.681
3CM05	.752	.755	**.878**	.721	.684	.748	.761
EWG09	.628	.670	**.793**	.749	.580	.688	.678
CUA03	.535	.462	**.576**	.422	.494	.452	.535
CUA05	.598	.619	.641	**.782**	.552	.551	.576
EWG04	.632	.667	.712	**.851**	.566	.627	.643
EWG06	.668	.677	.717	**.842**	.558	.607	.582
EWG08	.623	.653	.711	**.814**	.517	.598	.581
EWG15	.509	.520	.539	**.682**	.561	.490	.468
3CM02	.587	.604	.648	**.764**	.530	.540	.546
3CM03	.620	.549	.569	**.709**	.481	.482	.509
CUA04	.586	.546	.545	.567	**.750**	.483	.520
CUA06	.703	.623	.703	.553	**.888**	.609	.655
CUA09	.609	.555	.566	.538	**.758**	.498	.514
CUA10	.540	.483	.563	.442	**.697**	.461	.526
CUA07	.467	.472	.496	.498	**.663**	.481	.454
CUA08	.338	.404	.388	.445	**.543**	.376	.399
EWG13	.695	.709	.785	.653	.601	**.925**	.758
EWG14	.691	.735	.818	.699	.633	**.926**	.760
EWG16	.667	.644	.741	.612	.623	**.880**	.703
CUA02	.684	.638	.748	.615	.643	.702	**.906**
EWG10	.674	.677	.800	.643	.628	.770	**.924**
EWG12	.722	.724	.822	.679	.674	.725	**.873**

Weights:							
Latent variable	Manifest variables	Outer weight	Outer weight (Bootstrap)	Standard error	Critical ratio (CR)	Lower bound (95%)	Upper bound (95%)
Grounding	CUA01	.193	.193	.007	25.924	.179	.208
	EEWGG03	.217	.217	.007	33.228	.205	.230
	EEWGG17	.211	.211	.006	32.716	.198	.224
	EEWGG18	.213	.213	.006	34.801	.202	.225
	3CCMM01	.197	.197	.008	25.482	.182	.213
	EEWGG11	.187	.187	.008	22.723	.171	.203
3C Mechanisms	3CCMM06	.414	.413	.050	8.307	.316	.510
	3CCMM07	.374	.373	.061	6.130	.250	.490
	3CCMM08	.338	.337	.064	5.274	.206	.460
Usability	EEWGG01	.100	.098	.029	3.466	.041	.155
	EEWGG02	.076	.077	.039	1.953	.001	.152
	EEWGG05	.256	.255	.035	7.288	.185	.324

	3CM04	.062	.061	.026	2.414	.010	.110
	EWG07	.109	.111	.046	2.381	.023	.201
	EWG19	.156	.155	.030	5.210	.097	.217
	3CM05	.224	.222	.036	6.318	.153	.292
	EWG09	.152	.152	.029	5.182	.094	.211
	CUA03	.083	.085	.027	3.129	.035	.139
Team Integration	CUA05	.171	.172	.058	2.962	.061	.286
	EWG04	.229	.228	.062	3.712	.109	.353
	EWG06	.236	.237	.060	3.907	.115	.354
	EWG08	.290	.289	.052	5.637	.188	.388
	EWG15	.186	.183	.047	3.965	.088	.273
	3CM02	-.020	-.022	.068	-.291	-.150	.116
	3CM03	.176	.174	.051	3.424	.077	.279
Shared Access	CUA04	.206	.204	.061	3.351	.085	.325
	CUA06	.543	.540	.061	8.853	.412	.654
	CUA09	.130	.133	.071	1.850	-.002	.270
	CUA10	.092	.090	.069	1.335	-.047	.227
	CUA07	.167	.165	.055	3.056	.058	.270
	CUA08	.165	.165	.051	3.213	.067	.269
Communication	EWG13	.368	.368	.008	44.421	.352	.385
	EWG14	.380	.380	.009	43.306	.364	.399
	EWG16	.350	.349	.010	34.674	.330	.370
Awareness	CUA02	.356	.356	.006	55.089	.344	.369
	EWG10	.370	.370	.007	56.943	.358	.383
	EWG12	.384	.384	.009	41.410	.367	.403

Correlations:										
Latent variable	Manifest variables	Standardized loadings	Loadings	Communalities	Redundancies	Standardized loadings (Bootstrap)	Standard error	Critical ratio (CR)	Lower bound (95%)	Upper bound (95%)
Grounding	CUA01	.780	.780	.608	.461	.780	.024	31.995	.729	.824
	EWG03	.833	.833	.693	.526	.833	.020	41.571	.791	.869
	EWG17	.853	.853	.727	.552	.852	.017	49.416	.815	.884
	EWG18	.864	.864	.746	.566	.864	.016	52.840	.829	.893
	3CM01	.805	.805	.648	.492	.805	.022	35.894	.758	.847
	EWG11	.779	.779	.607	.460	.779	.029	27.327	.716	.829
3C Mechanisms	3CM06	.897	.897	.804	.610	.895	.019	47.429	.857	.930
	3CM07	.895	.895	.801	.607	.894	.020	44.987	.850	.928
	3CM08	.871	.871	.758	.575	.870	.025	35.275	.816	.913
Usability	EWG01	.779	.779	.607	.549	.778	.027	29.180	.721	.828
	EWG02	.843	.843	.711	.642	.841	.022	38.685	.795	.881
	EWG05	.885	.885	.784	.709	.884	.016	57.031	.852	.912
	3CM04	.702	.702	.492	.445	.701	.034	2.570	.631	.763
	EWG07	.876	.876	.767	.694	.875	.017	5.337	.839	.906
	EWG19	.814	.814	.663	.599	.812	.022	37.499	.767	.853
	3CM05	.878	.878	.771	.697	.877	.014	61.542	.847	.903
	EWG09	.793	.793	.629	.569	.793	.024	32.766	.743	.838
	CUA03	.576	.576	.332	.300	.576	.053	1.861	.471	.676
Team Integration	CUA05	.782	.782	.612	.450	.778	.035	22.577	.706	.842
	EWG04	.851	.851	.723	.533	.847	.024	35.228	.797	.892
	EWG06	.842	.842	.709	.522	.838	.027	31.759	.783	.887
	EWG08	.814	.814	.663	.488	.811	.028	29.427	.753	.861
	EWG15	.682	.682	.466	.343	.678	.043	16.007	.590	.759
	3CM02	.764	.764	.583	.429	.760	.033	22.808	.691	.823
	3CM03	.709	.709	.503	.371	.707	.036	19.583	.633	.774
Shared Access	CUA04	.750	.750	.563	.365	.746	.037	2.190	.669	.816

	CUA06	.888	.888	.789	.512	.883	.025	35.757	.829	.927
	CUA09	.758	.758	.574	.372	.754	.038	19.710	.676	.825
	CUA10	.697	.697	.485	.315	.692	.043	16.380	.604	.768
	CUA07	.663	.663	.440	.285	.658	.041	16.069	.575	.737
	CUA08	.543	.543	.295	.191	.540	.051	1.585	.439	.637
Communication	EWG13	.925	.925	.857	.649	.925	.011	82.501	.901	.945
	EWG14	.926	.926	.857	.649	.926	.009	102.224	.907	.942
	EWG16	.880	.880	.774	.586	.880	.017	52.248	.843	.910
Awareness	CUA02	.906	.906	.821	.650	.906	.011	8.033	.882	.927
	EWG10	.924	.924	.853	.676	.924	.009	10.166	.904	.940
	EWG12	.873	.873	.763	.604	.873	.014	61.364	.843	.899

Mean Communalities		
Latent variable	Type	Mean Communalities
Grounding	Endogenous	.672
3C Mechanisms	Endogenous	.788
Usability	Endogenous	.640
Team Integration	Endogenous	.608
Shared Access	Endogenous	.524
Communication	Endogenous	.829
Awareness	Endogenous	.812
Mean		.662

Discriminant validity (Squared correlations < AVE):							
	Grounding	3C Mechanisms	Usability	Team Integration	Shared Access	Communication	Awareness
Grounding	**1**	.581	**.706**	.605	**.585**	.564	.593
3C Mechanisms	.581	**1**	**.731**	**.622**	.508	.586	.571
Usability	**.706**	**.731**	**1**	**.699**	**.587**	.737	.771
Team Integration	.605	**.622**	**.699**	**1**	.468	.518	.515
Shared Access	**.585**	.508	**.587**	.468	**1**	.462	.519
Communication	.564	.586	.737	.518	.462	**1**	.662
Awareness	.593	.571	.771	.515	.519	.662	**1**
Mean Communalities (AVE)	.672	.788	.640	.608	.524	.829	.812

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Composite reliability (Monofactorial manifest variables):						
Latent variable	Dimensions	Cronbach's alpha	D.G. rho (PCA)	Condition number	Critical value	Eigenvalues
Grounding	6	.902	.925	4.330	1.000	4.030
						.560
						.497
						.387
						.311
						.215
3C Mechanisms	3	.866	.918	2.824	1.000	2.365
						.338
						.297
Usability	8	.935	.946	5.353	1.000	5.511
						.589
						.514
						.376
						.308
						.279
						.231
						.192
Team Integration	7	.897	.920	4.018	1.000	4.352
						.674
						.548
						.461
						.386
						.309
						.270
Shared Access	7	.840	.881	3.652	1.000	3.621
						.980
						.680
						.593
						.437
						.416
						.272
Communication	3	.897	.936	3.641	1.000	2.488
						.324
						.188
Awareness	3	.884	.929	3.584	1.000	2.438
						.373
						.190

Variables/Factors correlations (Grounding):						
	F1	F2	F3	F4	F5	F6
CUA01	.779	.397	-.346	-.274	-.200	.031
EWG03	.828	.338	.013	.171	.413	-.025
EWG17	.853	-.231	.204	-.295	.041	-.297
EWG18	.865	-.314	.066	-.157	.090	.341
3CM01	.806	.170	.419	.248	-.290	.032
EWG11	.782	-.328	-.395	.331	-.082	-.090

Variables/Factors correlations (3C Mechanisms):			
	F1	F2	F3
3CM06	.884	-.406	-.232
3CM07	.897	-.009	.442
3CM08	.883	.416	-.217

Variables/Factors correlations (Usability):								
	F1	F2	F3	F4	F5	F6	F7	F8
EWG01	.797	.453	-.084	-.176	-.296	-.095	-.111	-.116
EWG02	.872	.018	-.003	.128	.316	-.226	-.266	-.032
EWG05	.855	-.127	-.090	-.256	.118	.385	-.120	-.044
3CM04	.746	-.102	**.639**	.088	-.098	.045	.014	-.073
EWG07	.895	.217	.038	.023	.007	.034	.064	.379
EWG19	.811	-.373	-.055	-.328	-.009	-.250	.171	.007
3CM05	.863	.222	-.130	.190	.164	.059	.310	-.163
EWG09	.789	-.348	-.264	.333	-.264	.039	-.065	.009

Variables/Factors correlations (Team Integration):							
	F1	F2	F3	F4	F5	F6	F7
CUA05	.802	.079	-.119	.404	.399	.049	-.106
EWG04	.856	-.155	-.087	.161	-.117	-.285	.340
EWG06	.834	-.145	.281	.090	-.249	-.166	-.327
EWG08	.764	.055	.510	-.275	.239	.057	.131
EWG15	.690	**.607**	-.259	-.254	-.036	-.138	-.069
3CM02	.847	.094	-.037	.103	-.287	.414	.086
3CM03	.711	-.492	-.344	-.336	.102	.062	-.081

Variables/Factors correlations (Shared Access):							
	F1	F2	F3	F4	F5	F6	F7
CUA04	.775	.271	.024	-.382	-.210	-.261	-.260
CUA06	.774	-.237	-.122	-.085	.556	-.102	-.056
CUA09	.803	.039	-.301	-.324	-.115	.206	.320
CUA10	.794	-.283	-.005	.203	-.125	.413	-.249
CUA07	.684	.272	-.338	.529	-.086	-.229	.057
CUA08	.550	**.605**	.522	.090	.148	.148	.085
CUA03	.613	-.574	.433	.079	-.159	-.224	.161

Variables/Factors correlations (Communication):			
	F1	F2	F3
EWG13	.926	-.215	.310
EWG14	.924	-.235	-.302
EWG16	.881	.472	-.009

Variables/Factors correlations (Awareness):			
	F1	F2	F3
CUA02	.913	-.292	-.285
EWG10	.928	-.181	.326
EWG12	.862	.504	-.048

Cross-loadings (Monofactorial manifest variables):							
	Grounding	3C Mechanisms	Usability	Team Integration	Shared Access	Communication	Awareness
CUA01	**.780**	.609	.630	.586	.600	.623	.602
EWG03	**.833**	.677	.728	.649	.708	.653	.689
EWG17	**.852**	.650	.714	.666	.655	.640	.640

EWG18	**.864**	.644	.742	.678	.654	.630	.668
3CM01	**.805**	.599	.666	.681	.594	.586	.585
EWG11	**.779**	.562	.612	.559	.648	.557	.598
3CM06	.660	**.893**	.756	.718	.648	.677	.700
3CM07	.702	**.897**	.776	.719	.627	.707	.644
3CM08	.671	**.873**	.748	.661	.667	.653	.666
EWG01	.689	.697	**.783**	.601	.645	.654	.661
EWG02	.706	.718	**.844**	.722	.642	.765	.704
EWG05	.765	.740	**.886**	.728	.677	.740	.817
3CM04	.551	.579	**.704**	.583	.560	.656	.622
EWG07	.707	.765	**.880**	.663	.673	.837	.792
EWG19	.653	.719	**.813**	.743	.636	.668	.681
3CM05	.752	.756	**.883**	.721	.711	.748	.761
EWG09	.628	.671	**.793**	.749	.583	.687	.678
CUA05	.598	.618	.644	**.778**	.543	.551	.576
EWG04	.632	.666	.716	**.850**	.572	.627	.643
EWG06	.668	.677	.718	**.843**	.577	.607	.582
EWG08	.623	.653	.708	**.817**	.547	.597	.581
EWG15	.509	.520	.543	**.679**	.551	.490	.468
3CM02	.587	.603	.654	**.760**	.519	.540	.546
3CM03	.620	.548	.563	**.710**	.501	.482	.509
CUA04	.586	.547	.540	.565	**.730**	.483	.520
CUA06	.703	.623	.698	.553	**.865**	.609	.655
CUA09	.609	.555	.564	.537	**.739**	.498	.514
CUA10	.541	.482	.541	.442	**.675**	.461	.526
CUA07	.467	.472	.499	.497	**.647**	.481	.454
CUA08	.338	.403	.388	.443	**.529**	.376	.399
CUA03	.535	.462	.520	.423	**.660**	.452	.535
EWG13	.695	.709	.786	.653	.621	**.926**	.758
EWG14	.691	.735	.823	.699	.644	**.926**	.760
EWG16	.667	.645	.740	.612	.644	**.880**	.703
CUA02	.684	.638	.741	.614	.672	.702	**.906**
EWG10	.674	.676	.794	.643	.661	.770	**.924**
EWG12	.722	.723	.823	.679	.685	.725	**.873**

Weights:							
Latent variable	Manifest variables	Outer weight	Outer weight (Bootstrap)	Standard error	Critical ratio (CR)	Lower bound (95%)	Upper bound (95%)
Grounding	CUA01	.194	.193	.008	25.767	.179	.208
	EWG03	.218	.217	.007	32.837	.205	.231
	EWG17	.210	.210	.006	33.146	.198	.223
	EWG18	.213	.213	.006	35.026	.201	.225
	3CM01	.197	.197	.008	25.650	.182	.212
	EWG11	.188	.187	.008	23.238	.171	.203
3C Mechanisms	3CM06	.402	.404	.051	7.881	.304	.506
	3CM07	.380	.376	.062	6.120	.254	.496
	3CM08	.344	.343	.064	5.397	.215	.469
Usability	EWG01	.113	.111	.029	3.937	.055	.167
	EWG02	.070	.071	.038	1.818	-.004	.146
	EWG05	.262	.262	.036	7.211	.190	.332

	3CM04	.070	.068	.025	2.763	.018	.117
	EWG07	.122	.126	.046	2.675	.036	.214
	EWG19	.155	.154	.030	5.076	.092	.212
	3CM05	.255	.252	.036	7.094	.181	.323
	EWG09	.143	.142	.029	4.896	.084	.200
Team Integration	CUA05	.164	.166	.058	2.849	.055	.277
	EWG04	.229	.230	.060	3.821	.108	.347
	EWG06	.241	.241	.061	3.954	.120	.361
	EWG08	.298	.296	.052	5.692	.191	.397
	EWG15	.183	.181	.046	3.999	.093	.273
	3CM02	-.027	-.028	.066	-.409	-.153	.105
	3CM03	.178	.175	.050	3.539	.077	.275
Shared Access	CUA04	.154	.154	.060	2.561	.038	.271
	CUA06	.457	.452	.061	7.551	.328	.568
	CUA09	.165	.164	.067	2.456	.033	.298
	CUA10	-.050	-.049	.071	-.701	-.190	.088
	CUA07	.195	.194	.052	3.719	.088	.296
	CUA08	.169	.169	.049	3.429	.072	.267
	CUA03	.284	.284	.056	5.092	.173	.396
Communication	EWG13	.368	.368	.008	45.181	.352	.385
	EWG14	.380	.379	.009	42.346	.363	.398
	EWG16	.350	.350	.010	34.894	.330	.370
Awareness	CUA02	.356	.356	.007	54.748	.344	.369
	EWG10	.371	.371	.006	57.417	.358	.384
	EWG12	.383	.383	.009	42.218	.366	.402

Correlations										
Latent variable	Manifest variables	Standardized loadings	Loadings	Communalities	Redundancies	Standardized loadings (Bootstrap)	Standard error	Critical ratio (CR)	Lower bound (95%)	Upper bound (95%)
Grounding	CUA01	.780	.780	.608	.463	.780	.025	31.604	.728	.825
	EWG03	.833	.833	.693	.528	.833	.019	42.947	.792	.869
	EWG17	.852	.852	.727	.553	.852	.017	49.525	.816	.884
	EWG18	.864	.864	.746	.568	.863	.016	52.855	.828	.892
	3CM01	.805	.805	.648	.493	.805	.022	35.906	.758	.847
	EWG11	.779	.779	.607	.462	.779	.028	28.019	.720	.830
3C Mechanisms	3CM06	.893	.893	.798	.606	.892	.019	46.553	.851	.927
	3CM07	.897	.897	.804	.611	.895	.020	44.677	.852	.931
	3CM08	.873	.873	.762	.579	.872	.025	34.620	.818	.916
Usability	EWG01	.783	.783	.613	.553	.782	.027	29.472	.726	.829
	EWG02	.844	.844	.713	.643	.843	.022	38.736	.796	.881
	EWG05	.886	.886	.785	.707	.885	.015	57.459	.853	.913
	3CM04	.704	.704	.496	.447	.704	.034	2.760	.634	.769
	EWG07	.880	.880	.775	.698	.880	.017	51.196	.842	.910
	EWG19	.813	.813	.662	.596	.811	.021	38.124	.768	.851
	3CM05	.883	.883	.779	.702	.881	.014	61.361	.852	.907
	EWG09	.793	.793	.629	.566	.792	.024	33.225	.745	.837
Team Integration	CUA05	.778	.778	.605	.446	.775	.035	22.272	.701	.838
	EWG04	.850	.850	.722	.532	.847	.024	35.364	.796	.890

	EWG06	.843	.843	.711	.524	.840	.027	31.192	.783	.888
	EWG08	.817	.817	.668	.493	.814	.027	3.022	.757	.863
	EWG15	.679	.679	.461	.340	.676	.042	16.014	.589	.756
	3CM02	.760	.760	.577	.426	.757	.034	22.388	.686	.819
	3CM03	.710	.710	.504	.372	.706	.037	19.422	.629	.774
Shared Access	CUA04	.730	.730	.533	.365	.726	.038	19.281	.647	.795
	CUA06	.865	.865	.749	.512	.860	.026	33.224	.804	.906
	CUA09	.739	.739	.545	.373	.735	.040	18.600	.654	.810
	CUA10	.675	.675	.455	.311	.671	.042	15.998	.585	.751
	CUA07	.647	.647	.418	.286	.643	.041	15.712	.560	.721
	CUA08	.529	.529	.280	.191	.526	.051	1.474	.424	.624
	CUA03	.660	.660	.435	.298	.657	.056	11.799	.540	.761
Communication	EWG13	.926	.926	.857	.652	.925	.011	82.087	.902	.945
	EWG14	.926	.926	.857	.652	.925	.009	99.306	.905	.942
	EWG16	.880	.880	.774	.589	.880	.017	51.627	.844	.910
Awareness	CUA02	.906	.906	.821	.648	.906	.011	8.863	.883	.926
	EWG10	.924	.924	.854	.674	.924	.009	98.280	.904	.941
	EWG12	.873	.873	.762	.602	.873	.014	61.281	.844	.899

Mean Communalities		
Latent variable	Type	Mean Communalities
Grounding	Endogenous	.672
3C Capabilites	Endogenous	.788
Usability	Endogenous	.681
Teaming	Endogenous	.607
Shared Access	Endogenous	.488
Communication	Endogenous	.829
Awareness	Endogenous	.812
Mean		.660

Discriminant validity (Squared correlations < AVE):					
	Grounding	Team Integration	Shared Access	Communication	Awareness
Grounding	**1**	.605	**.617**	.564	.593
3C Mechanisms	.581	**.622**	**.531**	.586	.570
Usability	**.696**	**.699**	**.607**	.741	.763
Team Integration	.605	**1**	**.489**	.518	.515
Shared Access	**.617**	**.489**	**1**	.487	.558
Communication	.564	.518	.487	**1**	.661
Awareness	.593	.515	.558	.661	**1**
Mean Communalities (AVE)	.672	.607	.488	.829	.812

D.

