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Interactivity Model 2.0: Social communication dynamics in organizational contexts[☆]Lillyana María Giraldo Marín^{a,*}, Marta Silvia Tabares Betancur^b, Luis Joyanes Aguilar^a^a Universidad de Medellín, Colombia^b Universidad EAFIT, Colombia

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ABSTRACT

This article presents the Interactivity Model 2.0, which aims to support the communicative process of knowledge transfer 2.0 developed in organizations that follow a social business model. This model has its origin in SECI and Ba interaction models and in the Open Communication Interactivity Model. This study defines Interactivity building on two concepts: role and interaction. The study considers *role* as actors taking part in Knowledge Transfer Process 2.0, and *interaction* as the process of communication that enables a transfer. The research tests this model through a case study at a Colombian Information Technology Company. The results show the changes of the communicative process in social settings and allow the identification of a message, a role, the direction and control of a message, and the knowledge contributions of the various actors of the Knowledge Transfer Process 2.0.

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1. Introduction

For almost a decade, society has been using social media to weave a new organizational context (Boughzala, 2012; Bughin, 2010; Bughin & Chui, 2013; Fuetterer, 2013; Holtzblatt, Drury, Weiss, & Damianos, 2013). Accordingly, this field has to create and improve proposals that integrate this concept of social business into organization models.

Social business allows companies to enrich themselves using social networks as structures to transfer knowledge. This process includes internal knowledge but also external knowledge that would help to expand the company's frontiers; that is, obtaining the knowledge from experts outside the company through collaborative spaces. Social business trains an organization to respond effectively to constant changes in the environment to promote the company's development and fulfill its objectives while empowering its organizational strategies.

As a response to these new social organizational contexts, this study presents a Knowledge Transfer Model 2.0 (COOPIN 2.0), a framework that proposes social media and social business drawing on the following models: Cooperation 2.0, Collaboration 2.0, Interactivity 2.0, and Participation 2.0.

Meanwhile, social media, which supports Interactivity 2.0, is becoming a scenario for participation. This scenario allows Knowledge Transfer Process 2.0 (KTP 2.0) actors to create and transfer knowledge, exchanging

roles and enriching a communication process based on the individual as a participative actor. Interactivity has left behind passive spectators and has started a new form of communication in which both senders and receivers may give an opinion, update, change and create new information and knowledge in a social collective construction.

The following section explains preliminary concepts, description, and definition of the Interactivity Model 2.0. Section 3 explains the method; Section 4 presents the Interactivity Model 2.0; and Section 5 explains a case study implementing the model. Lastly, Section 6 includes the results and conclusions.

2. Theoretical framework

2.1. Coopin 2.0

COOPIN 2.0 is an organizational iterative incremental Knowledge Transference Model (2.0) that explores established relations and a communication or interaction process between the various actors of Knowledge Transfer Process 2.0 (KTP 2.0) (senders, receivers, and participants) (Giraldo, Joyanes, & Tabares, 2014). A work proposal that social media and social business propound delineates the COOPIN Model 2.0. This model is an improved version of the SECI and Ba models. This section describes the following models: Collaboration 2.0, Cooperation 2.0, Participation 2.0, and Interactivity 2.0 in the COOPIN Model 2.0 framework.

Collaboration Model 2.0 defines a collaboration strategy that draws on the use of social media and allows participation, cooperation, and interactivity among the various actors of a knowledge transfer process.

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* Corresponding author at: Systems Engineering Program, School of Engineering at Universidad de Medellín, Carr. 87 No. 35-65, Medellín, Colombia.

E-mail address: lmgiraldo@udem.edu.co (L.M. Giraldo Marín).

Cooperation Model 2.0 allows the construction of social networks as structures through which KTP 2.0 actors may make their various individual contributions on the web.

Participation Model 2.0 evaluates and assesses knowledge contributions that the various KTP 2.0 actors make.