Composite reliability (Monofactorial manifest variables):						
Latent variable	Dimensions	Cronbach's alpha	D.G. rho (PCA)	Condition number	Critical value	Eigenvalues
Grounding	6	.902	.925	4.330	1.000	4.030
						.560
						.497
						.387
						.311
						.215
3C Mechanisms	3	.866	.918	2.824	1.000	2.365
						.338
						.297
Usability	8	.935	.946	5.353	1.000	5.511
						.589
						.514
						.376
						.308
						.279
						.231
						.192
Team Integration	7	.897	.920	4.018	1.000	4.352
						.674
						.548
						.461
						.386
						.309
						.270
Shared Access	6	.803	.861	3.108	1.000	3.072
						.921
						.680
						.573
						.436
						.318
Communication	3	.897	.936	3.641	1.000	2.488
						.324
						.188
Awareness	3	.884	.929	3.584	1.000	2.438
						.373
						.190

Variables/Factors correlations (Grounding):						
	F1	F2	F3	F4	F5	F6
CUA01	.779	.397	-.346	-.274	-.200	.031
EWG03	.828	.338	.013	.171	.413	-.025
EWG17	.853	-.231	.204	-.295	.041	-.297
EWG18	.865	-.314	.066	-.157	.090	.341
3CM01	.806	.170	.419	.248	-.290	.032
EWG11	.782	-.328	-.395	.331	-.082	-.090
Variables/Factors correlations (3C Mechanisms):						

	F1	F2	F3
3CM06	.884	-.406	-.232
3CM07	.897	-.009	.442
3CM08	.883	.416	-.217

Variables/Factors correlations (Usability):

	F1	F2	F3	F4	F5	F6	F7	F8
EWG01	.797	.453	-.084	-.176	-.296	-.095	-.111	-.116
EWG02	.872	.018	-.003	.128	.316	-.226	-.266	-.032
EWG05	.855	-.127	-.090	-.256	.118	.385	-.120	-.044
3CM04	.746	-.102	**.639**	.088	-.098	.045	.014	-.073
EWG07	.895	.217	.038	.023	.007	.034	.064	.379
EWG19	.811	-.373	-.055	-.328	-.009	-.250	.171	.007
3CM05	.863	.222	-.130	.190	.164	.059	.310	-.163
EWG09	.789	-.348	-.264	.333	-.264	.039	-.065	.009

Variables/Factors correlations (Team Integration):

	F1	F2	F3	F4	F5	F6	F7
CUA05	.802	.079	-.119	.404	.399	.049	-.106
EWG04	.856	-.155	-.087	.161	-.117	-.285	.340
EWG06	.834	-.145	.281	.090	-.249	-.166	-.327
EWG08	.764	.055	.510	-.275	.239	.057	.131
EWG15	.690	**.607**	-.259	-.254	-.036	-.138	-.069
3CM02	.847	.094	-.037	.103	-.287	.414	.086
3CM03	.711	-.492	-.344	-.336	.102	.062	-.081

Variables/Factors correlations (Shared Access):

	F1	F2	F3	F4	F5	F6
CUA04	.816	-.157	.022	-.337	-.262	-.357
CUA06	.772	.328	-.124	.026	.506	-.156
CUA09	.807	.034	-.303	-.328	-.059	.381
CUA07	.695	-.253	-.336	.562	-.155	-.018
CUA08	.588	-.575	.524	.039	.182	.123
CUA03	.575	**.627**	.431	.183	-.223	.077

Variables/Factors correlations (Communication):

	F1	F2	F3
EWG13	.926	-.215	.310
EWG14	.924	-.235	-.302
EWG16	.881	.472	-.009

Variables/Factors correlations (Awareness):

	F1	F2	F3
CUA02	.913	-.292	-.285
EWG10	.928	-.181	.326
EWG12	.862	.504	-.048

Cross-loadings (Monofactorial manifest variables):

	Grounding	3C Mechanisms	Usability	Team Integration	Shared Access	Communication	Awareness
CUA01	**.780**	.609	.630	.586	.602	.623	.602
EWG03	**.833**	.677	.727	.649	.708	.653	.689
EWG17	**.852**	.650	.714	.666	.654	.640	.640
EWG18	**.864**	.644	.742	.678	.653	.630	.668
3CM01	**.805**	.599	.666	.681	.592	.586	.585

EWG11	**.779**	.562	.612	.559	.649	.557	.598
3CM06	.660	**.894**	.756	.718	.650	.677	.700
3CM07	.702	**.896**	.776	.719	.626	.707	.644
3CM08	.671	**.873**	.748	.661	.664	.653	.666
EWG01	.689	.696	**.783**	.601	.644	.654	.661
EWG02	.706	.718	**.845**	.722	.643	.765	.704
EWG05	.765	.740	**.886**	.728	.679	.740	.817
3CM04	.551	.579	**.705**	.583	.561	.656	.622
EWG07	.707	.765	**.880**	.663	.672	.837	.792
EWG19	.653	.719	**.814**	.743	.638	.668	.681
3CM05	.752	.756	**.882**	.721	.710	.748	.761
EWG09	.628	.671	**.793**	.749	.583	.687	.678
CUA05	.598	.618	.644	**.778**	.544	.551	.576
EWG04	.632	.666	.716	**.850**	.570	.627	.643
EWG06	.668	.677	.718	**.843**	.576	.607	.582
EWG08	.623	.653	.708	**.817**	.545	.597	.581
EWG15	.509	.520	.543	**.679**	.549	.490	.468
3CM02	.587	.603	.654	**.760**	.520	.540	.546
3CM03	.620	.548	.563	**.710**	.502	.482	.509
CUA04	.586	.547	.540	.565	**.731**	.483	.520
CUA06	.703	.623	.698	.553	**.866**	.609	.655
CUA09	.609	.555	.564	.537	**.739**	.498	.514
CUA07	.467	.472	.499	.497	**.647**	.481	.454
CUA08	.338	.403	.388	.443	**.530**	.376	.399
CUA03	.535	.462	.520	.423	**.660**	.452	.535
EWG13	.695	.709	.786	.653	.621	**.926**	.758
EWG14	.691	.735	.823	.699	.642	**.926**	.760
EWG16	.667	.645	.740	.612	.643	**.880**	.703
CUA02	.684	.638	.741	.614	.671	.702	**.906**
EWG10	.674	.676	.794	.643	.662	.770	**.924**
EWG12	.722	.723	.823	.679	.685	.725	**.873**

Latent variable	Manifest variables	Outer weight	Outer weight (Bootstrap)	Standard error	Critical ratio (CR)	Lower bound (95%)	Upper bound (95%)
Grounding	CUA01	.194	.194	.008	25.690	.179	.208
	EWG03	.218	.217	.007	33.372	.205	.231
	EWG17	.210	.210	.007	31.973	.198	.224
	EWG18	.213	.213	.006	34.030	.201	.225
	3CM01	.197	.197	.008	25.513	.182	.212
	EWG11	.188	.188	.008	23.284	.172	.203
3C Mechanisms	3CM06	.404	.405	.051	7.845	.307	.508
	3CM07	.379	.378	.061	6.201	.257	.495
	3CM08	.343	.340	.064	5.387	.211	.461
Usability	EWG01	.112	.110	.029	3.897	.053	.165
	EWG02	.070	.072	.039	1.804	-.006	.148
	EWG05	.263	.263	.037	7.183	.190	.332
	3CM04	.070	.068	.025	2.789	.017	.117
	EWG07	.122	.126	.046	2.664	.035	.216
	EWG19	.155	.154	.030	5.142	.094	.212
	3CM05	.254	.252	.036	7.001	.180	.322
	EWG09	.142	.142	.030	4.784	.085	.201

Team Integration	CUA05	.166	.167	.057	2.909	.056	.278
	EWG04	.229	.228	.061	3.734	.109	.352
	EWG06	.241	.241	.061	3.923	.118	.358
	EWG08	.297	.295	.052	5.754	.193	.394
	EWG15	.182	.181	.046	3.974	.091	.273
	3CM02	-.026	-.027	.067	-.389	-.155	.112
	3CM03	.179	.176	.050	3.566	.079	.275
Shared Access	CUA04	.157	.157	.061	2.593	.037	.274
	CUA06	.449	.445	.059	7.574	.330	.561
	CUA09	.150	.150	.063	2.396	.028	.274
	CUA07	.186	.183	.053	3.526	.079	.286
	CUA08	.167	.167	.048	3.478	.072	.262
	CUA03	.268	.269	.052	5.129	.170	.374
Communication	EWG13	.368	.368	.008	44.297	.353	.385
	EWG14	.380	.380	.009	42.797	.363	.398
	EWG16	.350	.350	.010	34.454	.329	.370
Awareness	CUA02	.356	.356	.006	55.025	.344	.369
	EWG10	.371	.371	.006	57.188	.358	.384
	EWG12	.383	.383	.009	41.630	.366	.402

Correlations:

Latent variable	Manifest variables	Standardized loadings	Loadings	Communalities	Redundancies	Standardized loadings (Bootstrap)	Standard error	Critical ratio (CR)	Lower bound (95%)	Upper bound (95%)
Grounding	CUA01	.780	.780	.608	.463	.780	.025	31.648	.727	.824
	EWG03	.833	.833	.693	.528	.832	.019	42.839	.791	.868
	EWG17	.852	.852	.726	.553	.852	.017	49.302	.817	.883
	EWG18	.864	.864	.746	.568	.863	.016	52.978	.828	.892
	3CM01	.805	.805	.648	.494	.804	.023	35.651	.757	.847
	EWG11	.779	.779	.607	.462	.779	.028	27.391	.719	.831
3C Mechanisms	3CM06	.894	.894	.799	.607	.892	.019	45.910	.851	.927
	3CM07	.896	.896	.804	.611	.895	.020	45.636	.854	.930
	3CM08	.873	.873	.762	.579	.871	.025	35.073	.818	.915
Usability	EWG01	.783	.783	.613	.552	.781	.026	29.575	.726	.830
	EWG02	.845	.845	.713	.643	.843	.022	38.895	.798	.882
	EWG05	.886	.886	.786	.708	.885	.015	58.240	.853	.913
	3CM04	.705	.705	.496	.447	.703	.034	2.545	.634	.767
	EWG07	.880	.880	.775	.698	.879	.017	51.909	.842	.909
	EWG19	.814	.814	.662	.597	.811	.021	38.217	.767	.851
	3CM05	.882	.882	.778	.702	.881	.014	61.220	.850	.907
	EWG09	.793	.793	.628	.566	.792	.024	33.189	.742	.836
Team Integration	CUA05	.778	.778	.606	.447	.775	.034	22.868	.707	.838
	EWG04	.850	.850	.722	.532	.846	.025	34.671	.793	.891
	EWG06	.843	.843	.711	.525	.840	.027	3.957	.784	.889
	EWG08	.817	.817	.668	.492	.814	.027	3.083	.755	.863
	EWG15	.679	.679	.460	.340	.676	.042	16.057	.590	.755
	3CM02	.760	.760	.578	.426	.757	.034	22.147	.688	.822
	3CM03	.710	.710	.505	.372	.707	.036	19.561	.630	.772
Ad A	CUA04	.731	.731	.534	.365	.727	.038	19.179	.649	.797

	CUA06	.866	.866	.750	.513	.861	.026	33.376	.806	.907
	CUA09	.739	.739	.546	.373	.736	.040	18.491	.654	.811
	CUA07	.647	.647	.419	.286	.642	.042	15.476	.559	.724
	CUA08	.530	.530	.280	.192	.526	.050	1.671	.424	.620
	CUA03	.660	.660	.436	.298	.658	.056	11.740	.543	.759
Communication	EWG13	.926	.926	.857	.652	.925	.011	81.156	.901	.945
	EWG14	.926	.926	.857	.652	.925	.009	101.087	.906	.942
	EWG16	.880	.880	.774	.589	.879	.017	52.253	.843	.909
Awareness	CUA02	.906	.906	.821	.648	.906	.011	81.265	.883	.927
	EWG10	.924	.924	.854	.674	.923	.009	99.506	.904	.940
	EWG12	.873	.873	.762	.602	.872	.014	61.663	.843	.898

Mean Communalities		
Latent variable	Type	Mean Communalities
Grounding	Endogenous	.672
3C Mechanisms	Endogenous	.788
Usability	Endogenous	.681
Team Integration	Endogenous	.607
Shared Access	Endogenous	.494
Communication	Endogenous	.829
Awareness	Endogenous	.812
Mean		.666

Discriminant validity (Squared correlations < AVE):							
	Grounding	3C Mechanisms	Usability	Team Integration	Shared Access	Communication	Awareness
Grounding	**1**	.581	**.696**	.605	**.617**	.564	.593
3C Mechanisms	.581	**1**	**.733**	**.622**	**.529**	.586	.570
Usability	**.696**	**.733**	**1**	**.699**	**.607**	.741	.763
Team Integration	.605	**.622**	**.699**	**1**	.486	.518	.515
Shared Access	**.617**	**.529**	**.607**	.486	**1**	.486	.559
Communication	.564	.586	.741	.518	.486	**1**	.662
Awareness	.593	.570	.763	.515	.559	.662	**1**
Mean Communalities (AVE)	.672	.788	.681	.607	.494	.829	.812

E.

Composite reliability (Monofactorial manifest variables):						
Latent variable	Dimensions	Cronbach's alpha	D.G. rho (PCA)	Condition number	Critical value	Eigenvalues
Grounding	6	.902	.925	4.330	1.000	4.030
						.560
						.497
						.387
						.311
						.215
3C Mechanisms	3	.866	.918	2.824	1.000	2.365
						.338
						.297
Usability	8	.935	.946	5.353	1.000	5.511
						.589
						.514
						.376
						.308
						.279
						.231
						.192
Team Integration	6	.873	.905	3.689	1.000	3.691
						.668
						.547
						.458
						.365
						.271
Shared Access	6	.803	.861	3.108	1.000	3.072
						.921
						.680
						.573
						.436
						.318
Communication	3	.897	.936	3.641	1.000	2.488
						.324
						.188
Awareness	3	.884	.929	3.584	1.000	2.438
						.373
						.190

Variables/Factors correlations (Grounding):						
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EWG17	.853	-.231	.204	-.295	.041	-.297
EWG18	.865	-.314	.066	-.157	.090	.341
3CM01	.806	.170	.419	.248	-.290	.032
EWG11	.782	-.328	-.395	.331	-.082	-.090

Variables/Factors correlations (3C Mechanisms):			
	F1	F2	F3

3CM06	.884	-.406	-.232
3CM07	.897	-.009	.442
3CM08	.883	.416	-.217

Variables/Factors correlations (Usability):

	F1	F2	F3	F4	F5	F6	F7	F8
EWG01	.797	.453	-.084	-.176	-.296	-.095	-.111	-.116
EWG02	.872	.018	-.003	.128	.316	-.226	-.266	-.032
EWG05	.855	-.127	-.090	-.256	.118	.385	-.120	-.044
3CM04	.746	-.102	**.639**	.088	-.098	.045	.014	-.073
EWG07	.895	.217	.038	.023	.007	.034	.064	.379
EWG19	.811	-.373	-.055	-.328	-.009	-.250	.171	.007
3CM05	.863	.222	-.130	.190	.164	.059	.310	-.163
EWG09	.789	-.348	-.264	.333	-.264	.039	-.065	.009

Variables/Factors correlations (Team Integration):

	F1	F2	F3	F4	F5	F6
CUA05	.807	.097	-.126	.457	-.323	-.103
EWG04	.861	-.141	-.088	.170	.241	.380
EWG06	.837	-.131	.282	.076	.327	-.300
EWG08	.776	.090	.495	-.248	-.257	.128
EWG15	.685	**.623**	-.278	-.224	.110	-.044
3CM03	.725	-.474	-.349	-.320	-.132	-.085

Variables/Factors correlations (Shared Access):

	F1	F2	F3	F4	F5	F6
CUA04	.816	-.157	.022	-.337	-.262	-.357
CUA06	.772	.328	-.124	.026	.506	-.156
CUA09	.807	.034	-.303	-.328	-.059	.381
CUA07	.695	-.253	-.336	.562	-.155	-.018
CUA08	.588	-.575	.524	.039	.182	.123
CUA03	.575	**.627**	.431	.183	-.223	.077

Variables/Factors correlations (Communication):

	F1	F2	F3
EWG13	.926	-.215	.310
EWG14	.924	-.235	-.302
EWG16	.881	.472	-.009

Variables/Factors correlations (Awareness):

	F1	F2	F3
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EWG10	.928	-.181	.326
EWG12	.862	.504	-.048

Cross-loadings (Monofactorial manifest variables):

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EWG03	**.833**	.677	.727	.648	.708	.653	.689
EWG17	**.852**	.650	.714	.667	.654	.640	.640
EWG18	**.864**	.644	.742	.678	.653	.630	.668
3CM01	**.805**	.599	.666	.682	.592	.586	.585
EWG11	**.779**	.562	.612	.558	.649	.557	.598
3CM06	.660	**.894**	.756	.718	.650	.677	.700

3CM07	.702	**.896**	.776	.718	.626	.707	.644
3CM08	.671	**.873**	.748	.661	.664	.653	.666
EWG01	.689	.696	**.783**	.602	.644	.654	.661
EWG02	.706	.718	**.844**	.722	.643	.765	.704
EWG05	.765	.740	**.886**	.728	.679	.740	.817
3CM04	.551	.579	**.704**	.583	.561	.656	.622
EWG07	.707	.765	**.880**	.663	.672	.837	.792
EWG19	.653	.719	**.814**	.744	.638	.668	.681
3CM05	.752	.756	**.882**	.721	.710	.748	.761
EWG09	.628	.671	**.793**	.751	.583	.687	.678
CUA05	.598	.618	.644	**.778**	.544	.551	.576
EWG04	.632	.666	.716	**.850**	.570	.627	.643
EWG06	.668	.677	.718	**.844**	.576	.607	.582
EWG08	.623	.653	.708	**.817**	.545	.597	.581
EWG15	.509	.520	.543	**.679**	.549	.490	.468
3CM03	.620	.548	.563	**.711**	.502	.482	.509
CUA04	.586	.547	.540	.566	**.731**	.483	.520
CUA06	.703	.623	.698	.552	**.866**	.609	.655
CUA09	.609	.555	.564	.537	**.739**	.498	.514
CUA07	.467	.472	.499	.497	**.647**	.481	.454
CUA08	.338	.403	.388	.443	**.530**	.376	.399
CUA03	.535	.462	.520	.422	**.660**	.452	.535
EWG13	.695	.709	.786	.653	.621	**.926**	.758
EWG14	.691	.735	.823	.699	.642	**.926**	.760
EWG16	.667	.645	.740	.611	.643	**.880**	.703
CUA02	.684	.638	.741	.614	.671	.702	**.906**
EWG10	.674	.676	.794	.643	.662	.770	**.924**
EWG12	.722	.723	.823	.679	.685	.725	**.873**

Weights:							
Latent variable	Manifest variables	Outer weight	Outer weight (Bootstrap)	Standard error	Critical ratio (CR)	Lower bound (95%)	Upper bound (95%)
Grounding	CUA001	.194	.193	.007	26.093	.179	.208
	EEWGG003	.218	.217	.007	33.211	.205	.231
	EEWGG017	.210	.210	.006	32.657	.198	.223
	EEWGG018	.213	.213	.006	33.751	.201	.226
	3CCMM011	.197	.196	.008	26.032	.182	.212
	EEWGG011	.188	.188	.008	22.771	.171	.203
3C Mechanisms	3CCMM006	.404	.404	.050	8.043	.304	.504
	3CCMM007	.379	.378	.062	6.105	.255	.497
	3CCMM008	.343	.341	.064	5.390	.217	.465
Usability	EEWGG001	.113	.111	.029	3.898	.054	.167
	EEWGG002	.07002	.071	.038	1.835	-.004	.146
	EEWGG005	.263	.262	.037	7.176	.187	.333
	3CCMM004	.07004	.069	.026	2.739	.017	.116
	EEWGG007	.122	.125	.046	2.662	.035	.216
	EEWGG019	.155	.155	.030	5.183	.097	.214
	3CCMM005	.253	.251	.036	7.004	.180	.322
	EEWGG009	.143	.143	.029	4.997	.088	.199
Team Integration	CUA005	.161	.164	.057	2.809	.051	.278
	EWGG004	.223	.223	.059	3.812	.107	.335

	EWG06	.234	.233	.058	4.047	.119	.349
	EWG08	.295	.294	.051	5.744	.192	.396
	EWG15	.177	.173	.042	4.185	.092	.258
	3CM03	.176	.175	.051	3.453	.074	.275
Shared Access	CUA04	.158	.157	.060	2.646	.038	.275
	CUA06	.449	.444	.058	7.759	.329	.555
	CUA09	.150	.149	.062	2.413	.028	.274
	CUA07	.186	.183	.051	3.647	.082	.283
	CUA08	.167	.167	.050	3.358	.070	.264
	CUA03	.267	.269	.051	5.200	.173	.372
Communication	EWG13	.368	.368	.008	44.027	.353	.385
	EWG14	.380	.379	.009	43.194	.363	.398
	EWG16	.350	.349	.010	34.459	.330	.370
Awareness	CUA02	.356	.356	.006	55.273	.344	.369
	EWG10	.371	.371	.006	57.442	.358	.384
	EWG12	.383	.383	.009	41.593	.366	.402

Correlations:

Latent variable	Manifest variables	Standardized loadings	Loadings	Communalities	Redundancies	Standardized loadings (Bootstrap)	Standard error	Critical ratio (CR)	Lower bound (95%)	Upper bound (95%)
Grounding	CUA01	.780	.780	.608	.463	.780	.025	31.764	.730	.825
	EWG03	.833	.833	.693	.528	.833	.020	42.381	.791	.870
	EWG17	.852	.852	.727	.553	.852	.017	49.252	.816	.884
	EWG18	.864	.864	.746	.568	.864	.016	53.724	.829	.892
	3CM01	.805	.805	.648	.494	.805	.022	35.987	.759	.846
	EWG11	.779	.779	.607	.462	.780	.028	27.378	.719	.830
3C Mechanisms	3CM06	.894	.894	.799	.607	.892	.019	46.516	.852	.927
	3CM07	.896	.896	.804	.611	.895	.020	44.904	.853	.931
	3CM08	.873	.873	.762	.579	.871	.025	34.868	.818	.915
Usability	EWG01	.783	.783	.613	.553	.781	.027	29.050	.724	.830
	EWG02	.844	.844	.713	.643	.843	.022	38.915	.797	.882
	EWG05	.886	.886	.786	.708	.885	.015	58.508	.853	.913
	3CM04	.704	.704	.496	.447	.704	.035	2.289	.632	.768
	EWG07	.880	.880	.775	.698	.879	.017	51.328	.843	.909
	EWG19	.814	.814	.662	.597	.812	.021	37.911	.768	.852
	3CM05	.882	.882	.778	.702	.881	.015	59.542	.849	.908
	EWG09	.793	.793	.629	.567	.792	.024	33.502	.743	.837
Team Integration	CUA05	.778	.778	.606	.447	.777	.034	22.640	.705	.841
	EWG04	.850	.850	.722	.533	.847	.024	34.903	.795	.892
	EWG06	.844	.844	.712	.525	.840	.027	31.167	.782	.890
	EWG08	.817	.817	.668	.493	.815	.027	3.366	.759	.864
	EWG15	.679	.679	.461	.340	.676	.042	16.146	.589	.757
	3CM03	.711	.711	.505	.373	.708	.037	19.102	.630	.778
Shared Access	CUA04	.731	.731	.534	.365	.727	.038	19.198	.647	.797
	CUA06	.866	.866	.750	.513	.861	.025	34.756	.808	.907
	CUA09	.739	.739	.546	.373	.736	.040	18.529	.656	.812
	CUA07	.647	.647	.419	.287	.643	.041	15.685	.560	.724
	CUA08	.530	.530	.281	.192	.526	.050	1.506	.428	.622

	CUA03	.660	.660	.436	.298	.659	.056	11.810	.545	.762
Communication	EWG13	.926	.926	.857	.652	.925	.011	81.721	.901	.945
	EWG14	.926	.926	.857	.652	.926	.009	10.889	.906	.942
	EWG16	.880	.880	.774	.589	.880	.017	51.938	.843	.910
Awareness	CUA02	.906	.906	.821	.648	.906	.011	8.191	.882	.926
	EWG10	.924	.924	.854	.674	.924	.009	98.246	.904	.941
	EWG12	.873	.873	.762	.602	.873	.014	61.216	.843	.899

Mean Communalities		
Latent variable	Type	Mean Communalities
Grounding	Endogenous	.672
3C Mechanisms	Endogenous	.788
Usability	Endogenous	.681
Team Integration	Endogenous	.612
Shared Access	Endogenous	.494
Communication	Endogenous	.829
Awareness	Endogenous	.812
Mean		.669

Discriminant validity (Squared correlations < AVE):							
	Grounding	3C Mechanisms	Usability	Team Integration	Shared Access	Communication	Awareness
Grounding	**1**	.581	**.696**	.605	**.617**	.564	.593
3C Mechanisms	.581	**1**	**.733**	**.622**	**.529**	.586	.570
Usability	**.696**	**.733**	**1**	**.700**	**.607**	.741	.763
Team Integration	.605	**.622**	**.700**	**1**	.486	.518	.515
Shared Access	**.617**	**.529**	**.607**	.486	**1**	.486	.559
Communication	.564	.586	.741	.518	.486	**1**	.662
Awareness	.593	.570	.763	.515	.559	.662	**1**
Mean Communalities (AVE)	.672	.788	.681	.612	.494	.829	.812

F.

Composite reliability (Monofactorial manifest variables):						
Latent variable	Dimensions	Cronbach's alpha	D.G. rho (PCA)	Condition number	Critical value	Eigenvalues
Grounding	6	.902	.925	4.330	1.000	4.030
						.560
						.497
						.387
						.311
						.215
3C Mechanisms	3	.866	.918	2.824	1.000	2.365
						.338
						.297
Usability	7	.933	.946	4.988	1.000	5.004
						.587
						.380
						.316
						.281
						.231
						.201
Team Integration	6	.873	.905	3.689	1.000	3.691
						.668
						.547
						.458
						.365
						.271
Shared Access	6	.803	.861	3.108	1.000	3.072
						.921
						.680
						.573
						.436
						.318
Communication	3	.897	.936	3.641	1.000	2.488
						.324
						.188
Awareness	3	.884	.929	3.584	1.000	2.438
						.373
						.190

Variables/Factors correlations (Grounding):						
	F1	F2	F3	F4	F5	F6
CUA01	.779	.397	-.346	-.274	-.200	.031
EWG03	.828	.338	.013	.171	.413	-.025
EWG17	.853	-.231	.204	-.295	.041	-.297
EWG18	.865	-.314	.066	-.157	.090	.341
3CM01	.806	.170	.419	.248	-.290	.032
EWG11	.782	-.328	-.395	.331	-.082	-.090

Variables/Factors correlations (3C Mechanisms):			
	F1	F2	F3
3CM06	.884	-.406	-.232

3CM07	.897	-.009	.442
3CM08	.883	.416	-.217

Variables/Factors correlations (Usability):							
	F1	F2	F3	F4	F5	F6	F7
EWG01	.805	.436	-.133	-.323	-.114	-.106	-.123
EWG02	.873	.014	.097	.349	-.192	-.254	-.074
EWG05	.860	-.141	-.239	.038	.406	-.119	-.054
EWG07	.894	.217	.008	.036	.018	.045	.387
EWG19	.812	-.382	-.326	-.018	-.239	.178	-.007
3CM05	.872	.202	.206	.132	.092	.321	-.165
EWG09	.797	-.379	.383	-.264	.010	-.069	.017

Variables/Factors correlations (Team Integration):						
	F1	F2	F3	F4	F5	F6
CUA05	.807	.097	-.126	.457	-.323	-.103
EWG04	.861	-.141	-.088	.170	.241	.380
EWG06	.837	-.131	.282	.076	.327	-.300
EWG08	.776	.090	.495	-.248	-.257	.128
EWG15	.685	**.623**	-.278	-.224	.110	-.044
3CM03	.725	-.474	-.349	-.320	-.132	-.085

Variables/Factors correlations (Shared Access):						
	F1	F2	F3	F4	F5	F6
CUA04	.816	-.157	.022	-.337	-.262	-.357
CUA06	.772	.328	-.124	.026	.506	-.156
CUA09	.807	.034	-.303	-.328	-.059	.381
CUA07	.695	-.253	-.336	.562	-.155	-.018
CUA08	.588	-.575	.524	.039	.182	.123
CUA03	.575	**.627**	.431	.183	-.223	.077

Variables/Factors correlations (Communication):			
	F1	F2	F3
EWG13	.926	-.215	.310
EWG14	.924	-.235	-.302
EWG16	.881	.472	-.009

Variables/Factors correlations (Awareness):			
	F1	F2	F3
CUA02	.913	-.292	-.285
EWG10	.928	-.181	.326
EWG12	.862	.504	-.048

Cross-loadings (Monofactorial manifest variables):							
	Grounding	3C Mechanisms	Usability	Team Integration	Shared Access	Communication	Awareness
CUA01	**.780**	.609	.629	.586	.602	.623	.602
EWG03	**.833**	.677	.726	.648	.708	.653	.689
EWG17	**.852**	.650	.716	.667	.654	.640	.640
EWG18	**.864**	.644	.745	.678	.654	.630	.668
3CM01	**.805**	.599	.668	.682	.593	.586	.585
EWG11	**.779**	.562	.611	.558	.649	.557	.598
3CM06	.660	**.894**	.757	.718	.650	.677	.700
3CM07	.702	**.896**	.777	.718	.626	.707	.644
3CM08	.671	**.873**	.749	.661	.665	.653	.666

EWG01	.689	.696	**.784**	.602	.644	.654	.661
EWG02	.706	.718	**.845**	.721	.642	.765	.704
EWG05	.765	.740	**.888**	.728	.679	.740	.817
EWG07	.707	.765	**.881**	.663	.672	.837	.792
EWG19	.653	.719	**.815**	.744	.638	.668	.681
3CM05	.752	.756	**.883**	.721	.710	.748	.761
EWG09	.628	.671	**.794**	.751	.583	.688	.678
CUA05	.598	.618	.641	**.778**	.544	.551	.576
EWG04	.632	.666	.717	**.850**	.570	.627	.643
EWG06	.668	.677	.715	**.843**	.576	.607	.582
EWG08	.623	.653	.706	**.817**	.544	.597	.581
EWG15	.509	.520	.539	**.678**	.549	.490	.468
3CM03	.620	.548	.567	**.712**	.502	.482	.509
CUA04	.586	.547	.541	.566	**.732**	.483	.520
CUA06	.703	.623	.698	.552	**.867**	.609	.655
CUA09	.609	.555	.561	.537	**.739**	.498	.514
CUA07	.467	.472	.487	.497	**.645**	.481	.454
CUA08	.338	.403	.388	.443	**.530**	.376	.399
CUA03	.535	.462	.518	.422	**.660**	.452	.535
EWG13	.695	.709	.785	.653	.621	**.926**	.758
EWG14	.691	.735	.822	.699	.642	**.926**	.760
EWG16	.667	.645	.735	.611	.642	**.880**	.703
CUA02	.684	.638	.740	.614	.672	.702	**.906**
EWG10	.674	.676	.792	.643	.662	.770	**.924**
EWG12	.722	.723	.821	.679	.685	.725	**.873**

Weights:							
Latent variable	Manifest variables	Outer weight	Outer weight (Bootstrap)	Standard error	Critical ratio (CR)	Lower bound (95%)	Upper bound (95%)
Grounding	CUA01	.194	.194	.007	26.287	.179	.208
	EWG03	.217	.217	.007	32.986	.205	.231
	EWG17	.210	.210	.007	32.234	.198	.223
	EWG18	.213	.213	.006	34.732	.201	.225
	3CM01	.197	.197	.008	26.121	.182	.212
	EWG11	.187	.188	.008	22.883	.171	.203
3C Mechanisms	3CM06	.403	.403	.051	7.908	.304	.506
	3CM07	.379	.378	.061	6.230	.260	.496
	3CM08	.344	.342	.064	5.398	.215	.464
Usability	EWG01	.112	.110	.030	3.703	.051	.169
	EWG02	.084	.084	.040	2.081	.004	.159
	EWG05	.269	.270	.038	7.171	.196	.343
	EWG07	.146	.149	.044	3.281	.063	.237
	EWG19	.167	.166	.032	5.233	.101	.228
	3CM05	.252	.250	.037	6.865	.178	.322
	EWG09	.145	.144	.030	4.878	.086	.202
Team Integration	CUA05	.160	.162	.057	2.810	.051	.274
	EWG04	.225	.224	.058	3.877	.110	.339
	EWG06	.233	.233	.059	3.950	.117	.347
	EWG08	.295	.294	.052	5.685	.192	.395
	EWG15	.176	.173	.042	4.177	.089	.253

	3CM03	.178	.177	.051	3.460	.076	.277
Shared Access	CUA04	.160	.161	.060	2.659	.044	.278
	CUA06	.451	.444	.059	7.665	.324	.557
	CUA09	.150	.150	.061	2.437	.030	.271
	CUA07	.182	.180	.052	3.504	.078	.280
	CUA08	.167	.167	.049	3.424	.071	.263
	CUA03	.267	.267	.051	5.203	.169	.370
Communication	EWG13	.369	.368	.008	45.142	.352	.385
	EWG14	.380	.379	.009	42.692	.363	.398
	EWG16	.349	.349	.010	35.154	.330	.370
Awareness	CUA02	.356	.356	.006	56.271	.344	.369
	EWG10	.371	.371	.007	56.783	.358	.384
	EWG12	.383	.383	.009	41.747	.366	.403

Correlations:										
Latent variable	Manifest variables	Standardized loadings	Loadings	Communalities	Redundancies	Standardized loadings (Bootstrap)	Standard error	Critical ratio (CR)	Lower bound (95%)	Upper bound (95%)
Grounding	CUA01	.780	.780	.608	.464	.780	.024	32.250	.730	.824
	EWG03	.833	.833	.693	.529	.832	.020	41.754	.790	.867
	EWG17	.852	.852	.727	.554	.852	.018	48.651	.815	.883
	EWG18	.864	.864	.746	.568	.864	.017	52.012	.828	.893
	3CM01	.805	.805	.648	.494	.805	.023	35.145	.755	.847
	EWG11	.779	.779	.607	.463	.779	.028	27.673	.718	.830
3C Mechanisms	3CM06	.894	.894	.799	.608	.892	.019	46.584	.852	.928
	3CM07	.896	.896	.804	.612	.896	.020	45.400	.854	.931
	3CM08	.873	.873	.762	.580	.871	.025	35.011	.817	.915
Usability	EWG01	.784	.784	.615	.553	.782	.027	28.835	.725	.832
	EWG02	.845	.845	.715	.643	.844	.021	39.977	.800	.882
	EWG05	.888	.888	.788	.708	.887	.015	58.394	.855	.914
	EWG07	.881	.881	.777	.698	.880	.017	51.584	.843	.911
	EWG19	.815	.815	.664	.597	.813	.021	38.172	.768	.852
	3CM05	.883	.883	.780	.702	.882	.015	59.708	.851	.909
	EWG09	.794	.794	.630	.567	.793	.024	32.920	.744	.838
Team Integration	CUA05	.778	.778	.605	.445	.775	.034	22.799	.705	.838
	EWG04	.850	.850	.723	.532	.847	.024	35.399	.798	.891
	EWG06	.843	.843	.711	.523	.840	.028	3.354	.780	.890
	EWG08	.817	.817	.668	.491	.815	.027	3.043	.757	.864
	EWG15	.678	.678	.460	.338	.675	.042	16.095	.589	.753
	3CM03	.712	.712	.506	.373	.709	.036	19.676	.635	.775
Shared Access	CUA04	.732	.732	.535	.366	.730	.038	19.102	.651	.800
	CUA06	.867	.867	.751	.513	.861	.025	34.246	.806	.906
	CUA09	.739	.739	.546	.373	.737	.040	18.674	.656	.810
	CUA07	.645	.645	.416	.284	.641	.042	15.289	.556	.720
	CUA08	.530	.530	.281	.192	.527	.051	1.378	.423	.621
	CUA03	.660	.660	.436	.298	.657	.056	11.823	.542	.761
Communication	EWG13	.926	.926	.857	.650	.925	.011	81.900	.901	.945
	EWG14	.926	.926	.857	.650	.926	.009	102.805	.907	.942
	EWG16	.880	.880	.774	.587	.880	.017	52.091	.844	.910

Awareness	CUA02	.906	.906	.821	.648	.906	.011	81.969	.883	.927
	EWG10	.924	.924	.854	.674	.924	.009	101.370	.904	.940
	EWG12	.873	.873	.762	.601	.873	.014	62.260	.844	.899

Mean Communalities		
Latent variable	Type	Mean Communalities
Grounding	Endogenous	.672
3C Mechanisms	Endogenous	.788
Usability	Endogenous	.710
Team Integration	Endogenous	.612
Shared Access	Endogenous	.494
Communication	Endogenous	.829
Awareness	Endogenous	.812
Mean		.674

Discriminant validity (Squared correlations < AVE):							
	Grounding	3C Mechanisms	Usability	Team Integration	Shared Access	Communication	Awareness
Grounding	**1**	.581	.697	.605	**.617**	.564	.593
3C Mechanisms	.581	**1**	**.734**	**.622**	**.530**	.586	.570
Usability	.697	**.734**	**1**	**.698**	**.603**	.737	.761
Team Integration	.605	**.622**	**.698**	**1**	.485	.518	.515
Shared Access	**.617**	**.530**	**.603**	.485	**1**	.486	.559
Communication	.564	.586	.737	.518	.486	**1**	.662
Awareness	.593	.570	.761	.515	.559	.662	**1**
Mean Communalities (AVE)	.672	.788	.710	.612	.494	.829	.812

G.

Composite reliability (Monofactorial manifest variables):						
Latent variable	Dimensions	Cronbach's alpha	D.G. rho (PCA)	Condition number	Critical value	Eigenvalues
Grounding	6	.902	.925	4.330	1.000	4.030
						.560
						.497
						.387
						.311
						.215
3C Mechanisms	3	.866	.918	2.824	1.000	2.365
						.338
						.297
Usability	6	.920	.937	4.595	1.000	4.285
						.587
						.377
						.292
						.256
						.203
Team Integration	6	.873	.905	3.689	1.000	3.691
						.668
						.547
						.458
						.365
						.271
Shared Access	6	.803	.861	3.108	1.000	3.072
						.921
						.680
						.573
						.436
						.318
Communication	3	.897	.936	3.641	1.000	2.488
						.324
						.188
Awareness	3	.884	.929	3.584	1.000	2.438
						.373
						.190

Variables/Factors correlations (Grounding):						
	F1	F2	F3	F4	F5	F6
CUA01	.779	.397	-.346	-.274	-.200	.031
EWG03	.828	.338	.013	.171	.413	-.025
EWG17	.853	-.231	.204	-.295	.041	-.297
EWG18	.865	-.314	.066	-.157	.090	.341
3CM01	.806	.170	.419	.248	-.290	.032
EWG11	.782	-.328	-.395	.331	-.082	-.090

Variables/Factors correlations (3C Mechanisms):			
	F1	F2	F3
3CM06	.884	-.406	-.232
3CM07	.897	-.009	.442

3CM08	.883	.416	-.217

Variables/Factors correlations (Usability):						
	F1	F2	F3	F4	F5	F6
EWG01	.814	.440	-.091	.314	.155	-.113
EWG05	.867	-.138	-.223	-.299	.297	-.048
EWG07	.895	.219	.015	-.066	-.087	.373
EWG19	.817	-.379	-.320	.167	-.241	-.033
3CM05	.871	.203	.206	-.223	-.246	-.217
EWG09	.802	-.376	.418	.149	.132	.019

Variables/Factors correlations (Team Integration):						
	F1	F2	F3	F4	F5	F6
CUA05	.807	.097	-.126	.457	-.323	-.103
EWG04	.861	-.141	-.088	.170	.241	.380
EWG06	.837	-.131	.282	.076	.327	-.300
EWG08	.776	.090	.495	-.248	-.257	.128
EWG15	.685	**.623**	-.278	-.224	.110	-.044
3CM03	.725	-.474	-.349	-.320	-.132	-.085

Variables/Factors correlations (Shared Access):						
	F1	F2	F3	F4	F5	F6
CUA04	.816	-.157	.022	-.337	-.262	-.357
CUA06	.772	.328	-.124	.026	.506	-.156
CUA09	.807	.034	-.303	-.328	-.059	.381
CUA07	.695	-.253	-.336	.562	-.155	-.018
CUA08	.588	-.575	.524	.039	.182	.123
CUA03	.575	**.627**	.431	.183	-.223	.077

Variables/Factors correlations (Communication):			
	F1	F2	F3
EWG13	.926	-.215	.310
EWG14	.924	-.235	-.302
EWG16	.881	.472	-.009

Variables/Factors correlations (Awareness):			
	F1	F2	F3
CUA02	.913	-.292	-.285
EWG10	.928	-.181	.326
EWG12	.862	.504	-.048

Cross-loadings (Monofactorial manifest variables):							
	Grounding	3C Mechanisms	Usability	Team Integration	Shared Access	Communication	Awareness
CUA01	**.780**	.609	.630	.586	.602	.623	.602
EWG03	**.833**	.677	.725	.648	.708	.653	.689
EWG17	**.852**	.650	.716	.667	.654	.640	.640
EWG18	**.864**	.644	.744	.678	.654	.630	.668
3CM01	**.805**	.598	.662	.682	.593	.586	.585
EWG11	**.779**	.562	.609	.558	.649	.557	.598
3CM06	.660	**.893**	.755	.718	.650	.677	.700
3CM07	.702	**.896**	.776	.718	.626	.707	.644
3CM08	.671	**.874**	.752	.661	.665	.653	.666
EWG01	.689	.697	**.785**	.602	.644	.654	.661
EWG05	.765	.740	**.889**	.728	.679	.740	.817

EWG07	.707	.765	**.882**	.663	.672	.837	.792
EWG19	.653	.719	**.816**	.744	.638	.668	.681
3CM05	.752	.756	**.884**	.721	.710	.748	.761
EWG09	.628	.670	**.795**	.751	.583	.688	.678
CUA05	.598	.618	.639	**.778**	.545	.551	.576
EWG04	.632	.666	.716	**.850**	.570	.627	.643
EWG06	.668	.677	.711	**.843**	.576	.607	.582
EWG08	.623	.653	.704	**.817**	.544	.597	.581
EWG15	.509	.520	.538	**.678**	.549	.490	.468
3CM03	.620	.548	.566	**.712**	.502	.482	.509
CUA04	.586	.547	.543	.566	**.732**	.483	.520
CUA06	.703	.623	.698	.552	**.866**	.609	.655
CUA09	.609	.555	.563	.537	**.739**	.498	.514
CUA07	.467	.472	.483	.497	**.644**	.481	.454
CUA08	.338	.403	.389	.443	**.530**	.376	.399
CUA03	.535	.463	.519	.422	**.660**	.452	.535
EWG13	.695	.709	.785	.653	.621	**.926**	.758
EWG14	.691	.735	.819	.699	.642	**.926**	.760
EWG16	.667	.645	.729	.611	.642	**.880**	.703
CUA02	.684	.638	.741	.614	.672	.702	**.906**
EWG10	.674	.676	.794	.644	.662	.770	**.924**
EWG12	.722	.723	.824	.679	.685	.725	**.873**

Weights:							
Latent variable	Manifest variables	Outer weight	Outer weight (Bootstrap)	Standard error	Critical ratio (CR)	Lower bound (95%)	Upper bound (95%)
Grounding	CUA01	.194	.193	.008	25.653	.179	.209
	EWG03	.217	.217	.007	32.697	.205	.231
	EWG17	.210	.210	.007	31.888	.197	.224
	EWG18	.213	.213	.006	34.568	.201	.225
	3CM01	.197	.196	.008	26.052	.182	.212
	EWG11	.187	.188	.008	23.159	.172	.203
3C Mechanisms	3CM06	.402	.403	.050	7.971	.304	.501
	3CM07	.378	.377	.061	6.199	.253	.495
	3CM08	.346	.344	.063	5.490	.217	.468
Usability	EWG01	.117	.115	.030	3.831	.056	.174
	EWG05	.278	.279	.037	7.594	.206	.348
	EWG07	.167	.169	.044	3.782	.083	.255
	EWG19	.181	.179	.031	5.901	.120	.240
	3CM05	.274	.273	.037	7.494	.201	.346
	EWG09	.155	.155	.028	5.470	.099	.211
Team Integration	CUA05	.160	.162	.056	2.837	.053	.275
	EWG04	.226	.224	.058	3.860	.112	.338
	EWG06	.232	.232	.057	4.057	.121	.343
	EWG08	.296	.294	.051	5.774	.192	.391
	EWG15	.176	.173	.042	4.161	.088	.258
	3CM03	.178	.177	.052	3.446	.076	.276
Shared Access	CUA04	.160	.161	.060	2.681	.043	.278
	CUA06	.451	.447	.059	7.598	.327	.559
	CUA09	.150	.150	.063	2.382	.027	.276
	CUA07	.180	.177	.052	3.452	.076	.279

	CUA08	.167	.168	.049	3.440	.071	.264
	CUA03	.267	.267	.052	5.141	.167	.373
Communication	EWG13	.369	.369	.008	43.863	.352	.386
	EWG14	.380	.380	.009	42.078	.364	.398
	EWG16	.349	.349	.010	34.905	.329	.369
Awareness	CUA02	.356	.356	.006	55.478	.344	.369
	EWG10	.371	.371	.007	56.389	.358	.384
	EWG12	.383	.383	.009	41.778	.366	.402

Correlations:

Latent variable	Manifest variables	Standardized loadings	Loadings	Communalities	Redundancies	Standardized loadings (Bootstrap)	Standard error	Critical ratio (CR)	Lower bound (95%)	Upper bound (95%)
Grounding	CUA01	.780	.780	.608	.464	.780	.025	31.511	.728	.826
	EWG03	.833	.833	.693	.528	.833	.019	42.790	.793	.869
	EWG17	.852	.852	.727	.554	.852	.017	49.281	.816	.884
	EWG18	.864	.864	.746	.568	.863	.017	52.103	.828	.892
	3CM01	.805	.805	.648	.494	.805	.023	35.368	.758	.846
	EWG11	.779	.779	.607	.462	.780	.028	27.548	.720	.830
3C Mechanisms	3CM06	.893	.893	.798	.608	.892	.019	46.637	.852	.926
	3CM07	.896	.896	.803	.612	.895	.020	44.774	.852	.930
	3CM08	.874	.874	.763	.582	.872	.024	35.869	.820	.916
Usability	EWG01	.785	.785	.616	.553	.783	.027	29.445	.728	.833
	EWG05	.889	.889	.789	.709	.888	.015	58.428	.856	.915
	EWG07	.882	.882	.778	.699	.881	.017	51.625	.845	.912
	EWG19	.816	.816	.665	.597	.814	.021	38.526	.769	.854
	3CM05	.884	.884	.782	.702	.883	.015	59.765	.853	.910
	EWG09	.795	.795	.632	.567	.794	.024	33.167	.745	.838
Team Integration	CUA05	.778	.778	.605	.444	.775	.034	22.621	.704	.838
	EWG04	.850	.850	.723	.530	.847	.024	34.810	.797	.892
	EWG06	.843	.843	.710	.521	.840	.027	3.930	.783	.889
	EWG08	.817	.817	.668	.490	.814	.027	3.065	.756	.863
	EWG15	.678	.678	.460	.337	.674	.043	15.890	.587	.755
	3CM03	.712	.712	.507	.372	.709	.037	19.364	.635	.777
Shared Access	CUA04	.732	.732	.536	.366	.728	.038	19.296	.651	.798
	CUA06	.866	.866	.751	.513	.862	.025	34.228	.809	.907
	CUA09	.739	.739	.546	.373	.736	.040	18.331	.654	.811
	CUA07	.644	.644	.415	.283	.640	.042	15.252	.552	.719
	CUA08	.530	.530	.281	.192	.526	.051	1.355	.422	.624
	CUA03	.660	.660	.436	.298	.656	.057	11.644	.540	.763
Communication	EWG13	.926	.926	.857	.647	.925	.011	82.225	.901	.945
	EWG14	.926	.926	.857	.647	.925	.009	101.113	.906	.942
	EWG16	.880	.880	.774	.584	.880	.017	51.049	.842	.910
Awareness	CUA02	.906	.906	.821	.650	.906	.011	81.641	.883	.927
	EWG10	.924	.924	.854	.676	.924	.009	99.394	.904	.941
	EWG12	.873	.873	.762	.604	.873	.014	61.916	.843	.898

Mean Communalities

Latent variable	Type	Mean Communalities
Grounding	Endogenous	.672
3C Mechanisms	Endogenous	.788
Usability	Endogenous	.710
Team Integration	Endogenous	.612
Shared Access	Endogenous	.494
Communication	Endogenous	.829
Awareness	Endogenous	.812
Mean		.673

Discriminant validity (Squared correlations < AVE):							
	Grounding	3C Mechanisms	Usability	Team Integration	Shared Access	Communication	Awareness
Grounding	**1**	.581	.695	.605	**.617**	.564	.593
3C Mechanisms	.581	**1**	**.734**	**.622**	**.530**	.586	.570
Usability	.695	**.734**	**1**	**.693**	**.604**	.731	.764
Team Integration	.605	**.622**	**.693**	**1**	.485	.518	.515
Shared Access	**.617**	**.530**	**.604**	.485	**1**	.486	.559
Communication	.564	.586	.731	.518	.486	**1**	.662
Awareness	.593	.570	.764	.515	.559	.662	**1**
Mean Communalities (AVE)	.672	.788	.710	.612	.494	.829	.812

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Composite reliability (Monofactorial manifest variables):						
Latent variable	Dimensions	Cronbach's alpha	D.G. rho (PCA)	Condition number	Critical value	Eigenvalues
Grounding	6	.902	.925	4.330	1.000	4.030
						.560
						.497
						.387
						.311
						.215
3C Mechanisms	3	.866	.918	2.824	1.000	2.365
						.338
						.297
Usability	6	.920	.937	4.595	1.000	4.285
						.587
						.377
						.292
						.256
						.203
Team Integration	6	.873	.905	3.689	1.000	3.691
						.668
						.547
						.458
						.365
						.271
Shared Access	5	.804	.865	2.948	1.000	2.823
						.787
						.589
						.476
						.325
Communication	3	.897	.936	3.641	1.000	2.488
						.324
						.188
Awareness	3	.884	.929	3.584	1.000	2.438
						.373
						.190

Variables/Factors correlations (Grounding):						
	F1	F2	F3	F4	F5	F6
CUA01	.779	.397	-.346	-.274	-.200	.031
EWG03	.828	.338	.013	.171	.413	-.025
EWG17	.853	-.231	.204	-.295	.041	-.297
EWG18	.865	-.314	.066	-.157	.090	.341
3CM01	.806	.170	.419	.248	-.290	.032
EWG11	.782	-.328	-.395	.331	-.082	-.090

Variables/Factors correlations (3C Mechanisms):			
	F1	F2	F3
3CM06	.884	-.406	-.232
3CM07	.897	-.009	.442
3CM08	.883	.416	-.217

Variables/Factors correlations (Usability):						
	F1	F2	F3	F4	F5	F6
EWG01	.814	.440	-.091	.314	.155	-.113
EWG05	.867	-.138	-.223	-.299	.297	-.048
EWG07	.895	.219	.015	-.066	-.087	.373
EWG19	.817	-.379	-.320	.167	-.241	-.033
3CM05	.871	.203	.206	-.223	-.246	-.217
EWG09	.802	-.376	.418	.149	.132	.019

Variables/Factors correlations (Team Integration):						
	F1	F2	F3	F4	F5	F6
CUA05	.807	.097	-.126	.457	-.323	-.103
EWG04	.861	-.141	-.088	.170	.241	.380
EWG06	.837	-.131	.282	.076	.327	-.300
EWG08	.776	.090	.495	-.248	-.257	.128
EWG15	.685	**.623**	-.278	-.224	.110	-.044
3CM03	.725	-.474	-.349	-.320	-.132	-.085

Variables/Factors correlations (Shared Access):					
	F1	F2	F3	F4	F5
CUA04	.830	.069	-.280	-.298	-.374
CUA06	.746	-.407	-.058	.515	-.097
CUA09	.820	-.283	-.183	-.242	.395
CUA07	.723	.035	**.680**	-.108	-.034
CUA08	.619	**.732**	-.109	.226	.136

Variables/Factors correlations (Communication):			
	F1	F2	F3
EWG13	.926	-.215	.310
EWG14	.924	-.235	-.302
EWG16	.881	.472	-.009

Variables/Factors correlations (Awareness):			
	F1	F2	F3
CUA02	.913	-.292	-.285
EWG10	.928	-.181	.326
EWG12	.862	.504	-.048

Cross-loadings (Monofactorial manifest variables):							
	Grounding	3C Mechanisms	Usability	Team Integration	Shared Access	Communication	Awareness
CUA01	**.780**	.609	.630	.585	.575	.623	.602
EWG03	**.832**	.677	.724	.647	.676	.653	.689
EWG17	**.853**	.650	.716	.666	.653	.640	.640
EWG18	**.864**	.644	.744	.677	.647	.630	.668
3CM01	**.805**	.599	.662	.681	.580	.586	.585
EWG11	**.779**	.562	.609	.558	.614	.557	.598
3CM06	.660	**.896**	.755	.719	.650	.677	.700
3CM07	.702	**.895**	.776	.717	.606	.707	.644
3CM08	.671	**.872**	.752	.661	.644	.653	.666
EWG01	.689	.696	**.784**	.601	.622	.654	.661
EWG05	.765	.740	**.889**	.728	.662	.740	.817
EWG07	.707	.765	**.880**	.663	.644	.837	.792
EWG19	.653	.719	**.818**	.744	.630	.668	.681

3CM05	.752	.755	**.883**	.720	.684	.748	.761
EWG09	.628	.670	**.798**	.750	.580	.688	.678
CUA05	.598	.619	.640	**.781**	.550	.551	.576
EWG04	.632	.667	.717	**.853**	.570	.627	.644
EWG06	.668	.677	.711	**.841**	.558	.607	.582
EWG08	.623	.653	.706	**.814**	.519	.598	.581
EWG15	.509	.520	.539	**.684**	.567	.490	.468
3CM03	.620	.549	.567	**.708**	.478	.482	.509
CUA04	.586	.547	.544	.567	**.753**	.483	.520
CUA06	.703	.623	.698	.552	**.890**	.609	.655
CUA09	.609	.555	.563	.538	**.760**	.498	.514
CUA07	.467	.472	.484	.499	**.662**	.481	.454
CUA08	.338	.404	.390	.446	**.546**	.376	.399
EWG13	.695	.709	.784	.653	.597	**.926**	.758
EWG14	.691	.735	.819	.699	.637	**.926**	.760
EWG16	.667	.644	.729	.611	.623	**.880**	.703
CUA02	.683	.638	.741	.615	.640	.702	**.906**
EWG10	.674	.677	.793	.644	.620	.770	**.924**
EWG12	.722	.724	.824	.679	.671	.725	**.874**

Weights:

Latent variable	Manifest variables	Outer weight	Outer weight (Bootstrap)	Standard error	Critical ratio (CR)	Lower bound (95%)	Upper bound (95%)
Grounding	CUA01	.193	.193	.008	25.740	.179	.208
	EWG03	.217	.216	.007	32.270	.204	.231
	EWG17	.211	.211	.007	32.207	.198	.224
	EWG18	.214	.214	.006	34.653	.202	.226
	3CM01	.197	.197	.008	25.903	.182	.212
	EWG11	.187	.187	.008	22.410	.169	.202
3C Mechanisms	3CM06	.412	.412	.050	8.280	.317	.510
	3CM07	.373	.371	.061	6.096	.250	.484
	3CM08	.341	.340	.064	5.353	.214	.463
Usability	EWG01	.117	.116	.030	3.890	.058	.176
	EWG05	.279	.278	.036	7.658	.206	.349
	EWG07	.162	.163	.044	3.645	.077	.250
	EWG19	.185	.184	.030	6.215	.125	.241
	3CM05	.270	.269	.036	7.471	.198	.341
	EWG09	.161	.161	.028	5.699	.106	.218
Team Integration	CUA05	.166	.167	.057	2.925	.056	.279
	EWG04	.232	.231	.059	3.950	.119	.349
	EWG06	.228	.228	.057	3.992	.118	.341
	EWG08	.288	.286	.051	5.632	.186	.387
	EWG15	.184	.182	.042	4.407	.098	.259
	3CM03	.171	.169	.051	3.338	.071	.271
Shared Access	CUA04	.206	.208	.063	3.285	.086	.331
	CUA06	.572	.568	.061	9.378	.445	.682
	CUA09	.161	.159	.066	2.438	.026	.289
	CUA07	.180	.180	.054	3.344	.073	.284
	CUA08	.173	.173	.052	3.315	.072	.276
Communication	EWG13	.368	.368	.008	44.055	.352	.385
	EWG14	.381	.381	.009	42.194	.364	.399
	EWG16	.349	.349	.010	35.456	.329	.368
Awareness	CUA02	.356	.356	.006	55.365	.344	.369
	EWG10	.370	.369	.007	56.058	.357	.383
	EWG12	.385	.385	.009	41.909	.368	.404

Correlations:

Latent variable	Manifest variable	Standardized	Loadings	Communalities	Redundancies	Standardized	Standard error	Critical ratio	Lower bound	Upper bound

	s	loadings				loadings (Bootstrap)		(CR)	(95%)	(95%)
Grounding	CUA01	.780	.780	.608	.459	.779	.024	32.564	.730	.823
	EWG03	.832	.832	.693	.524	.832	.019	42.843	.791	.868
	EWG17	.853	.853	.727	.550	.853	.017	5.178	.817	.883
	EWG18	.864	.864	.746	.564	.864	.016	52.765	.829	.893
	3CM01	.805	.805	.649	.490	.805	.023	35.370	.756	.846
	EWG11	.779	.779	.606	.458	.779	.028	27.342	.719	.830
3C Mechanisms	3CM06	.896	.896	.803	.612	.895	.019	47.293	.854	.929
	3CM07	.895	.895	.800	.610	.893	.020	44.201	.849	.928
	3CM08	.872	.872	.760	.579	.870	.025	35.441	.817	.915
Usability	EWG01	.784	.784	.614	.551	.783	.026	29.869	.729	.831
	EWG05	.889	.889	.790	.709	.888	.015	57.993	.855	.915
	EWG07	.880	.880	.775	.695	.879	.017	5.800	.844	.911
	EWG19	.818	.818	.669	.600	.817	.021	38.898	.774	.856
	3CM05	.883	.883	.779	.699	.882	.014	61.649	.852	.908
	EWG09	.798	.798	.636	.571	.797	.024	33.145	.748	.842
Team Integration	CUA05	.781	.781	.611	.448	.779	.034	22.798	.709	.841
	EWG04	.853	.853	.727	.534	.850	.024	34.908	.798	.894
	EWG06	.841	.841	.707	.519	.838	.027	3.949	.782	.888
	EWG08	.814	.814	.662	.486	.811	.028	29.473	.752	.860
	EWG15	.684	.684	.467	.343	.682	.042	16.266	.595	.760
	3CM03	.708	.708	.502	.369	.706	.037	19.319	.631	.776
Shared Access	CUA04	.753	.753	.567	.365	.751	.037	2.092	.676	.822
	CUA06	.890	.890	.793	.510	.886	.025	35.227	.831	.930
	CUA09	.760	.760	.577	.371	.756	.040	19.227	.676	.829
	CUA07	.662	.662	.439	.282	.658	.042	15.703	.574	.736
	CUA08	.546	.546	.298	.192	.543	.052	1.504	.440	.642
Communication	EWG13	.926	.926	.857	.646	.925	.011	8.773	.900	.945
	EWG14	.926	.926	.857	.647	.926	.009	103.741	.907	.942
	EWG16	.880	.880	.774	.584	.879	.017	51.831	.843	.910
Awareness	CUA02	.906	.906	.820	.647	.906	.011	8.613	.882	.926
	EWG10	.924	.924	.853	.673	.923	.009	98.557	.903	.940
	EWG12	.874	.874	.763	.602	.873	.014	62.063	.844	.899

Mean Communalities		
Latent variable	Type	Mean Communalities
Grounding	Endogenous	.672
3C Mechanisms	Endogenous	.788
Usability	Endogenous	.711
Team Integration	Endogenous	.613
Shared Access	Endogenous	.535
Communication	Endogenous	.829
Awareness	Endogenous	.812
Mean		.685

Discriminant validity (Squared correlations < AVE):							
	Grounding	3C Mechanisms	Usability	Team Integration	Shared Access	Communication	Awareness
Grounding	**1**	.581	.694	.604	**.582**	.564	.593

3C Mechanisms	.581	**1**	**.734**	**.622**	.508	.586	.571
Usability	.694	**.734**	**1**	**.695**	**.571**	.730	.764
Team Integration	.604	**.622**	**.695**	**1**	.471	.518	.515
Shared Access	**.582**	.508	**.571**	.471	**1**	.461	.512
Communication	.564	.586	.730	.518	.461	**1**	.662
Awareness	.593	.571	.764	.515	.512	.662	**1**
Mean Communalities (AVE)	.672	.788	.711	.613	.535	.829	.812

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Composite reliability (Monofactorial manifest variables):						
Latent variable	Dimensions	Cronbach's alpha	D.G. rho (PCA)	Condition number	Critical value	Eigenvalues
Grounding	6	.902	.925	4.330	1.000	4.030
						.560
						.497
						.387
						.311
						.215
3C Mechanisms	3	.866	.918	2.824	1.000	2.365
						.338
						.297
Usability	6	.920	.937	4.595	1.000	4.285
						.587
						.377
						.292
						.256
						.203
Team Integration	6	.873	.905	3.689	1.000	3.691
						.668
						.547
						.458
						.365
						.271
Shared Access	4	.807	.874	2.703	1.000	2.538
						.597
						.518
						.347
Communication	3	.897	.936	3.641	1.000	2.488
						.324
						.188
Awareness	3	.884	.929	3.584	1.000	2.438
						.373
						.190

Variables/Factors correlations (Grounding):						
	F1	F2	F3	F4	F5	F6
CUA01	.779	.397	-.346	-.274	-.200	.031
EWG03	.828	.338	.013	.171	.413	-.025
EWG17	.853	-.231	.204	-.295	.041	-.297
EWG18	.865	-.314	.066	-.157	.090	.341
3CM01	.806	.170	.419	.248	-.290	.032
EWG11	.782	-.328	-.395	.331	-.082	-.090

Variables/Factors correlations (3C Mechanisms):			
	F1	F2	F3
3CM06	.884	-.406	-.232
3CM07	.897	-.009	.442
3CM08	.883	.416	-.217

Variables/Factors correlations (Usability):

	F1	F2	F3	F4	F5	F6
EWG01	.814	.440	-.091	.314	.155	-.113
EWG05	.867	-.138	-.223	-.299	.297	-.048
EWG07	.895	.219	.015	-.066	-.087	.373
EWG19	.817	-.379	-.320	.167	-.241	-.033
3CM05	.871	.203	.206	-.223	-.246	-.217
EWG09	.802	-.376	.418	.149	.132	.019

Variables/Factors correlations (Team Integration):

	F1	F2	F3	F4	F5	F6
CUA05	.807	.097	-.126	.457	-.323	-.103
EWG04	.861	-.141	-.088	.170	.241	.380
EWG06	.837	-.131	.282	.076	.327	-.300
EWG08	.776	.090	.495	-.248	-.257	.128
EWG15	.685	**.623**	-.278	-.224	.110	-.044
3CM03	.725	-.474	-.349	-.320	-.132	-.085

Variables/Factors correlations (Shared Access):

	F1	F2	F3	F4
CUA04	.818	-.182	-.431	-.334
CUA06	.783	-.211	.563	-.157
CUA09	.853	-.216	-.121	.459
CUA07	.726	**.687**	.021	.007

Variables/Factors correlations (Communication):

	F1	F2	F3
EWG13	.926	-.215	.310
EWG14	.924	-.235	-.302
EWG16	.881	.472	-.009

Variables/Factors correlations (Awareness):

	F1	F2	F3
CUA02	.913	-.292	-.285
EWG10	.928	-.181	.326
EWG12	.862	.504	-.048

Cross-loadings (Monofactorial manifest variables):