Interactivity Model 2.0 establishes an open social participative interaction process based on four forms of relation (feedback, mutual discourse, sensitive dialog, and monolog); likewise, this model allows identifying the direction and control of a message.

COOPIN 2.0 is the base to establish the Interactivity Model 2.0 inspired in Nonaka, Toyama, and Konno's (Nonaka & Konno, 1998); (Nonaka, Toyama, & Konno, 2000) unified SECI & Ba interaction model, and McMillan's Open Interactivity Model (McMillan, 2002).

2.2. SECI and 'Ba' interaction spaces

Nonaka et al. (2000) define Ba as a SECI knowledge model interaction space to create knowledge, (Nonaka & Konno, 1998); (Nonaka et al., 2000), and understand Ba as the organizational context where knowledge sharing and transfer takes place. These authors create and use Ba in interactions occurring in ontological and epistemological dimensions (Nonaka & Konno, 1998).

Peris and Rueda (2001) establish five links or analytical phases that explain the four stages of the SECI model following a Ba global interaction model.

1. Sharing tacit knowledge. This phase corresponds to Knowledge Socialization or to the original Ba.
2. Creating concepts. This study considers this phase as the most important step of exteriorization. Here, people have to establish bridges between intuition, which corresponds to tacit knowledge, and concepts or rational interpretation. This phase corresponds to an interactive Ba.
3. Justifying concepts. This phase is a filter between exteriorization and combination, which assures that only those explicit concepts that surpass this filter, will be new organizational knowledge advancing toward a combination phase.
4. Constructing archetypes. This phase converts concepts into archetypes, which may assume the form of prototypes in the case of products or of models in the event that innovation has a directive organizational character. The construction of archetypes consists in combining new explicit knowledge and explicit knowledge the company already has. Phases 3 and 4 are part of a systematizer Ba.
5. Equaling knowledge throughout an organization. Once the researchers have combined knowledge with previous knowledge through models, archetypes, or changes in ways of acting or acting processes, the company must disclose knowledge throughout the organization, equaling knowledge in all of the company's ontological dimensions. This phase corresponds to interiorizing Ba.

2.3. Interactivity concept

Interactivity = Communication. Santaella states that interactivity on the web allows one to access information non-linearly at a distance, send messages that are available without hierarchical values, conduct collaborative actions, act in remote places, see distant spaces, coexist in real and virtual contexts, and be a part of virtual settings and interact in them through various immersion processes (Santaella, 2007).

2.4. Interactivity principles

Aparici and Silva specify, "The term interactivity acquires notoriety in the 1980s with the disclosure and expansion of information and communication technology" (Aparici & Silva, 2012). Thus, those authors propose that some of the interactivity principles are: a) user intervention in a content, b) transformation of spectators into actors; c) an

individualized dialog with related services; d) reciprocal actions in form of a dialog with users, or in real time with devices (each communicator answers another or others). Meanwhile, Santaella names other principles of interactivity based on the act of communication:

- a) Participation-intervention: participating is not just answering "yes" or "no" or electing a determinate option. Instead, this activity supposes interfering or intervening by providing content information or modifying a message.
- b) Bidireccionalidad-hybridization: communication is the joint process of sending and receiving; this process is a co-creation of two poles, coding and decoding, and they join into one.
- c) Permutability-potentiality: communication supposes multiple articulatory network connections and the freedom to make changes, associations, and produce multiple meanings (Santaella, 2007).

Silva and Aparici state that these principles may inspire a rupturing of the logic of conveying and opening a space to conduct genuine true participation; that is, having sensorimotor and semantic participation and not just mechanical (Silva, 2005).

The previously mentioned principles are fundamental for KTP 2.0, for they establish actors' active participation in the process. Thus, the principle of reciprocity, for instance, becomes one of the key items to establish relations in social participation scenarios.