	Grounding	3C Mechanisms	Usability	Team Integration	Shared Access	Communication	Awareness
CUA01	**.780**	.609	.630	.586	.576	.623	.602
EWG03	**.832**	.677	.724	.648	.679	.653	.689
EWG17	**.853**	.650	.717	.667	.654	.640	.640
EWG18	**.864**	.644	.744	.678	.650	.630	.668
3CM01	**.805**	.599	.662	.682	.585	.586	.585
EWG11	**.779**	.562	.610	.558	.624	.557	.598
3CM06	.660	**.894**	.754	.718	.633	.677	.700
3CM07	.702	**.897**	.776	.718	.606	.707	.644
3CM08	.671	**.871**	.752	.661	.633	.653	.666
EWG01	.689	.696	**.784**	.602	.620	.654	.661
EWG05	.765	.740	**.888**	.728	.652	.740	.817
EWG07	.707	.765	**.880**	.662	.638	.837	.792
EWG19	.653	.719	**.815**	.744	.610	.668	.681
3CM05	.752	.756	**.885**	.721	.688	.748	.761

EWG09	.628	.671	**.798**	.750	.577	.688	.678
CUA05	.598	.618	.639	**.779**	.530	.551	.576
EWG04	.632	.666	.716	**.849**	.544	.627	.643
EWG06	.668	.677	.712	**.843**	.554	.607	.582
EWG08	.623	.654	.706	**.816**	.516	.598	.581
EWG15	.509	.520	.538	**.681**	.546	.490	.468
3CM03	.620	.548	.566	**.710**	.475	.482	.509
CUA04	.586	.546	.543	.567	**.761**	.483	.520
CUA06	.703	.623	.698	.552	**.901**	.609	.655
CUA09	.609	.555	.563	.538	**.768**	.498	.514
CUA07	.467	.472	.483	.498	**.670**	.481	.454
EWG13	.695	.709	.784	.653	.585	**.925**	.758
EWG14	.691	.735	.818	.699	.622	**.926**	.760
EWG16	.667	.645	.729	.611	.625	**.880**	.703
CUA02	.683	.638	.741	.614	.635	.702	**.906**
EWG10	.674	.676	.793	.643	.612	.770	**.924**
EWG12	.722	.723	.823	.679	.655	.725	**.873**

Weights:								
Latent variable	Manifest variables	Outer weight	Outer weight (normalized)	Outer weight (Bootstrap)	Standard error	Critical ratio (CR)	Lower bound (95%)	Upper bound (95%)
Grounding	CUA01	.193		.193	.008	25.594	.179	.207
	EWG03	.217		.216	.007	33.200	.204	.230
	EWG17	.211		.211	.007	31.971	.199	.224
	EWG18	.214		.214	.006	33.762	.202	.227
	3CM01	.197		.197	.007	26.494	.183	.212
	EWG11	.187		.187	.008	23.005	.171	.203
3C Mechanisms	3CM06	.406		.406	.050	8.052	.309	.505
	3CM07	.381		.379	.062	6.191	.260	.497
	3CM08	.339		.338	.064	5.273	.209	.460
Usability	EWG01	.118		.117	.030	3.895	.057	.175
	EWG05	.278		.277	.037	7.564	.204	.348
	EWG07	.160		.160	.044	3.592	.073	.248
	EWG19	.177		.177	.031	5.818	.115	.236
	3CM05	.277		.276	.037	7.417	.203	.349
	EWG09	.164		.163	.027	5.971	.111	.218
Team Integration	CUA05	.163		.163	.057	2.842	.053	.278
	EWG04	.222		.223	.057	3.897	.110	.336
	EWG06	.234		.234	.058	4.025	.119	.347
	EWG08	.292		.291	.051	5.687	.185	.387
	EWG15	.181		.179	.043	4.239	.095	.262
	3CM03	.176		.174	.051	3.414	.074	.274
Shared Access	CUA04	.278		.277	.061	4.532	.158	.398
	CUA06	.581		.578	.060	9.659	.451	.689
	CUA09	.156		.157	.066	2.357	.027	.287
	CUA07	.217		.216	.054	4.022	.108	.320
Communication	EWG13	.368		.367	.008	43.427	.351	.385
	EWG14	.380		.380	.009	43.015	.364	.399
	EWG16	.350		.350	.010	34.132	.330	.370

Awareness	CUA02	.356		.356	.006	56.112	.344	.369
	EWG10	.370		.370	.007	56.314	.357	.383
	EWG12	.384		.384	.009	41.288	.367	.403

Correlations:

Latent variable	Manifest variables	Standardized loadings	Loadings	Communalities	Redundancies	Standardized loadings (Bootstrap)	Standard error	Critical ratio (CR)	Lower bound (95%)	Upper bound (95%)
Grounding	CUA01	.780	.780	.608	.464	.779	.024	32.422	.729	.824
	EWG03	.832	.832	.693	.528	.832	.019	42.690	.792	.868
	EWG17	.853	.853	.727	.555	.853	.017	5.286	.817	.884
	EWG18	.864	.864	.746	.569	.864	.016	54.271	.830	.892
	3CM01	.805	.805	.649	.495	.805	.022	35.969	.759	.847
	EWG11	.779	.779	.607	.463	.779	.029	27.310	.718	.831
3C Mechanisms	3CM06	.894	.894	.800	.609	.893	.019	46.703	.853	.928
	3CM07	.897	.897	.805	.613	.896	.020	45.175	.853	.931
	3CM08	.871	.871	.759	.578	.870	.025	35.008	.817	.914
Usability	EWG01	.784	.784	.615	.552	.783	.027	29.135	.725	.831
	EWG05	.888	.888	.789	.708	.887	.015	59.282	.856	.915
	EWG07	.880	.880	.775	.696	.879	.017	5.930	.842	.911
	EWG19	.815	.815	.664	.596	.814	.021	38.290	.770	.853
	3CM05	.885	.885	.783	.703	.884	.014	63.017	.855	.910
	EWG09	.798	.798	.637	.572	.798	.024	32.724	.747	.843
Team Integration	CUA05	.779	.779	.607	.446	.776	.035	22.500	.706	.840
	EWG04	.849	.849	.721	.530	.847	.024	35.579	.798	.891
	EWG06	.843	.843	.711	.522	.840	.028	3.456	.781	.888
	EWG08	.816	.816	.666	.489	.813	.028	29.395	.754	.863
	EWG15	.681	.681	.464	.341	.680	.042	16.150	.594	.759
	3CM03	.710	.710	.504	.370	.707	.037	19.414	.632	.775
Shared Access	CUA04	.761	.761	.579	.369	.758	.038	19.821	.677	.829
	CUA06	.901	.901	.811	.517	.897	.024	36.914	.845	.939
	CUA09	.768	.768	.590	.377	.766	.040	19.294	.684	.838
	CUA07	.670	.670	.449	.286	.667	.043	15.602	.578	.747
Communication	EWG13	.925	.925	.856	.646	.925	.011	82.184	.901	.945
	EWG14	.926	.926	.857	.647	.926	.009	102.398	.907	.942
	EWG16	.880	.880	.774	.584	.880	.017	52.472	.844	.910
Awareness	CUA02	.906	.906	.821	.646	.906	.011	81.459	.882	.926
	EWG10	.924	.924	.853	.672	.924	.009	102.173	.905	.940
	EWG12	.873	.873	.763	.600	.874	.014	62.876	.844	.898

Mean Communalities

Latent variable	Type	Mean Communalities
Grounding	Endogenous	.672
3C Mechanisms	Endogenous	.788
Usability	Endogenous	.710
Team Integration	Endogenous	.612
Shared Access	Endogenous	.607
Communication	Endogenous	.829
Awareness	Endogenous	.812

Mean		.699

Discriminant validity (Squared correlations < AVE):							
	Grounding	3C Mechanisms	Usability	Team Integration	Shared Access	Communication	Awareness
Grounding	**1**	.581	.695	.605	.589	.564	.593
3C Mechanisms	.581	**1**	**.734**	**.622**	.494	.586	.570
Usability	.695	**.734**	**1**	**.695**	.562	.730	.764
Team Integration	.605	**.622**	**.695**	**1**	.449	.518	.515
Shared Access	.589	.494	.562	.449	**1**	.449	.496
Communication	.564	.586	.730	.518	.449	**1**	.661
Awareness	.593	.570	.764	.515	.496	.661	**1**
Mean Communalities (AVE)	.672	.788	.710	.612	.607	.829	.812

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Composite reliability (Monofactorial manifest variables):						
Latent variable	Dimensions	Cronbach's alpha	D.G. rho (PCA)	Condition number	Critical value	Eigenvalues
Grounding	6	.902	.925	4.330	1.000	4.030
						.560
						.497
						.387
						.311
						.215
3C Mechanisms	3	.866	.918	2.824	1.000	2.365
						.338
						.297
Usability	6	.920	.937	4.595	1.000	4.285
						.587
						.377
						.292
						.256
						.203
Team Integration	5	.870	.906	3.472	1.000	3.298
						.575
						.480
						.373
						.274
Shared Access	4	.807	.874	2.703	1.000	2.538
						.597
						.518
						.347
Communication	3	.897	.936	3.641	1.000	2.488
						.324
						.188
Awareness	3	.884	.929	3.584	1.000	2.438
						.373
						.190

Variables/Factors correlations (Grounding):						
	F1	F2	F3	F4	F5	F6
CUA01	.779	.397	-.346	-.274	-.200	.031
EWG03	.828	.338	.013	.171	.413	-.025
EWG17	.853	-.231	.204	-.295	.041	-.297
EWG18	.865	-.314	.066	-.157	.090	.341
3CM01	.806	.170	.419	.248	-.290	.032
EWG11	.782	-.328	-.395	.331	-.082	-.090

Variables/Factors correlations (3C Mechanisms):			
	F1	F2	F3
3CM06	.884	-.406	-.232
3CM07	.897	-.009	.442
3CM08	.883	.416	-.217

Variables/Factors correlations (Usability):						
	F1	F2	F3	F4	F5	F6

EWG01	.814	.440	-.091	.314	.155	-.113
EWG05	.867	-.138	-.223	-.299	.297	-.048
EWG07	.895	.219	.015	-.066	-.087	.373
EWG19	.817	-.379	-.320	.167	-.241	-.033
3CM05	.871	.203	.206	-.223	-.246	-.217
EWG09	.802	-.376	.418	.149	.132	.019

Variables/Factors correlations (Team Integration):					
	F1	F2	F3	F4	F5
CUA05	.804	-.048	.517	-.262	-.129
EWG04	.870	.113	.144	.251	.383
EWG06	.854	-.171	-.091	.378	-.299
EWG08	.779	-.444	-.335	-.267	.115
3CM03	.748	.577	-.269	-.164	-.085

Variables/Factors correlations (Shared Access):				
	F1	F2	F3	F4
CUA04	.818	-.182	-.431	-.334
CUA06	.783	-.211	.563	-.157
CUA09	.853	-.216	-.121	.459
CUA07	.726	**.687**	.021	.007

Variables/Factors correlations (Communication):			
	F1	F2	F3
EWG13	.926	-.215	.310
EWG14	.924	-.235	-.302
EWG16	.881	.472	-.009

Variables/Factors correlations (Awareness):			
	F1	F2	F3
CUA02	.913	-.292	-.285
EWG10	.928	-.181	.326
EWG12	.862	.504	-.048

Cross-loadings (Monofactorial manifest variables):							
	Grounding	3C Mechanisms	Usability	Team Integration	Shared Access	Communication	Awareness
CUA01	**.779**	.609	.630	.573	.576	.623	.602
EWG03	**.832**	.677	.724	.644	.680	.653	.689
EWG17	**.853**	.650	.717	.663	.655	.640	.640
EWG18	**.864**	.644	.744	.678	.651	.630	.668
3CM01	**.806**	.599	.662	.686	.586	.586	.585
EWG11	**.779**	.562	.609	.542	.624	.557	.598
3CM06	.660	**.895**	.754	.716	.633	.677	.700
3CM07	.702	**.896**	.776	.710	.606	.707	.644
3CM08	.671	**.872**	.752	.659	.634	.653	.666
EWG01	.689	.696	**.784**	.597	.620	.654	.661
EWG05	.765	.740	**.889**	.729	.652	.740	.817
EWG07	.707	.765	**.880**	.659	.638	.837	.792
EWG19	.653	.719	**.815**	.741	.610	.668	.681
3CM05	.752	.756	**.884**	.716	.688	.748	.761
EWG09	.628	.671	**.799**	.750	.577	.688	.678
CUA05	.598	.619	.639	**.788**	.530	.551	.576
EWG04	.632	.666	.716	**.859**	.544	.627	.643

EWG06	.668	.677	.712	**.852**	.554	.607	.582
EWG08	.623	.653	.706	**.825**	.516	.598	.581
3CM03	.620	.548	.566	**.718**	.475	.482	.509
CUA04	.586	.546	.543	.555	**.763**	.483	.520
CUA06	.703	.623	.698	.531	**.901**	.609	.655
CUA09	.609	.555	.563	.523	**.769**	.498	.514
CUA07	.467	.472	.483	.464	**.666**	.481	.454
EWG13	.695	.709	.784	.652	.584	**.926**	.758
EWG14	.691	.735	.818	.698	.622	**.926**	.760
EWG16	.666	.645	.729	.593	.625	**.880**	.703
CUA02	.683	.638	.741	.607	.635	.702	**.906**
EWG10	.674	.677	.793	.644	.612	.770	**.924**
EWG12	.722	.723	.823	.678	.655	.725	**.873**

Weights:							
Latent variable	Manifest variables	Outer weight	Outer weight (Bootstrap)	Standard error	Critical ratio (CR)	Lower bound (95%)	Upper bound (95%)
Grounding	CUA01	.193	.192	.008	25.505	.178	.207
	EWG03	.217	.216	.007	33.142	.204	.230
	EWG17	.211	.211	.007	31.839	.199	.225
	EWG18	.214	.214	.006	34.003	.202	.227
	3CM01	.198	.197	.008	25.918	.182	.213
	EWG11	.186	.186	.008	22.760	.169	.202
3C Mechanisms	3CM06	.407	.407	.050	8.096	.311	.508
	3CM07	.377	.376	.060	6.252	.256	.492
	3CM08	.341	.340	.062	5.477	.218	.464
Usability	EWG01	.117	.117	.030	3.896	.057	.174
	EWG05	.280	.280	.036	7.681	.208	.350
	EWG07	.160	.161	.044	3.665	.079	.249
	EWG19	.176	.176	.031	5.764	.114	.237
	3CM05	.275	.274	.037	7.487	.202	.346
	EWG09	.165	.165	.028	5.783	.111	.221
Team Integration	CUA05	.213	.213	.058	3.682	.101	.329
	EWG04	.259	.259	.063	4.083	.138	.387
	EWG06	.241	.241	.062	3.874	.120	.361
	EWG08	.334	.331	.053	6.291	.227	.433
	3CM03	.180	.178	.053	3.374	.072	.280
Shared Access	CUA04	.282	.281	.062	4.552	.160	.404
	CUA06	.581	.577	.060	9.651	.452	.689
	CUA09	.157	.160	.068	2.323	.026	.295
	CUA07	.210	.208	.055	3.841	.101	.316
Communication	EWG13	.368	.368	.009	42.879	.352	.386
	EWG14	.381	.381	.009	42.136	.364	.400
	EWG16	.349	.348	.010	33.724	.328	.369
Awareness	CUA02	.356	.356	.007	54.509	.344	.369
	EWG10	.370	.370	.007	55.571	.357	.383
	EWG12	.384	.384	.009	41.054	.367	.404

Correlations:										
Latent variable	Manifest variables	Standardized	Loadings	Communalities	Redundancies	Standardized	Standard error	Critical ratio (CR)	Lower bound	Upper bound

		loadings				loadings (Bootstrap)			(95%)	(95%)
Grounding	CUA01	.779	.779	.608	.464	.778	.025	31.213	.728	.824
	EWG03	.832	.832	.693	.529	.832	.020	41.818	.790	.868
	EWG17	.853	.853	.728	.556	.853	.017	49.561	.817	.884
	EWG18	.864	.864	.746	.570	.864	.016	53.283	.830	.893
	3CM01	.806	.806	.649	.496	.805	.023	35.659	.758	.846
	EWG11	.779	.779	.606	.463	.778	.028	27.379	.719	.830
3C Mechanisms	3CM06	.895	.895	.801	.609	.893	.019	46.698	.853	.927
	3CM07	.896	.896	.803	.611	.894	.020	45.066	.851	.929
	3CM08	.872	.872	.761	.579	.870	.024	36.096	.819	.914
Usability	EWG01	.784	.784	.614	.552	.782	.027	28.753	.723	.831
	EWG05	.889	.889	.790	.710	.888	.015	58.820	.855	.914
	EWG07	.880	.880	.775	.696	.879	.017	5.514	.842	.911
	EWG19	.815	.815	.664	.596	.813	.021	38.175	.769	.852
	3CM05	.884	.884	.782	.702	.884	.014	63.524	.854	.909
	EWG09	.799	.799	.638	.573	.798	.024	32.806	.748	.844
Team Integration	CUA05	.788	.788	.621	.452	.785	.034	22.913	.714	.848
	EWG04	.859	.859	.738	.537	.857	.024	35.741	.807	.900
	EWG06	.852	.852	.726	.529	.849	.026	32.211	.794	.897
	EWG08	.825	.825	.680	.495	.822	.027	3.705	.764	.870
	3CM03	.718	.718	.515	.375	.715	.036	19.981	.641	.782
Shared Access	CUA04	.763	.763	.582	.372	.761	.038	2.277	.684	.832
	CUA06	.901	.901	.812	.519	.897	.024	36.805	.843	.939
	CUA09	.769	.769	.592	.379	.768	.039	19.586	.688	.840
	CUA07	.666	.666	.443	.284	.663	.043	15.413	.572	.743
Communication	EWG13	.926	.926	.857	.646	.926	.011	82.195	.901	.945
	EWG14	.926	.926	.857	.647	.926	.009	10.875	.907	.942
	EWG16	.880	.880	.774	.584	.879	.017	5.624	.842	.910
Awareness	CUA02	.906	.906	.820	.646	.906	.011	8.608	.882	.926
	EWG10	.924	.924	.853	.672	.923	.009	97.571	.904	.941
	EWG12	.873	.873	.763	.600	.874	.014	61.967	.844	.899

Mean Communalities		
Latent variable	Type	Mean Communalities
Grounding	Endogenous	.672
3C Mechanisms	Endogenous	.788
Usability	Endogenous	.710
Team Integration	Endogenous	.656
Shared Access	Endogenous	.607
Communication	Endogenous	.829
Awareness	Endogenous	.812
Mean		.710

Discriminant validity (Squared correlations < AVE):							
	Grounding	3C Mechanisms	Usability	Team Integration	Shared Access	Communication	Awareness
Grounding	**1**	.581	.695	.596	.589	.564	.593
3C Mechanisms	.581	**1**	**.734**	.615	.494	.586	.571
Usability	.695	**.734**	**1**	**.690**	.561	.730	.764

Team Integration	.596	.615	**.690**	**1**	.416	.507	.511
Shared Access	.589	.494	.561	.416	**1**	.448	.496
Communication	.564	.586	.730	.507	.448	**1**	.662
Awareness	.593	.571	.764	.511	.496	.662	**1**
Mean Communalities (AVE)	.672	.788	.710	.656	.607	.829	.812

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Composite reliability (Monofactorial manifest variables):						
Latent variable	Dimensions	Cronbach's alpha	D.G. rho (PCA)	Condition number	Critical value	Eigenvalues
Grounding	6	.902	.925	4.330	1.000	4.030
						.560
						.497
						.387
						.311
						.215
3C Mechanisms	3	.866	.918	2.824	1.000	2.365
						.338
						.297
Usability	5	.896	.923	3.732	1.000	3.531
						.548
						.377
						.290
						.254
Team Integration	5	.870	.906	3.472	1.000	3.298
						.575
						.480
						.373
						.274
Shared Access	4	.807	.874	2.703	1.000	2.538
						.597
						.518
						.347
Communication	3	.897	.936	3.641	1.000	2.488
						.324
						.188
Awareness	3	.884	.929	3.584	1.000	2.438
						.373
						.190

Variables/Factors correlations (Grounding):						
	F1	F2	F3	F4	F5	F6
CUA01	.779	.397	-.346	-.274	-.200	.031
EWG03	.828	.338	.013	.171	.413	-.025
EWG17	.853	-.231	.204	-.295	.041	-.297
EWG18	.865	-.314	.066	-.157	.090	.341
3CM01	.806	.170	.419	.248	-.290	.032
EWG11	.782	-.328	-.395	.331	-.082	-.090

Variables/Factors correlations (3C Mechanisms):			
	F1	F2	F3
3CM06	.884	-.406	-.232
3CM07	.897	-.009	.442
3CM08	.883	.416	-.217

Variables/Factors correlations (Usability):					
	F1	F2	F3	F4	F5
EWG01	.801	.509	-.078	-.275	-.132

EWG05	.877	-.085	-.221	.323	-.267
EWG19	.836	-.331	-.321	-.182	.233
3CM05	.863	.250	.212	.239	.302
EWG09	.822	-.331	.417	-.142	-.140
Variables/Factors correlations (Team Integration):					
	F1	F2	F3	F4	F5
CUA05	.804	-.048	.517	-.262	-.129
EWG04	.870	.113	.144	.251	.383
EWG06	.854	-.171	-.091	.378	-.299
EWG08	.779	-.444	-.335	-.267	.115
3CM03	.748	.577	-.269	-.164	-.085
Variables/Factors correlations (Shared Access):					
	F1	F2	F3	F4	
CUA04	.818	-.182	-.431	-.334	
CUA06	.783	-.211	.563	-.157	
CUA09	.853	-.216	-.121	.459	
CUA07	.726	**.687**	.021	.007	
Variables/Factors correlations (Communication):					
	F1	F2	F3		
EWG13	.926	-.215	.310		
EWG14	.924	-.235	-.302		
EWG16	.881	.472	-.009		
Variables/Factors correlations (Awareness):					
	F1	F2	F3		
CUA02	.913	-.292	-.285		
EWG10	.928	-.181	.326		
EWG12	.862	.504	-.048		