2.5. Interactivity model in open communication

This model defines two important aspects of an open communication process, which are direction and control of a message. McMillan (2002) proposes an interaction model that presents four phases: feedback, mutual discourse, sensitive dialog, and monolog. This study defines how these phases interact with different roles in an interactivity process, highlighting two important variables: control and direction of a message. The items of this model are the following:

- a) Roles. A role is a function an individual performs in an interactivity process. This model presents three roles: sender, receiver, and participant. The latter is an individual who changes roles depending on whether the individual needs to interact with a sender or a receiver.
- b) Control of a message. Message control is the power one of the roles has for determining when to convey a message, and that role's method to do so.
- c) Direction of a message. Participants who start a communication process determine the direction of a message. In a monolog, the direction of communication indicates a degree of interaction that a person may find in most web pages where a sender sends closed messages. In feedback, people find a sense of direction produced when the receiver is the one who dominates a situation, for instance, when someone sends an e-mail and that person is not sure if the e-mail will get a reply. Regarding mutual discourse, this direction of communication occurs when a sender and a receiver can easily exchange positions. The phases of the model are the following.
 - a) Feedback phase. The direction of a message travels just one way, and the receiver starts the phase. Senders have control of messages; thus, this is the phase where receivers' level of control is low.
 - b) Mutual discourse phase. The direction of a message travels two ways; therefore, the actors can exchange roles. That is, both a sender's role and a receiver's may change and become a participant role, so both roles control a message.
 - c) Sensitive dialog phase. In this phase, the direction of a message is highly interactive, for both can start a dialog; nevertheless, the sender controls the message.

- d) Monolog phase. In this phase, the sender's role has both the direction and control of a message; thus, a sender's level of control is high.

In brief, this model exposes two characteristics of an interactivity model, which includes the direction, and control of a message. Depending on a model's phase I in which the two roles meet, the value these variables take will change.

3. Data and method

3.1. Data

This study validates the Interactivity Model 2.0 using a case study research technique, conducted in the COOPIN Model 2.0 experimentation framework in an (IT) Information Technology company in the city of Medellín, Colombia. The company provides services to organizations located in various parts of the world and has a service portfolio leveraged on international practices including a Software Factory, Application Management, and Business Intelligence.

3.2. Method

Based on a case study conducted in the KTP 2.0 framework in a Colombian (IT) Information Technology company, this study evidenced a change in a communicative process in social contexts, identified roles, the direction and control of a message, and knowledge contributions that various KTP 2.0 actors make.

COOPIN Model 2.0 research, based on a process of observation, experimentation, and event analysis (Giraldo, 2013), suggests that an application of an Interactivity Model 2.0 improves a communication process in KTP 2.0.

3.2.1. Observation

In the observation process, this study defined work teams to contribute to defined transference in an organization. Once researchers identified these teams and implemented the Social Network Analysis Method (Knoke & Song, 2008), this study identified some communities of experts within the organization. The study conducted polls to identify communication problems in KTP 2.0 drawing on participants' perceptions.

3.2.2. Experimentation

Based on performed observation activities and poll results, this study identified some communication problems. These problems included a) a lack of communication protocols to use the COOPIN Model 2.0, b) no knowledge of the use of some social media as supports for defined transfer strategies (blogs, wikis, multiplatform messaging, collaborative document editing, etc.), and c) a lack of collaborative strategies, which allow an open participation and the recording of participants' knowledge contributions (Giraldo, 2013).

3.2.3. Event

Taking the observation and experimentation conducted as a starting point, this study defined a case study and developed various COOPIN Model 2.0 iterations using Interactivity Model 2.0 as the basis of communication.

4. Interactivity Model 2.0

Interactivity supported on Internet and Social Media technologies and services is transitioning from a simple medium to a scenario of participation to create and transfer knowledge in which KTP 2.0 actors may exchange roles. Thus, individuals enrich a communication process by actively participating in the process.

The Interactivity Model 2.0 builds on roles and interaction. Actors that intervene in a transfer process adopt the role of a sender, a receiver, or a participant. The participant can change roles in any phase of a SECI model. Interaction defines a communication process, which is the basis of knowledge transfer in social contexts (Fig. 1).