Cross-loadings (Monofactorial manifest variables):							
	Grounding	3C Mechanisms	Usability	Team Integration	Shared Access	Communication	Awareness
CUA01	**.779**	.609	.629	.573	.576	.623	.602
EWG03	**.832**	.677	.723	.644	.680	.653	.689
EWG17	**.853**	.650	.720	.663	.655	.640	.640
EWG18	**.864**	.644	.755	.678	.651	.630	.668
3CM01	**.805**	.599	.661	.686	.586	.586	.585
EWG11	**.779**	.562	.618	.542	.624	.557	.598
3CM06	.660	**.894**	.746	.715	.633	.677	.700
3CM07	.702	**.896**	.774	.710	.606	.707	.644
3CM08	.670	**.873**	.752	.659	.634	.653	.666
EWG01	.689	.696	**.787**	.597	.620	.654	.661
EWG05	.765	.740	**.892**	.729	.652	.740	.817
EWG19	.653	.719	**.817**	.741	.610	.668	.681
3CM05	.752	.756	**.887**	.716	.688	.748	.761
EWG09	.628	.671	**.801**	.750	.577	.688	.678
CUA05	.598	.618	.643	**.788**	.530	.551	.576
EWG04	.632	.666	.715	**.857**	.544	.627	.644
EWG06	.668	.677	.718	**.852**	.554	.607	.582
EWG08	.623	.653	.718	**.826**	.516	.598	.581
3CM03	.620	.548	.569	**.718**	.475	.482	.509

CUA04	.586	.547	.545	.555	**.763**	.483	.520
CUA06	.703	.623	.701	.531	**.901**	.609	.655
CUA09	.609	.555	.570	.522	**.771**	.498	.514
CUA07	.467	.472	.483	.464	**.665**	.481	.454
EWG13	.695	.709	.764	.652	.584	**.925**	.758
EWG14	.691	.735	.799	.697	.621	**.926**	.760
EWG16	.667	.645	.718	.593	.624	**.880**	.703
CUA02	.683	.638	.733	.607	.635	.702	**.906**
EWG10	.674	.676	.782	.644	.612	.770	**.924**
EWG12	.722	.723	.821	.678	.655	.725	**.874**

Weights:							
Latent variable	Manifest variables	Outer weight	Outer weight (Bootstrap)	Standard error	Critical ratio (CR)	Lower bound (95%)	Upper bound (95%)
Grounding	CUA01	.192	.192	.007	25.781	.177	.207
	EWG03	.217	.216	.006	34.036	.204	.229
	EWG17	.211	.211	.006	32.728	.199	.224
	EWG18	.214	.214	.006	34.741	.203	.227
	3CM01	.197	.197	.008	25.789	.182	.213
	EWG11	.187	.187	.008	22.895	.170	.203
3C Mechanisms	3CM06	.403	.404	.051	7.977	.305	.504
	3CM07	.379	.379	.061	6.197	.259	.497
	3CM08	.344	.340	.064	5.390	.211	.462
Usability	EWG01	.167	.166	.028	5.997	.112	.222
	EWG05	.310	.310	.035	8.889	.239	.377
	EWG19	.192	.190	.031	6.191	.129	.250
	3CM05	.331	.331	.034	9.834	.264	.396
	EWG09	.177	.177	.030	5.899	.118	.238
Team Integration	CUA05	.213	.215	.058	3.679	.102	.330
	EWG04	.255	.254	.063	4.049	.131	.380
	EWG06	.241	.242	.062	3.880	.120	.368
	EWG08	.337	.334	.053	6.306	.226	.437
	3CM03	.180	.177	.053	3.392	.074	.284
Shared Access	CUA04	.281	.279	.062	4.542	.155	.401
	CUA06	.581	.578	.060	9.693	.456	.689
	CUA09	.160	.160	.068	2.349	.029	.297
	CUA07	.209	.209	.054	3.874	.102	.314
Communication	EWG13	.368	.368	.009	43.195	.352	.386
	EWG14	.381	.380	.009	41.507	.363	.400
	EWG16	.349	.349	.010	33.567	.329	.370
Awareness	CUA02	.356	.356	.006	54.941	.343	.369
	EWG10	.370	.369	.007	55.190	.357	.383
	EWG12	.385	.385	.009	4.552	.367	.405

Correlations:										
Latent variable	Manifest variables	Standardized loadings	Loadings	Communalities	Redundancies	Standardized loadings (Bootstr	Standard error	Critical ratio (CR)	Lower bound (95%)	Upper bound (95%)

						ap)				
Grounding	CUA01	.779	.779	.607	.465	.779	.024	32.175	.729	.823
	EWG03	.832	.832	.693	.531	.832	.020	42.039	.791	.868
	EWG17	.853	.853	.728	.557	.853	.017	5.527	.818	.883
	EWG18	.864	.864	.747	.572	.864	.016	53.904	.830	.893
	3CM01	.805	.805	.649	.497	.805	.022	36.190	.759	.847
	EWG11	.779	.779	.606	.465	.779	.028	27.363	.717	.831
3C Mechanisms	3CM06	.894	.894	.799	.605	.892	.019	46.964	.853	.927
	3CM07	.896	.896	.804	.609	.895	.020	45.725	.854	.931
	3CM08	.873	.873	.762	.578	.871	.025	35.389	.818	.914
Usability	EWG01	.787	.787	.619	.551	.785	.027	29.237	.729	.834
	EWG05	.892	.892	.795	.708	.891	.015	6.708	.860	.918
	EWG19	.817	.817	.668	.595	.816	.022	37.965	.770	.857
	3CM05	.887	.887	.787	.701	.887	.014	63.434	.857	.912
	EWG09	.801	.801	.642	.571	.801	.025	32.384	.750	.848
Team Integration	CUA05	.788	.788	.620	.456	.785	.035	22.827	.713	.846
	EWG04	.857	.857	.735	.540	.855	.024	35.505	.806	.899
	EWG06	.852	.852	.726	.534	.849	.026	32.843	.796	.897
	EWG08	.826	.826	.683	.501	.823	.027	3.359	.766	.873
	3CM03	.718	.718	.515	.378	.714	.036	19.793	.640	.781
Shared Access	CUA04	.763	.763	.582	.373	.760	.037	2.397	.681	.830
	CUA06	.901	.901	.812	.521	.897	.024	36.781	.844	.940
	CUA09	.771	.771	.594	.381	.769	.039	19.556	.688	.841
	CUA07	.665	.665	.442	.284	.662	.043	15.353	.571	.745
Communication	EWG13	.925	.925	.857	.635	.925	.011	82.179	.901	.945
	EWG14	.926	.926	.857	.636	.926	.009	101.534	.906	.942
	EWG16	.880	.880	.774	.574	.880	.017	51.225	.842	.910
Awareness	CUA02	.906	.906	.820	.642	.906	.011	81.326	.882	.926
	EWG10	.924	.924	.853	.668	.923	.009	98.373	.904	.941
	EWG12	.874	.874	.763	.597	.873	.014	62.447	.844	.899

Mean Communalities		
Latent variable	Type	Mean Communalities
Grounding	Endogenous	.672
3C Mechanisms	Endogenous	.788
Usability	Endogenous	.702
Team Integration	Endogenous	.656
Shared Access	Endogenous	.607
Communication	Endogenous	.829
Awareness	Endogenous	.812
Mean		.708

Discriminant validity (Squared correlations < AVE):							
	Grounding	3C Mechanisms	Usability	Team Integration	Shared Access	Communication	Awareness
Grounding	**1**	.581	.701	.596	.590	.564	.593
3C Mechanisms	.581	**1**	**.727**	.615	.494	.586	.571
Usability	.701	**.727**	**1**	**.701**	.566	.698	.750
Team Integration	.596	.615	**.701**	**1**	.416	.507	.511

Shared Access	.590	.494	.566	.416	**1**	.448	.496
Communication	.564	.586	.698	.507	.448	**1**	.662
Awareness	.593	.571	.750	.511	.496	.662	**1**
Mean Communalities (AVE)	.672	.788	.702	.656	.607	.829	.812

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Composite reliability (Monofactorial manifest variables):						
Latent variable	Dimensions	Cronbach's alpha	D.G. rho (PCA)	Condition number	Critical value	Eigenvalues
Grounding	6	.902	.925	4.330	1.000	4.030
						.560
						.497
						.387
						.311
						.215
3C Mechanisms	3	.866	.918	2.824	1.000	2.365
						.338
						.297
Usability	4	.878	.916	3.333	1.000	2.932
						.502
						.303
						.264
Team Integration	5	.870	.906	3.472	1.000	3.298
						.575
						.480
						.373
						.274
Shared Access	4	.807	.874	2.703	1.000	2.538
						.597
						.518
						.347
Communication	3	.897	.936	3.641	1.000	2.488
						.324
						.188
Awareness	3	.884	.929	3.584	1.000	2.438
						.373
						.190

Variables/Factors correlations (Grounding):						
	F1	F2	F3	F4	F5	F6
CUA01	.779	.397	-.346	-.274	-.200	.031
EWG03	.828	.338	.013	.171	.413	-.025
EWG17	.853	-.231	.204	-.295	.041	-.297
EWG18	.865	-.314	.066	-.157	.090	.341
3CM01	.806	.170	.419	.248	-.290	.032
EWG11	.782	-.328	-.395	.331	-.082	-.090

Variables/Factors correlations (3C Mechanisms):			
	F1	F2	F3
3CM06	.884	-.406	-.232
3CM07	.897	-.009	.442
3CM08	.883	.416	-.217

Variables/Factors correlations (Usability):				
	F1	F2	F3	F4
EWG01	.835	-.429	-.339	.066
EWG05	.885	.208	.152	.388

EWG19	.832	.464	-.195	-.235
3CM05	.872	-.243	.356	-.232

Variables/Factors correlations (Team Integration):					
	F1	F2	F3	F4	F5
CUA05	.804	-.048	.517	-.262	-.129
EWG04	.870	.113	.144	.251	.383
EWG06	.854	-.171	-.091	.378	-.299
EWG08	.779	-.444	-.335	-.267	.115
3CM03	.748	.577	-.269	-.164	-.085

Variables/Factors correlations (Shared Access):				
	F1	F2	F3	F4
CUA04	.818	-.182	-.431	-.334
CUA06	.783	-.211	.563	-.157
CUA09	.853	-.216	-.121	.459
CUA07	.726	**.687**	.021	.007

Variables/Factors correlations (Communication):			
	F1	F2	F3
EWG13	.926	-.215	.310
EWG14	.924	-.235	-.302
EWG16	.881	.472	-.009

Variables/Factors correlations (Awareness):			
	F1	F2	F3
CUA02	.913	-.292	-.285
EWG10	.928	-.181	.326
EWG12	.862	.504	-.048

Cross-loadings (Monofactorial manifest variables):							
	Grounding	3C Mechanisms	Usability	Team Integration	Shared Access	Communication	Awareness
CUA01	**.779**	.609	.632	.574	.576	.623	.602
EWG03	**.832**	.677	.729	.644	.680	.653	.689
EWG17	**.853**	.650	.713	.663	.655	.640	.640
EWG18	**.864**	.644	.757	.678	.651	.630	.668
3CM01	**.805**	.598	.654	.686	.586	.586	.585
EWG11	**.779**	.562	.626	.542	.624	.557	.598
3CM06	.660	**.894**	.743	.716	.633	.677	.700
3CM07	.702	**.895**	.763	.709	.606	.707	.644
3CM08	.671	**.875**	.757	.659	.634	.653	.666
EWG01	.689	.697	**.792**	.597	.621	.654	.661
EWG05	.765	.740	**.898**	.729	.652	.740	.817
EWG19	.653	.719	**.823**	.740	.610	.668	.681
3CM05	.752	.756	**.894**	.716	.688	.748	.761
CUA05	.598	.618	.632	**.788**	.530	.551	.576
EWG04	.632	.667	.702	**.858**	.544	.627	.644
EWG06	.668	.676	.711	**.854**	.554	.607	.582
EWG08	.623	.653	.686	**.822**	.516	.598	.581
3CM03	.620	.549	.565	**.720**	.475	.482	.509
CUA04	.586	.547	.539	.555	**.761**	.483	.520
CUA06	.703	.623	.705	.531	**.902**	.609	.656
CUA09	.609	.555	.569	.523	**.770**	.498	.514

CUA07	.467	.472	.477	.464	**.664**	.481	.454
EWG13	.695	.709	.756	.652	.584	**.926**	.758
EWG14	.691	.735	.786	.697	.621	**.926**	.760
EWG16	.667	.644	.712	.593	.624	**.880**	.703
CUA02	.683	.638	.724	.607	.635	.702	**.906**
EWG10	.674	.677	.776	.644	.612	.770	**.924**
EWG12	.722	.724	.826	.678	.655	.725	**.874**

Weights:							
Latent variable	Manifest variables	Outer weight	Outer weight (Bootstrap)	Standard error	Critical ratio (CR)	Lower bound (95%)	Upper bound (95%)
Grounding	CUA01	.193	.192	.007	26.087	.178	.207
	EWG03	.217	.217	.006	33.754	.205	.230
	EWG17	.211	.211	.006	32.635	.199	.224
	EWG18	.215	.214	.006	34.721	.203	.227
	3CM01	.197	.197	.007	26.296	.182	.212
	EWG11	.187	.187	.008	23.266	.171	.202
3C Mechanisms	3CM06	.404	.405	.051	7.988	.308	.506
	3CM07	.372	.371	.060	6.251	.253	.487
	3CM08	.349	.348	.063	5.585	.221	.468
Usability	EWG01	.168	.168	.030	5.562	.109	.229
	EWG05	.350	.349	.035	9.850	.279	.419
	EWG19	.252	.251	.031	8.113	.192	.312
	3CM05	.387	.386	.033	11.816	.321	.450
Team Integration	CUA05	.214	.215	.058	3.702	.104	.331
	EWG04	.254	.253	.065	3.937	.128	.380
	EWG06	.248	.248	.063	3.935	.125	.369
	EWG08	.327	.325	.054	6.034	.216	.430
	3CM03	.183	.181	.053	3.434	.079	.285
Shared Access	CUA04	.279	.279	.063	4.464	.155	.404
	CUA06	.584	.580	.060	9.751	.458	.691
	CUA09	.160	.161	.067	2.385	.029	.292
	CUA07	.207	.206	.053	3.878	.103	.310
Communication	EWG13	.368	.368	.009	42.444	.351	.385
	EWG14	.380	.380	.009	41.937	.363	.399
	EWG16	.349	.349	.011	33.251	.329	.371
Awareness	CUA02	.355	.355	.006	55.285	.343	.369
	EWG10	.370	.369	.006	57.349	.357	.383
	EWG12	.386	.385	.010	4.451	.368	.405

Correlations:										
Latent variable	Manifest variables	Standardized loadings	Loadings	Communalities	Redundancies	Standardized loadings (Bootstrap)	Standard error	Critical ratio (CR)	Lower bound (95%)	Upper bound (95%)
Grounding	CUA01	.779	.779	.607	.468	.779	.024	31.815	.728	.824
	EWG03	.832	.832	.693	.533	.833	.020	41.638	.792	.869
	EWG17	.853	.853	.727	.560	.853	.017	49.981	.818	.884
	EWG18	.864	.864	.747	.575	.864	.016	53.814	.831	.894
	3CM01	.805	.805	.648	.499	.805	.023	35.601	.758	.847
	EWG11	.779	.779	.607	.467	.780	.028	27.878	.721	.831

3C Mechanisms	3CM06	.894	.894	.799	.607	.893	.019	46.607	.854	.927
	3CM07	.895	.895	.800	.608	.893	.020	44.930	.850	.929
	3CM08	.875	.875	.765	.582	.873	.024	36.801	.822	.916
Usability	EWG01	.792	.792	.628	.550	.791	.027	28.858	.734	.841
	EWG05	.898	.898	.807	.707	.898	.015	61.720	.868	.924
	EWG19	.823	.823	.678	.594	.822	.022	38.048	.778	.863
	3CM05	.894	.894	.799	.700	.893	.014	65.547	.864	.918
Team Integration	CUA05	.788	.788	.622	.445	.786	.035	22.818	.715	.850
	EWG04	.858	.858	.736	.528	.855	.024	35.807	.807	.900
	EWG06	.854	.854	.730	.523	.852	.027	32.116	.794	.898
	EWG08	.822	.822	.676	.485	.819	.028	29.509	.761	.869
	3CM03	.720	.720	.518	.371	.717	.037	19.614	.643	.785
Shared Access	CUA04	.761	.761	.580	.372	.759	.038	2.177	.683	.831
	CUA06	.902	.902	.814	.522	.899	.024	37.091	.844	.941
	CUA09	.770	.770	.593	.380	.768	.039	19.715	.689	.844
	CUA07	.664	.664	.440	.282	.661	.044	15.232	.572	.743
Communication	EWG13	.926	.926	.857	.631	.925	.011	82.094	.901	.945
	EWG14	.926	.926	.857	.631	.926	.009	101.953	.907	.942
	EWG16	.880	.880	.774	.570	.880	.017	52.011	.843	.909
Awareness	CUA02	.906	.906	.820	.641	.906	.011	81.020	.882	.926
	EWG10	.924	.924	.853	.666	.923	.009	99.204	.903	.940
	EWG12	.874	.874	.764	.596	.873	.014	63.725	.845	.899

Model assessment:

Latent variable	Type	Mean Communalities
Grounding	Endogenous	.672
3C Mechanisms	Endogenous	.788
Usability	Endogenous	.728
Team Integration	Endogenous	.656
Shared Access	Endogenous	.607
Communication	Endogenous	.829
Awareness	Endogenous	.812
Mean		.712

Discriminant validity (Squared correlations < AVE):

	Grounding	3C Mechanisms	Usability	Team Integration	Shared Access	Communication	Awareness
Grounding	**1**	.581	.703	.596	.590	.564	.594
3C Mechanisms	.581	**1**	.721	.614	.494	.586	.571
Usability	.703	.721	**1**	**.670**	.566	.682	.744
Team Integration	.596	.614	**.670**	**1**	.416	.507	.511
Shared Access	.590	.494	.566	.416	**1**	.448	.496
Communication	.564	.586	.682	.507	.448	**1**	.662
Awareness	.594	.571	.744	.511	.496	.662	**1**
Mean Communalities (AVE)	.672	.788	.728	.656	.607	.829	.812

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Composite reliability (Monofactorial manifest variables):						
Latent variable	Dimensions	Cronbach's alpha	D.G. rho (PCA)	Condition number	Critical value	Eigenvalues
Grounding	6	.902	.925	4.330	1.000	4.030
						.560
						.497
						.387
						.311
						.215
3C Mechanisms	3	.866	.918	2.824	1.000	2.365
						.338
						.297
Usability	4	.878	.916	3.333	1.000	2.932
						.502
						.303
						.264
Team Integration	5	.870	.906	3.472	1.000	3.298
						.575
						.480
						.373
						.274
Shared Access	3	.797	.881	2.479	1.000	2.135
						.518
						.347
Communication	3	.897	.936	3.641	1.000	2.488
						.324
						.188
Awareness	3	.884	.929	3.584	1.000	2.438
						.373
						.190

Variables/Factors correlations (Grounding):						
	F1	F2	F3	F4	F5	F6
CUA01	.779	.397	-.346	-.274	-.200	.031
EWG03	.828	.338	.013	.171	.413	-.025
EWG17	.853	-.231	.204	-.295	.041	-.297
EWG18	.865	-.314	.066	-.157	.090	.341
3CM01	.806	.170	.419	.248	-.290	.032
EWG11	.782	-.328	-.395	.331	-.082	-.090

Variables/Factors correlations (3C Mechanisms):			
	F1	F2	F3
3CM06	.884	-.406	-.232
3CM07	.897	-.009	.442
3CM08	.883	.416	-.217

Variables/Factors correlations (Usability):				
	F1	F2	F3	F4
EWG01	.835	-.429	-.339	.066
EWG05	.885	.208	.152	.388
EWG19	.832	.464	-.195	-.235

3CM05	.872	-.243	.356	-.232	
Variables/Factors correlations (Team Integration):					
	F1	F2	F3	F4	F5
CUA05	.804	-.048	.517	-.262	-.129
EWG04	.870	.113	.144	.251	.383
EWG06	.854	-.171	-.091	.378	-.299
EWG08	.779	-.444	-.335	-.267	.115
3CM03	.748	.577	-.269	-.164	-.085
Variables/Factors correlations (Shared Access):					
	F1	F2	F3		
CUA04	.842	-.426	-.333		
CUA06	.808	.569	-.156		
CUA09	.880	-.115	.461		
Variables/Factors correlations (Communication):					
	F1	F2	F3		
EWG13	.926	-.215	.310		
EWG14	.924	-.235	-.302		
EWG16	.881	.472	-.009		
Variables/Factors correlations (Awareness):					
	F1	F2	F3		
CUA02	.913	-.292	-.285		
EWG10	.928	-.181	.326		
EWG12	.862	.504	-.048		

Cross-loadings (Monofactorial manifest variables):							
	Grounding	3C Mechanisms	Usability	Team Integration	Shared Access	Communication	Awareness
CUA01	**.779**	.609	.632	.574	.570	.623	.602
EWG03	**.832**	.678	.730	.644	.682	.653	.689
EWG17	**.853**	.650	.713	.663	.655	.640	.640
EWG18	**.864**	.644	.757	.678	.649	.630	.668
3CM01	**.805**	.598	.654	.687	.592	.586	.585
EWG11	**.779**	.562	.626	.542	.615	.557	.598
3CM06	.660	**.892**	.743	.716	.615	.677	.700
3CM07	.702	**.894**	.763	.709	.592	.707	.644
3CM08	.671	**.878**	.758	.659	.637	.653	.666
EWG01	.689	.699	**.794**	.596	.621	.654	.661
EWG05	.765	.740	**.898**	.729	.643	.740	.817
EWG19	.653	.719	**.821**	.740	.594	.668	.681
3CM05	.752	.756	**.895**	.716	.686	.748	.761
CUA05	.598	.617	.631	**.788**	.516	.551	.576
EWG04	.632	.666	.702	**.859**	.533	.627	.644
EWG06	.668	.676	.711	**.854**	.540	.607	.582
EWG08	.623	.652	.686	**.822**	.499	.598	.581
3CM03	.620	.549	.565	**.721**	.470	.482	.509
CUA04	.586	.548	.538	.555	**.773**	.483	.520
CUA06	.703	.623	.706	.531	**.916**	.609	.656
CUA09	.609	.555	.569	.523	**.782**	.498	.514
EWG13	.695	.709	.756	.652	.572	**.926**	.758
EWG14	.691	.735	.786	.697	.608	**.926**	.760

EWG16	.667	.644	.712	.592	.596	**.879**	.703
CUA02	.683	.638	.724	.607	.635	.702	**.906**
EWG10	.674	.677	.776	.644	.601	.770	**.924**
EWG12	.722	.724	.826	.677	.642	.725	**.874**

Weights:							
Latent variable	Manifest variables	Outer weight	Outer weight (Bootstrap)	Standard error	Critical ratio (CR)	Lower bound (95%)	Upper bound (95%)
Grounding	CUA01	.192	.192	.007	26.379	.177	.206
	EWG03	.217	.217	.006	33.967	.205	.230
	EWG17	.211	.211	.007	32.113	.198	.224
	EWG18	.214	.214	.006	34.345	.203	.227
	3CM01	.197	.197	.007	26.685	.183	.212
	EWG11	.186	.187	.008	23.512	.171	.202
3C Mechanisms	3CM06	.399	.400	.051	7.798	.299	.499
	3CM07	.369	.369	.061	6.075	.248	.486
	3CM08	.358	.355	.064	5.638	.226	.478
Usability	EWG01	.171	.170	.029	5.816	.113	.228
	EWG05	.349	.349	.035	9.972	.279	.418
	EWG19	.247	.247	.031	8.107	.187	.307
	3CM05	.389	.388	.033	11.969	.324	.450
Team Integration	CUA05	.213	.215	.057	3.744	.103	.328
	EWG04	.256	.253	.064	3.973	.131	.382
	EWG06	.247	.250	.063	3.947	.126	.371
	EWG08	.326	.323	.054	6.057	.213	.424
	3CM03	.185	.182	.054	3.412	.075	.288
Shared Access	CUA04	.330	.329	.060	5.485	.212	.446
	CUA06	.636	.632	.061	1.420	.509	.746
	CUA09	.208	.209	.068	3.072	.074	.340
Communication	EWG13	.368	.368	.009	42.517	.352	.386
	EWG14	.381	.380	.009	41.041	.364	.399
	EWG16	.348	.348	.011	32.468	.328	.370
Awareness	CUA02	.356	.356	.007	54.534	.344	.369
	EWG10	.369	.369	.007	56.301	.357	.382
	EWG12	.385	.385	.009	41.520	.368	.404

Correlations:										
Latent variable	Manifest variables	Standardized loadings	Loadings	Communalities	Redundancies	Standardized loadings (Bootstrap)	Standard error	Critical ratio (CR)	Lower bound (95%)	Upper bound (95%)
Grounding	CUA01	.779	.779	.607	.470	.778	.024	31.982	.727	.823
	EWG03	.832	.832	.693	.536	.832	.020	42.360	.791	.868
	EWG17	.853	.853	.727	.563	.852	.018	48.208	.815	.884
	EWG18	.864	.864	.747	.578	.864	.016	53.775	.829	.893
	3CM01	.805	.805	.649	.502	.806	.023	35.589	.758	.847
	EWG11	.779	.779	.606	.469	.780	.028	28.184	.723	.829
3C Mechanisms	3CM06	.892	.892	.796	.605	.891	.020	45.107	.849	.926
	3CM07	.894	.894	.799	.607	.893	.020	43.901	.850	.928
	3CM08	.878	.878	.770	.585	.875	.024	37.214	.826	.917
b i l	EWG01	.794	.794	.630	.553	.793	.026	3.213	.738	.841

	EWG05	.898	.898	.806	.707	.897	.015	61.237	.866	.924
	EWG19	.821	.821	.675	.591	.820	.021	38.622	.777	.860
	3CM05	.895	.895	.800	.702	.894	.013	67.710	.867	.919
Team Integration	CUA05	.788	.788	.621	.445	.785	.034	23.172	.715	.846
	EWG04	.859	.859	.737	.529	.856	.024	35.631	.806	.901
	EWG06	.854	.854	.730	.523	.852	.026	32.444	.797	.900
	EWG08	.822	.822	.675	.484	.819	.028	29.495	.758	.870
	3CM03	.721	.721	.520	.373	.717	.037	19.621	.641	.784
Shared Access	CUA04	.773	.773	.598	.379	.771	.038	2.275	.693	.841
	CUA06	.916	.916	.839	.532	.914	.024	38.335	.862	.955
	CUA09	.782	.782	.612	.388	.781	.039	2.132	.701	.851
Communication	EWG13	.926	.926	.857	.631	.925	.011	81.857	.901	.946
	EWG14	.926	.926	.857	.632	.926	.009	10.657	.906	.942
	EWG16	.879	.879	.773	.570	.879	.017	5.471	.841	.910
Awareness	CUA02	.906	.906	.820	.641	.906	.011	8.892	.883	.927
	EWG10	.924	.924	.853	.666	.923	.009	10.491	.904	.940
	EWG12	.874	.874	.763	.596	.874	.014	62.790	.844	.898

Mean Communalities		
Latent variable	Type	Mean Communalities
Grounding	Endogenous	.672
3C Mechanisms	Endogenous	.788
Usability	Endogenous	.728
Team Integration	Endogenous	.657
Shared Access	Endogenous	.683
Communication	Endogenous	.829
Awareness	Endogenous	.812
Mean		.725

Discriminant validity (Squared correlations < AVE):							
	Grounding	3C Mechanisms	Usability	Team Integration	Shared Access	Communication	Awareness
Grounding	**1**	.581	.703	.596	.587	.564	.594
3C Mechanisms	.581	**1**	.721	.614	.479	.585	.571
Usability	.703	.721	**1**	**.669**	.554	.682	.744
Team Integration	.596	.614	**.669**	**1**	.396	.507	.511
Shared Access	.587	.479	.554	.396	**1**	.422	.483
Communication	.564	.585	.682	.507	.422	**1**	.662
Awareness	.594	.571	.744	.511	.483	.662	**1**
Mean Communalities (AVE)	.672	.788	.728	.657	.683	.829	.812

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Composite reliability (Monofactorial manifest variables):						
Latent variable	Dimensions	Cronbach's alpha	D.G. rho (PCA)	Condition number	Critical value	Eigenvalues
Grounding	5	.891	.920	3.938	1.000	3.488
						.539
						.433
						.315
						.225
3C Mechanisms	3	.866	.918	2.824	1.000	2.365
						.338
						.297
Usability	4	.878	.916	3.333	1.000	2.932
						.502
						.303
						.264
Team Integration	5	.870	.906	3.472	1.000	3.298
						.575
						.480
						.373
						.274
Shared Access	3	.797	.881	2.479	1.000	2.135
						.518
						.347
Communication	3	.897	.936	3.641	1.000	2.488
						.324
						.188
Awareness	3	.884	.929	3.584	1.000	2.438
						.373
						.190

Variables/Factors correlations (Grounding):					
	F1	F2	F3	F4	F5
CUA01	.787	.475	-.317	-.231	-.019
EWG03	.841	.286	.176	.421	.048
EWG17	.862	-.340	-.157	-.027	.340
EWG18	.858	-.338	-.195	.090	-.323
3CM01	.826	-.038	.489	-.274	-.049

Variables/Factors correlations (3C Mechanisms):			
	F1	F2	F3
3CM06	.884	-.406	-.232
3CM07	.897	-.009	.442
3CM08	.883	.416	-.217

Variables/Factors correlations (Usability):				
	F1	F2	F3	F4
EWG01	.835	-.429	-.339	.066
EWG05	.885	.208	.152	.388
EWG19	.832	.464	-.195	-.235
3CM05	.872	-.243	.356	-.232

Variables/Factors correlations (Team Integration):

	F1	F2	F3	F4	F5
CUA05	.804	-.048	.517	-.262	-.129
EWG04	.870	.113	.144	.251	.383
EWG06	.854	-.171	-.091	.378	-.299
EWG08	.779	-.444	-.335	-.267	.115
3CM03	.748	.577	-.269	-.164	-.085

Variables/Factors correlations (Shared Access):			
	F1	F2	F3
CUA04	.842	-.426	-.333
CUA06	.808	.569	-.156
CUA09	.880	-.115	.461

Variables/Factors correlations (Communication):			
	F1	F2	F3
EWG13	.926	-.215	.310
EWG14	.924	-.235	-.302
EWG16	.881	.472	-.009

Variables/Factors correlations (Awareness):			
	F1	F2	F3
CUA02	.913	-.292	-.285
EWG10	.928	-.181	.326
EWG12	.862	.504	-.048

Cross-loadings (Monofactorial manifest variables):							
	Grounding	3C Mechanisms	Usability	Team Integration	Shared Access	Communication	Awareness
CUA01	**.787**	.609	.633	.575	.570	.623	.602
EWG03	**.845**	.678	.730	.645	.682	.653	.689
EWG17	**.861**	.650	.713	.664	.655	.640	.640
EWG18	**.858**	.644	.757	.678	.649	.630	.668
3CM01	**.823**	.598	.654	.687	.592	.586	.585
3CM06	.660	**.892**	.743	.716	.615	.677	.700
3CM07	.699	**.893**	.763	.709	.592	.707	.644
3CM08	.673	**.878**	.758	.659	.637	.653	.666
EWG01	.690	.699	**.794**	.597	.620	.655	.661
EWG05	.764	.740	**.898**	.729	.643	.740	.817
EWG19	.651	.719	**.821**	.740	.595	.668	.681
3CM05	.749	.756	**.894**	.716	.686	.748	.761
CUA05	.594	.617	.631	**.786**	.516	.551	.576
EWG04	.640	.667	.702	**.859**	.533	.627	.644
EWG06	.677	.676	.711	**.855**	.540	.607	.582
EWG08	.625	.652	.686	**.821**	.499	.598	.581
3CM03	.630	.549	.564	**.722**	.470	.482	.509
CUA04	.580	.548	.538	.555	**.774**	.483	.520
CUA06	.689	.623	.706	.531	**.915**	.609	.656
CUA09	.607	.555	.569	.523	**.784**	.497	.514
EWG13	.693	.709	.756	.652	.572	**.926**	.758
EWG14	.702	.735	.787	.697	.608	**.926**	.760
EWG16	.654	.644	.712	.592	.596	**.879**	.703
CUA02	.674	.638	.724	.607	.634	.702	**.906**
EWG10	.673	.677	.776	.644	.601	.770	**.924**

EWG12	.716	.724	.826	.677	.642	.725	**.874**

Weights:							
Latent variable	Manifest variables	Outer weight	Outer weight (Bootstrap)	Standard error	Critical ratio (CR)	Lower bound (95%)	Upper bound (95%)
Grounding	CUA01	.223	.223	.008	27.546	.207	.239
	EWG03	.252	.251	.007	36.241	.238	.266
	EWG17	.245	.244	.007	34.395	.231	.259
	EWG18	.249	.249	.007	34.602	.235	.263
	3CM01	.229	.228	.008	28.633	.213	.245
3C Mechanisms	3CM06	.399	.401	.051	7.848	.304	.503
	3CM07	.367	.366	.061	6.037	.241	.479
	3CM08	.360	.357	.063	5.713	.231	.478
Usability	EWG01	.172	.172	.030	5.662	.114	.233
	EWG05	.349	.349	.036	9.667	.277	.420
	EWG19	.247	.247	.031	7.889	.184	.306
	3CM05	.388	.387	.033	11.832	.321	.451
Team Integration	CUA05	.208	.210	.058	3.593	.096	.326
	EWG04	.258	.256	.063	4.101	.133	.380
	EWG06	.250	.250	.062	4.024	.128	.373
	EWG08	.324	.321	.054	5.983	.215	.425
	3CM03	.187	.185	.054	3.480	.077	.287
Shared Access	CUA04	.330	.331	.060	5.510	.211	.450
	CUA06	.633	.630	.061	1.389	.507	.741
	CUA09	.211	.210	.067	3.156	.079	.341
Communication	EWG13	.368	.368	.009	43.125	.352	.385
	EWG14	.382	.381	.009	41.841	.365	.401
	EWG16	.347	.347	.011	32.959	.327	.368
Awareness	CUA02	.356	.355	.007	54.581	.343	.369
	EWG10	.370	.370	.007	56.463	.357	.383
	EWG12	.385	.385	.009	41.164	.367	.404

Correlations:										
Latent variable	Manifest variables	Standardized loadings	Loadings	Communalities	Redundancies	Standardized loadings (Bootstrap)	Standard error	Critical ratio (CR)	Lower bound (95%)	Upper bound (95%)
Grounding	CUA01	.787	.787	.619	.476	.786	.025	31.437	.732	.832
	EWG03	.845	.845	.713	.548	.845	.018	46.653	.806	.877
	EWG17	.861	.861	.742	.570	.861	.016	52.438	.826	.891
	EWG18	.858	.858	.736	.566	.858	.016	53.787	.825	.887
	3CM01	.823	.823	.677	.521	.823	.021	39.541	.780	.860
3C Mechanisms	3CM06	.892	.892	.796	.605	.891	.019	46.193	.851	.925
	3CM07	.893	.893	.798	.606	.892	.020	44.290	.849	.927
	3CM08	.878	.878	.771	.586	.876	.024	36.816	.826	.919
Usability	EWG01	.794	.794	.631	.553	.793	.027	29.594	.737	.843
	EWG05	.898	.898	.806	.707	.897	.015	6.863	.866	.924
	EWG19	.821	.821	.674	.591	.820	.021	38.843	.776	.859
	3CM05	.894	.894	.800	.701	.894	.014	66.039	.866	.919
Team Inte	CUA05	.786	.786	.618	.445	.784	.035	22.624	.713	.846
	EWG04	.859	.859	.739	.532	.857	.024	35.232	.807	.901

	EWG06	.855	.855	.732	.527	.852	.026	32.741	.799	.901
	EWG08	.821	.821	.674	.485	.818	.028	29.402	.758	.870
	3CM03	.722	.722	.522	.376	.719	.036	19.974	.644	.787
Shared Access	CUA04	.774	.774	.599	.375	.772	.038	2.275	.694	.843
	CUA06	.915	.915	.838	.524	.912	.024	37.905	.859	.954
	CUA09	.784	.784	.614	.384	.781	.039	2.317	.703	.855
Communication	EWG13	.926	.926	.857	.632	.926	.011	81.788	.901	.945
	EWG14	.926	.926	.858	.632	.926	.009	104.331	.907	.943
	EWG16	.879	.879	.773	.570	.879	.017	51.706	.843	.909
Awareness	CUA02	.906	.906	.820	.640	.906	.011	79.969	.882	.926
	EWG10	.924	.924	.853	.666	.924	.009	99.945	.904	.940
	EWG12	.874	.874	.763	.596	.874	.014	62.489	.844	.899

Mean Communalities		
Latent variable	Type	Mean Communalities
Grounding	Endogenous	.697
3C Mechanisms	Endogenous	.788
Usability	Endogenous	.728
Team Integration	Endogenous	.657
Shared Access	Endogenous	.684
Communication	Endogenous	.829
Awareness	Endogenous	.812
Mean		.732

Discriminant validity (Squared correlations < AVE):							
	Grounding	3C Mechanisms	Usability	Team Integration	Shared Access	Communication	Awareness
Grounding	**1**	.581	.700	.606	.571	.563	.583
3C Mechanisms	.581	**1**	.722	.613	.479	.585	.571
Usability	.700	.722	**1**	**.669**	.554	.682	.744
Team Integration	.606	.613	**.669**	**1**	.396	.507	.511
Shared Access	.571	.479	.554	.396	**1**	.422	.483
Communication	.563	.585	.682	.507	.422	**1**	.662
Awareness	.583	.571	.744	.511	.483	.662	**1**
Mean Communalities (AVE)	.697	.788	.728	.657	.684	.829	.812

O.

Composite reliability (Monofactorial manifest variables):						
Latent variable	Dimensions	Cronbach's alpha	D.G. rho (PCA)	Condition number	Critical value	Eigenvalues
Grounding	5	.891	.920	3.938	1.000	3.488
						.539
						.433
						.315
						.225
3C Mechanisms	3	.866	.918	2.824	1.000	2.365
						.338
						.297
Usability	3	.858	.914	2.859	1.000	2.337
						.377
						.286
Team Integration	5	.870	.906	3.472	1.000	3.298
						.575
						.480
						.373
						.274
Shared Access	3	.797	.881	2.479	1.000	2.135
						.518
						.347
Communication	3	.897	.936	3.641	1.000	2.488
						.324
						.188
Awareness	3	.884	.929	3.584	1.000	2.438
						.373
						.190

Variables/Factors correlations (Grounding):					
	F1	F2	F3	F4	F5
CUA01	.787	.475	-.317	-.231	-.019
EWG03	.841	.286	.176	.421	.048
EWG17	.862	-.340	-.157	-.027	.340
EWG18	.858	-.338	-.195	.090	-.323
3CM01	.826	-.038	.489	-.274	-.049

Variables/Factors correlations (3C Mechanisms):			
	F1	F2	F3
3CM06	.884	-.406	-.232
3CM07	.897	-.009	.442
3CM08	.883	.416	-.217

Variables/Factors correlations (Usability):			
	F1	F2	F3
EWG01	.875	-.415	-.249
EWG05	.870	.452	-.196
3CM05	.902	-.034	.431

Variables/Factors correlations (Team Integration):					
	F1	F2	F3	F4	F5
CUA05	.804	-.048	.517	-.262	-.129

EWG04	.870	.113	.144	.251	.383
EWG06	.854	-.171	-.091	.378	-.299
EWG08	.779	-.444	-.335	-.267	.115
3CM03	.748	.577	-.269	-.164	-.085

Variables/Factors correlations (Shared Access):			
	F1	F2	F3
CUA04	.842	-.426	-.333
CUA06	.808	.569	-.156
CUA09	.880	-.115	.461

Variables/Factors correlations (Communication):			
	F1	F2	F3
EWG13	.926	-.215	.310
EWG14	.924	-.235	-.302
EWG16	.881	.472	-.009

Variables/Factors correlations (Awareness):			
	F1	F2	F3
CUA02	.913	-.292	-.285
EWG10	.928	-.181	.326
EWG12	.862	.504	-.048

Cross-loadings (Monofactorial manifest variables):							
	Grounding	3C Mechanisms	Usability	Team Integration	Shared Access	Communication	Awareness
CUA01	**.787**	.609	.639	.575	.570	.623	.602
EWG03	**.845**	.678	.733	.645	.683	.653	.689
EWG17	**.861**	.650	.712	.664	.655	.640	.640
EWG18	**.858**	.644	.752	.678	.649	.630	.668
3CM01	**.823**	.598	.648	.687	.592	.586	.585
3CM06	.660	**.890**	.717	.715	.615	.677	.700
3CM07	.699	**.894**	.748	.710	.593	.707	.644
3CM08	.673	**.880**	.746	.659	.637	.653	.666
EWG01	.690	.700	**.806**	.597	.621	.655	.661
EWG05	.764	.740	**.911**	.729	.644	.740	.817
3CM05	.749	.756	**.908**	.717	.687	.748	.761
CUA05	.594	.617	.594	**.783**	.515	.551	.576
EWG04	.640	.666	.672	**.859**	.532	.627	.643
EWG06	.677	.676	.696	**.858**	.540	.607	.582
EWG08	.625	.652	.659	**.821**	.499	.598	.581
3CM03	.630	.549	.544	**.723**	.469	.482	.509
CUA04	.580	.548	.514	.555	**.769**	.483	.520
CUA06	.689	.623	.708	.531	**.918**	.609	.655
CUA09	.607	.555	.561	.523	**.784**	.497	.514
EWG13	.693	.709	.752	.652	.572	**.926**	.758
EWG14	.702	.734	.772	.697	.607	**.926**	.760
EWG16	.654	.644	.705	.592	.596	**.879**	.703
CUA02	.674	.638	.729	.607	.635	.702	**.906**
EWG10	.673	.676	.780	.644	.601	.770	**.924**
EWG12	.716	.723	.815	.677	.642	.725	**.873**

Weights:							
Latent	Manifest	Outer	Outer weight	Standard	Critical ratio	Lower bound	Upper bound

variable	variables	weight	(Bootstrap)	error	(CR)	(95%)	(95%)
Grounding	CUA01	.223	.223	.008	27.420	.208	.240
	EWG03	.252	.252	.007	36.511	.239	.266
	EWG17	.245	.244	.007	35.051	.231	.259
	EWG18	.248	.248	.007	34.717	.235	.263
	3CM01	.228	.228	.008	28.892	.213	.244
3C Mechanisms	3CM06	.393	.394	.051	7.716	.293	.495
	3CM07	.370	.370	.061	6.079	.251	.486
	3CM08	.363	.360	.062	5.893	.241	.484
Usability	EWG01	.199	.199	.031	6.380	.137	.262
	EWG05	.490	.489	.033	15.023	.423	.551
	3CM05	.433	.434	.035	12.384	.367	.504
Team Integration	CUA05	.202	.203	.059	3.448	.090	.317
	EWG04	.255	.254	.064	3.997	.130	.379
	EWG06	.259	.258	.063	4.086	.135	.380
	EWG08	.323	.322	.055	5.840	.214	.431
	3CM03	.188	.186	.055	3.439	.077	.292
Shared Access	CUA04	.322	.320	.060	5.324	.202	.438
	CUA06	.638	.635	.062	1.377	.509	.749
	CUA09	.213	.215	.067	3.171	.081	.344
Communication	EWG13	.369	.368	.009	42.593	.352	.386
	EWG14	.381	.381	.009	41.997	.365	.400
	EWG16	.347	.347	.011	32.612	.326	.369
Awareness	CUA02	.356	.356	.007	54.474	.344	.369
	EWG10	.370	.370	.007	55.574	.357	.384
	EWG12	.384	.384	.009	41.068	.367	.403