The Interactivity Model 2.0 adopts concepts of direction and control of a message depending on the type of knowledge people are going to transfer and the collaboration strategy required to transfer this knowledge. Direction of a message refers to the possible types of communication that may occur in the various phases of an Interaction Model 2.0. Hence, direction of a message refers to a KTP 2.0 actor that starts a relation.

Control of a message refers to the way an individual participates in using, modifying, and creating a content. Thus, the actor of a transfer who controls the message defines what knowledge a person shall transfer, and how and when a person shall transfer that knowledge. Statement "one" shows an instance of an Interactivity Model 2.0.

Statement One.

Interactivity → Use + Role: Sender/Receiver + Interaction: Sensitive dialog + Direction: Sender–Receiver + Control: Sender

Where:

Use = "Networks" → Strategy = {Ba Moment: Combination, SECI Phase: Combination} + Social Technological Platform = "Blog"

Accordingly, statement "one" defines a framework from which people must establish communication protocols in an interactivity process to ensure the support of KTP 2.0.

4.1. Objectives of interactivity model 2.0

The objectives of Interactivity Model 2.0 include a) transforming KTP 2.0 spectators into active actors, b) contributing in a KTP 2.0 that generates value, and c) establishing reciprocal interaction, that allows the co-creation of a message. Other objectives are d) permitting the construction of multiple networks and the freedom to make changes, associations, and produce multiple meanings and e) "just working," which is sharing a collaboration strategy.

4.2. Principles of interactivity Model 2.0

Social spaces constructed according to the use of social media become spaces in which people interact freely under a common objective. Thus, defining principles like transparency, assertiveness using language, clarity, respect for other people's contributions, valuing of individual contributions, networks and organizations, oral and written competencies, commitment, discipline, reciprocity in a message, clear political will regarding intellectual property rights, and having a collaboration strategy is necessary. These principles are fundamental for KTP 2.0, for they establish actors' active participation in the process; nonetheless, those principles also define a principle of reciprocity. That is, an answer as a determinant factor in an interactive context.

4.3. Phases of interactivity Model 2.0 in a unified SECI and Ba model

Due to the use the COOPIN Model 2.0 gives to social technological platforms, researchers need to define an interactivity model that