Correlations:										
Latent variable	Manifest variables	Standardized loadings	Loadings	Communalities	Redundancies	Standardized loadings (Bootstrap)	Standard error	Critical ratio (CR)	Lower bound (95%)	Upper bound (95%)
Grounding	CUA01	.787	.787	.619	.480	.787	.024	32.610	.736	.830
	EWG03	.845	.845	.713	.553	.844	.018	46.197	.806	.878
	EWG17	.861	.861	.742	.575	.861	.017	51.654	.826	.892
	EWG18	.858	.858	.736	.571	.858	.016	54.348	.824	.886
	3CM01	.823	.823	.677	.525	.822	.020	4.543	.780	.859
3C Mechanisms	3CM06	.890	.890	.792	.596	.889	.020	44.935	.847	.926
	3CM07	.894	.894	.799	.602	.893	.020	44.269	.850	.929
	3CM08	.880	.880	.774	.582	.877	.024	37.163	.829	.920
Usability	EWG01	.806	.806	.650	.556	.805	.026	3.446	.749	.853
	EWG05	.911	.911	.830	.710	.910	.014	65.133	.881	.936
	3CM05	.908	.908	.824	.705	.907	.013	69.009	.880	.932
Team Integration	CUA05	.783	.783	.613	.432	.780	.036	22.021	.707	.845
	EWG04	.859	.859	.737	.520	.856	.024	35.124	.804	.901
	EWG06	.858	.858	.736	.520	.855	.026	32.523	.797	.901
	EWG08	.821	.821	.674	.475	.818	.028	28.980	.757	.869
	3CM03	.723	.723	.522	.369	.720	.037	19.721	.644	.786
Shared Access	CUA04	.769	.769	.592	.369	.767	.039	19.794	.685	.838
	CUA06	.918	.918	.842	.525	.915	.024	38.182	.862	.955

	CUA09	.784	.784	.614	.382	.782	.040	19.687	.699	.853
Communication	EWG13	.926	.926	.857	.630	.926	.011	82.550	.902	.945
	EWG14	.926	.926	.858	.631	.926	.009	10.409	.907	.943
	EWG16	.879	.879	.773	.568	.879	.017	5.756	.842	.909
Awareness	CUA02	.906	.906	.821	.643	.906	.011	81.552	.883	.926
	EWG10	.924	.924	.853	.668	.924	.009	10.382	.904	.940
	EWG12	.873	.873	.763	.597	.873	.014	62.642	.844	.898

Mean Communalities		
Latent variable	Type	Mean Communalities
Grounding	Endogenous	.697
3C Mechanisms	Endogenous	.788
Usability	Endogenous	.768
Team Integration	Endogenous	.657
Shared Access	Endogenous	.683
Communication	Endogenous	.829
Awareness	Endogenous	.812
Mean		.736

Discriminant validity (Squared correlations < AVE):							
	Grounding	3C Mechanisms	Usability	Team Integration	Shared Access	Communication	Awareness
Grounding	**1**	.581	.699	.606	.571	.563	.583
3C Mechanisms	.581	**1**	.688	.613	.479	.585	.571
Usability	.699	.688	**1**	.618	.543	.667	.742
Team Integration	.606	.613	.618	**1**	.395	.507	.510
Shared Access	.571	.479	.543	.395	**1**	.422	.483
Communication	.563	.585	.667	.507	.422	**1**	.662
Awareness	.583	.571	.742	.510	.483	.662	**1**
Mean Communalities (AVE)	.697	.788	.768	.657	.683	.829	.812

P.

Composite reliability (Monofactorial manifest variables):						
Latent variable	Dimensions	Cronbach's alpha	D.G. rho (PCA)	Condition number	Critical value	Eigenvalues
Grounding	5	.891	.920	3.938	1.000	3.488
						.539
						.433
						.315
						.225
3C Mechanisms	3	.866	.918	2.824	1.000	2.365
						.338
						.297
Usability	3	.858	.914	2.859	1.000	2.337
						.377
						.286
Team Integration	4	.862	.906	3.173	1.000	2.829
						.501
						.389
						.281
Shared Access	3	.797	.881	2.479	1.000	2.135
						.518
						.347
Communication	3	.897	.936	3.641	1.000	2.488
						.324
						.188
Awareness	3	.884	.929	3.584	1.000	2.438
						.373
						.190

Variables/Factors correlations (Grounding):					
	F1	F2	F3	F4	F5
CUA01	.787	.475	-.317	-.231	-.019
EWG03	.841	.286	.176	.421	.048
EWG17	.862	-.340	-.157	-.027	.340
EWG18	.858	-.338	-.195	.090	-.323
3CM01	.826	-.038	.489	-.274	-.049

Variables/Factors correlations (3C Mechanisms):			
	F1	F2	F3
3CM06	.884	-.406	-.232
3CM07	.897	-.009	.442
3CM08	.883	.416	-.217

Variables/Factors correlations (Usability):			
	F1	F2	F3
EWG01	.875	-.415	-.249
EWG05	.870	.452	-.196
3CM05	.902	-.034	.431

Variables/Factors correlations (Team Integration):				
	F1	F2	F3	F4
CUA05	.821	-.404	.379	-.136
EWG04	.866	-.226	-.270	.354

EWG06	.870	.126	-.326	-.346
EWG08	.804	.520	.256	.133

Variables/Factors correlations (Shared Access):			
	F1	F2	F3
CUA04	.842	-.426	-.333
CUA06	.808	.569	-.156
CUA09	.880	-.115	.461

Variables/Factors correlations (Communication):			
	F1	F2	F3
EWG13	.926	-.215	.310
EWG14	.924	-.235	-.302
EWG16	.881	.472	-.009

Variables/Factors correlations (Awareness):			
	F1	F2	F3
CUA02	.913	-.292	-.285
EWG10	.928	-.181	.326
EWG12	.862	.504	-.048

Cross-loadings (Monofactorial manifest variables):							
	Grounding	3C Mechanisms	Usability	Team Integration	Shared Access	Communication	Awareness
CUA01	**.787**	.609	.639	.546	.570	.623	.602
EWG03	**.845**	.678	.733	.626	.683	.653	.689
EWG17	**.861**	.650	.712	.650	.655	.640	.640
EWG18	**.858**	.644	.752	.659	.649	.630	.668
3CM01	**.823**	.598	.648	.670	.592	.586	.585
3CM06	.660	**.891**	.717	.713	.615	.677	.700
3CM07	.699	**.894**	.748	.706	.593	.707	.644
3CM08	.673	**.879**	.746	.651	.637	.653	.666
EWG01	.690	.699	**.806**	.595	.621	.655	.661
EWG05	.764	.740	**.911**	.725	.644	.740	.817
3CM05	.749	.756	**.908**	.714	.687	.748	.761
CUA05	.594	.617	.594	**.791**	.514	.551	.576
EWG04	.640	.666	.672	**.868**	.532	.627	.643
EWG06	.677	.676	.696	**.867**	.540	.607	.582
EWG08	.625	.652	.659	**.830**	.499	.598	.581
CUA04	.580	.548	.514	.543	**.768**	.483	.520
CUA06	.689	.623	.708	.524	**.918**	.609	.655
CUA09	.607	.555	.561	.517	**.784**	.497	.514
EWG13	.693	.709	.752	.650	.572	**.926**	.758
EWG14	.702	.734	.772	.696	.607	**.926**	.760
EWG16	.654	.644	.705	.595	.597	**.879**	.703
CUA02	.674	.638	.729	.601	.635	.702	**.906**
EWG10	.673	.676	.780	.637	.601	.770	**.924**
EWG12	.716	.723	.815	.676	.642	.725	**.873**

Weights:							
Latent variable	Manifest variables	Outer weight	Outer weight (Bootstrap)	Standard error	Critical ratio (CR)	Lower bound (95%)	Upper bound (95%)

Grounding	CUA01	.223	.223	.008	26.630	.207	.240
	EWG03	.252	.252	.007	35.745	.239	.266
	EWG17	.245	.245	.007	34.095	.231	.260
	EWG18	.248	.248	.007	34.010	.235	.263
	3CM01	.228	.228	.008	28.133	.213	.245
3C Mechanisms	3CM06	.395	.394	.050	7.844	.295	.493
	3CM07	.371	.371	.061	6.103	.248	.489
	3CM08	.360	.359	.063	5.706	.231	.480
Usability	EWG01	.199	.199	.031	6.426	.138	.260
	EWG05	.489	.488	.033	14.877	.423	.552
	3CM05	.434	.434	.036	12.144	.365	.504
Team Integration	CUA05	.224	.224	.060	3.757	.111	.344
	EWG04	.331	.328	.067	4.912	.200	.462
	EWG06	.289	.288	.063	4.608	.165	.413
	EWG08	.343	.343	.055	6.282	.237	.449
Shared Access	CUA04	.319	.320	.059	5.376	.204	.439
	CUA06	.639	.635	.061	1.555	.508	.747
	CUA09	.214	.215	.067	3.204	.085	.347
Communication	EWG13	.369	.369	.009	43.354	.353	.386
	EWG14	.381	.381	.009	42.299	.364	.400
	EWG16	.348	.348	.010	33.127	.326	.368
Awareness	CUA02	.356	.356	.006	54.909	.343	.369
	EWG10	.370	.370	.006	56.960	.357	.382
	EWG12	.384	.384	.009	41.583	.367	.404

Correlations:										
Latent variable	Manifest variables	Standardized loadings	Loadings	Communalities	Redundancies	Standardized loadings (Bootstrap)	Standard error	Critical ratio (CR)	Lower bound (95%)	Upper bound (95%)
Grounding	CUA01	.787	.787	.619	.475	.786	.024	32.133	.736	.832
	EWG03	.845	.845	.713	.547	.844	.018	46.358	.806	.877
	EWG17	.861	.861	.742	.569	.861	.017	51.499	.827	.892
	EWG18	.858	.858	.736	.565	.858	.016	52.630	.824	.888
	3CM01	.823	.823	.677	.519	.823	.021	39.835	.780	.860
3C Mechanisms	3CM06	.891	.891	.793	.596	.889	.019	45.719	.848	.924
	3CM07	.894	.894	.800	.601	.893	.020	44.959	.851	.929
	3CM08	.879	.879	.772	.580	.877	.024	36.694	.826	.921
Usability	EWG01	.806	.806	.650	.557	.806	.026	3.659	.749	.854
	EWG05	.911	.911	.829	.710	.910	.014	64.677	.881	.935
	3CM05	.908	.908	.824	.706	.908	.013	69.887	.881	.931
Team Integration	CUA05	.791	.791	.626	.430	.789	.035	22.464	.716	.853
	EWG04	.868	.868	.753	.518	.865	.024	36.635	.816	.908
	EWG06	.867	.867	.753	.517	.865	.024	35.427	.814	.910
	EWG08	.830	.830	.688	.473	.828	.028	29.219	.768	.879
Shared Access	CUA04	.768	.768	.590	.368	.766	.039	19.828	.687	.839
	CUA06	.918	.918	.843	.525	.915	.024	38.823	.863	.955
	CUA09	.784	.784	.615	.383	.782	.039	2.173	.701	.856
mmunicatio	EWG13	.926	.926	.857	.630	.926	.011	82.380	.901	.945
	EWG14	.926	.926	.858	.631	.926	.009	102.56	.907	.942

	EWG16	.879	.879	.773	.569	.879	.017	51.723	.842	.909
Awareness	CUA02	.906	.906	.821	.643	.906	.011	81.215	.882	.926
	EWG10	.924	.924	.853	.668	.924	.009	99.177	.904	.941
	EWG12	.873	.873	.763	.597	.873	.014	62.259	.844	.899

Mean Communalities		
Latent variable	Type	Mean Communalities
Grounding	Endogenous	.697
3C Mechanisms	Endogenous	.788
Usability	Endogenous	.768
Team Integration	Endogenous	.705
Shared Access	Endogenous	.683
Communication	Endogenous	.829
Awareness	Endogenous	.812
Mean		.748

Discriminant validity (Squared correlations < AVE):							
	Grounding	3C Mechanisms	Usability	Team Integration	Shared Access	Communication	Awareness
Grounding	**1**	.581	.699	.570	.571	.563	.583
3C Mechanisms	.581	**1**	.688	.605	.479	.586	.571
Usability	.699	.688	**1**	.613	.543	.667	.742
Team Integration	.570	.605	.613	**1**	.383	.506	.504
Shared Access	.571	.479	.543	.383	**1**	.422	.483
Communication	.563	.586	.667	.506	.422	**1**	.662
Awareness	.583	.571	.742	.504	.483	.662	**1**
Mean Communalities (AVE)	.697	.788	.768	.705	.683	.829	.812

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Composite reliability (Monofactorial manifest variables):						
Latent variable	Dimensions	Cronbach's alpha	D.G. rho (PCA)	Condition number	Critical value	Eigenvalues
Grounding	4	.865	.909	3.553	1.000	2.855
						.502
						.417
						.226
3C Mechanisms	3	.866	.918	2.824	1.000	2.365
						.338
						.297
Usability	3	.858	.914	2.859	1.000	2.337
						.377
						.286
Team Integration	4	.862	.906	3.173	1.000	2.829
						.501
						.389
						.281
Shared Access	3	.797	.881	2.479	1.000	2.135
						.518
						.347
Communication	3	.897	.936	3.641	1.000	2.488
						.324
						.188
Awareness	3	.884	.929	3.584	1.000	2.438
						.373
						.190

Variables/Factors correlations (Grounding):				
	F1	F2	F3	F4
CUA01	.779	**.620**	-.092	.002
EWG17	.889	-.232	-.188	.346
EWG18	.881	-.237	-.250	-.325
3CM01	.826	-.082	.557	-.028

Variables/Factors correlations (3C Mechanisms):			
	F1	F2	F3
3CM06	.884	-.406	-.232
3CM07	.897	-.009	.442
3CM08	.883	.416	-.217

Variables/Factors correlations (Usability):			
	F1	F2	F3
EWG01	.875	-.415	-.249
EWG05	.870	.452	-.196
3CM05	.902	-.034	.431

Variables/Factors correlations (Team Integration):				
	F1	F2	F3	F4
CUA05	.821	-.404	.379	-.136
EWG04	.866	-.226	-.270	.354
EWG06	.870	.126	-.326	-.346
EWG08	.804	.520	.256	.133

Variables/Factors correlations (Shared Access):			
	F1	F2	F3
CUA04	.842	-.426	-.333
CUA06	.808	.569	-.156
CUA09	.880	-.115	.461
Variables/Factors correlations (Communication):			
	F1	F2	F3
EWG13	.926	-.215	.310
EWG14	.924	-.235	-.302
EWG16	.881	.472	-.009
Variables/Factors correlations (Awareness):			
	F1	F2	F3
CUA02	.913	-.292	-.285
EWG10	.928	-.181	.326
EWG12	.862	.504	-.048

Cross-loadings (Monofactorial manifest variables):							
	Grounding	3C Mechanisms	Usability	Team Integration	Shared Access	Communication	Awareness
CUA01	**.782**	.609	.639	.546	.570	.623	.602
EWG17	**.888**	.650	.712	.650	.655	.640	.640
EWG18	**.881**	.644	.752	.659	.649	.630	.668
3CM01	**.825**	.598	.648	.670	.592	.586	.585
3CM06	.646	**.892**	.717	.713	.615	.677	.700
3CM07	.682	**.895**	.748	.706	.593	.707	.644
3CM08	.645	**.876**	.745	.651	.637	.653	.666
EWG01	.661	.698	**.804**	.595	.621	.655	.661
EWG05	.751	.740	**.912**	.725	.644	.740	.817
3CM05	.730	.756	**.908**	.714	.687	.748	.761
CUA05	.587	.618	.595	**.791**	.515	.551	.576
EWG04	.635	.666	.672	**.868**	.532	.627	.644
EWG06	.666	.676	.697	**.866**	.540	.607	.582
EWG08	.624	.653	.659	**.831**	.499	.598	.581
CUA04	.571	.547	.514	.543	**.771**	.483	.520
CUA06	.662	.623	.707	.524	**.917**	.609	.656
CUA09	.585	.555	.562	.517	**.784**	.497	.514
EWG13	.679	.709	.752	.650	.572	**.926**	.758
EWG14	.691	.735	.772	.696	.608	**.926**	.760
EWG16	.632	.644	.705	.595	.596	**.879**	.703
CUA02	.645	.638	.729	.601	.635	.702	**.906**
EWG10	.648	.676	.781	.637	.601	.770	**.924**
EWG12	.701	.723	.815	.677	.642	.725	**.874**

Weights:							
Latent variable	Manifest variables	Outer weight	Outer weight (Bootstrap)	Standard error	Critical ratio (CR)	Lower bound (95%)	Upper bound (95%)
Grounding	CUA01	.279	.279	.010	26.777	.259	.300
	EWG17	.307	.307	.009	35.197	.290	.324
	EWG18	.311	.311	.009	33.909	.294	.330
	3CM01	.286	.285	.010	29.029	.266	.305
e c h a n	3CM06	.399	.399	.052	7.655	.299	.502

	3CM07	.373	.372	.062	6.042	.246	.494
	3CM08	.354	.353	.064	5.545	.227	.476
Usability	EWG01	.193	.192	.032	6.038	.130	.255
	EWG05	.493	.494	.032	15.294	.431	.558
	3CM05	.435	.434	.035	12.283	.364	.503
Team Integration	CUA05	.223	.225	.059	3.803	.113	.342
	EWG04	.333	.329	.069	4.819	.197	.468
	EWG06	.285	.284	.065	4.355	.153	.412
	EWG08	.346	.345	.056	6.225	.235	.452
Shared Access	CUA04	.324	.325	.061	5.328	.209	.446
	CUA06	.637	.634	.063	1.025	.504	.753
	CUA09	.212	.211	.069	3.067	.078	.344
Communication	EWG13	.369	.369	.009	42.746	.352	.386
	EWG14	.382	.381	.009	42.028	.364	.400
	EWG16	.347	.347	.011	32.715	.327	.369
Awareness	CUA02	.355	.355	.006	55.171	.343	.368
	EWG10	.370	.369	.007	56.861	.357	.383
	EWG12	.385	.385	.009	41.536	.368	.404

Correlations:

Latent variable	Manifest variables	Standardized loadings	Loadings	Communalities	Redundancies	Standardized loadings (Bootstrap)	Standard error	Critical ratio (CR)	Lower bound (95%)	Upper bound (95%)
Grounding	CUA01	.782	.782	.611	.447	.781	.025	31.144	.729	.828
	EWG17	.888	.888	.788	.576	.887	.014	65.564	.859	.911
	EWG18	.881	.881	.776	.568	.881	.013	67.158	.853	.905
	3CM01	.825	.825	.680	.497	.824	.022	37.543	.777	.863
3C Mechanisms	3CM06	.892	.892	.796	.598	.891	.020	44.854	.848	.927
	3CM07	.895	.895	.801	.601	.894	.020	43.871	.851	.931
	3CM08	.876	.876	.768	.577	.875	.024	36.134	.822	.918
Usability	EWG01	.804	.804	.646	.552	.803	.026	3.361	.748	.851
	EWG05	.912	.912	.831	.711	.911	.014	65.701	.882	.937
	3CM05	.908	.908	.824	.704	.907	.013	69.743	.880	.931
Team Integration	CUA05	.791	.791	.626	.432	.789	.035	22.354	.714	.853
	EWG04	.868	.868	.754	.521	.866	.024	35.525	.815	.910
	EWG06	.866	.866	.750	.518	.863	.025	34.354	.808	.909
	EWG08	.831	.831	.690	.477	.829	.028	29.586	.771	.880
Shared Access	CUA04	.771	.771	.594	.363	.769	.039	19.573	.685	.841
	CUA06	.917	.917	.841	.514	.914	.025	36.979	.859	.956
	CUA09	.784	.784	.614	.375	.781	.040	19.379	.698	.854
Communication	EWG13	.926	.926	.857	.631	.926	.011	82.044	.901	.945
	EWG14	.926	.926	.858	.631	.926	.009	103.822	.908	.942
	EWG16	.879	.879	.773	.569	.879	.017	51.324	.843	.910
Awareness	CUA02	.906	.906	.820	.642	.906	.011	8.810	.882	.926
	EWG10	.924	.924	.853	.668	.924	.009	97.596	.904	.941
	EWG12	.874	.874	.763	.598	.874	.014	62.938	.845	.900

Mean Communalities

Latent variable	Type	Mean Communalities
Grounding	Endogenous	.714

3C Mechanisms	Endogenous	.788
Usability	Endogenous	.767
Team Integration	Endogenous	.705
Shared Access	Endogenous	.683
Communication	Endogenous	.829
Awareness	Endogenous	.812
Mean		.753

Discriminant validity (Squared correlations < AVE):							
	Grounding	3C Mechanisms	Usability	Team Integration	Shared Access	Communication	Awareness
Grounding	**1**	.549	.665	.560	.534	.538	.546
3C Mechanisms	.549	**1**	.687	.606	.479	.586	.571
Usability	.665	.687	**1**	.613	.542	.667	.743
Team Integration	.560	.606	.613	**1**	.383	.507	.504
Shared Access	.534	.479	.542	.383	**1**	.422	.483
Communication	.538	.586	.667	.507	.422	**1**	.662
Awareness	.546	.571	.743	.504	.483	.662	**1**
Mean Communalities (AVE)	.714	.788	.767	.705	.683	.829	.812