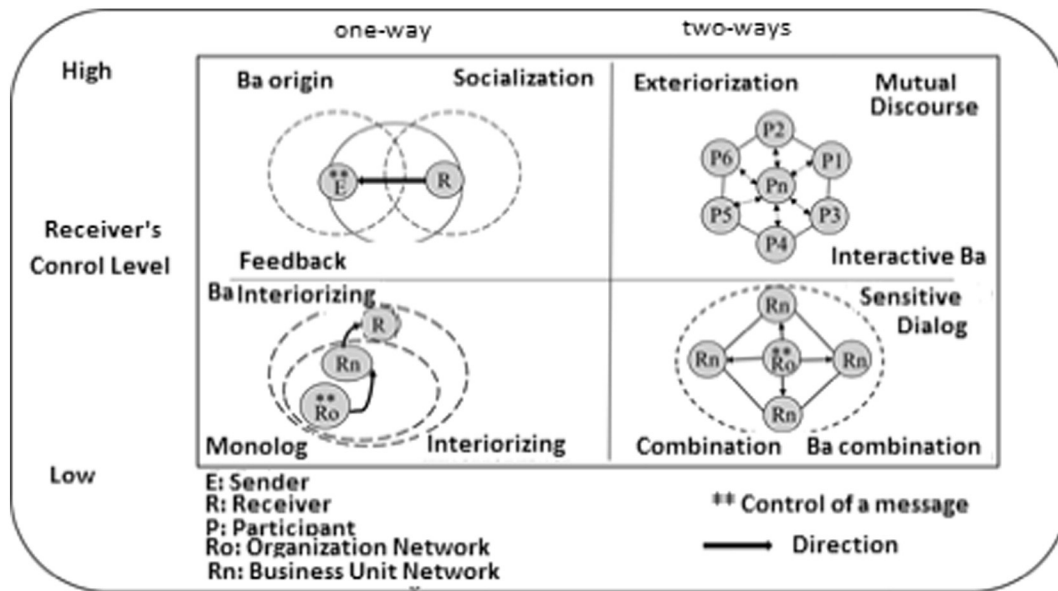


Fig. 1. Model of four forms of Interactivity 2.0. Source: [Elaborated based on Nonaka et al. (2000) and McMillan (2002)].

supports KTP 2.0. Thus, the phases of an Interactivity Model 2.0 are as follows.

- a) Feedback. This phase transfers tacit knowledge from a sender to a receiver. Hence, the receiver (R) starts the relation among these KTP 2.0 actors because he or she expresses a lack of knowledge. In other words, the receiver defines the direction of a message. In this phase, an actor sender (S) has control of a message. Communication in this phase is just one-way.
- b) Mutual discourse. This phase consists of knowledge transfer from participants to networks: Networks (Pn) start the relation between these KTP 2.0 actors because the networks express a lack of knowledge before the participants. In other words, they define the direction of a message. In this phase, networks and participants (Pn) and (P1...p4) share the control of a message. This phase has a two-way communication.
- c) Sensitive dialog. This phase transfers knowledge between networks. Thus, business unit networks (Rn) start the relation between networks in KTP 2.0 because they have to combine new knowledge and existing knowledge in an organization. In this phase, organizational networks (Ro) have the direction and control of a message. Communication in this phase is a two-way process.
- d) Monolog. This phase transfers knowledge from networks (Ro and Rn) to individuals (R). Then, organizational networks (Ro) start the relation between these two KTP 2.0 actors because they must incorporate new knowledge in organizational routines. In this phase, organizational networks (Ro) and business unit networks (Rn) share the direction and control of a message. Communication in this phase is one-way.

4.4. Strategies for KTP 2.0 based on interactivity Model 2.0

4.4.1. Feedback

This activity includes face-to-face dialogs, discussions, knowledge fairs, stories, lessons learned, good practices, conversations with experts, consultancies, assistance, expatriates, and countryside diaries.

4.4.2. Mutual discourse

This activity includes mind maps, concept maps, presentations, workshops, classroom-based courses, teamwork, report writing, analogies,

metaphors, social network analysis, virtual meetings, troubleshooting, active learning methods, communities of practice, and collaborative editing of documents.

4.4.3. Sensitive dialog

This activity includes collaborative work, teamwork, workshops, report writing, definition of specifications, field work, laboratory tests, experimentation, classroom-based courses, scientific publications, participative writing, coaching, mentoring, shared calendars, troubleshooting, active learning methods, communities of practice, and expatriates.

4.4.4. Monolog

This activity includes guided visits to other companies, workshops, practicums, training, simulators, expert points of view, peer knowledge validation, trouble-shooting, active learning methods, and communities of practice.

In KTP 2.0, establishing sender, receiver, or participant relations is the act that starts knowledge transfer. Affinities, motivations, competences, and the knowledge people share defines the success or failure of KTP 2.0. Interactivity is more than a message reinforcement process; this activity is an act of construction and connection among everyone who interacts, and in which this study does not establish divisions of any nature: They all have the same status and rank independent of the type of enunciation made.

Social media proposes a communicative and informational ecosystem where everyone is a potential sender. People are in a continuous content-creation situations, interrelating contents from conversational participation established and using the various communication tools.

5. Case study

To validate the Interactivity Model 2.0, the IT Company defines an organizational project ascribed to the Operations Management, which the Office of Knowledge Management (OKM) depends on. The KMO (Knowledge Management Officer) names a team of employees and consultants to conduct the KTP 2.0 under a COOPIN Model 2.0.

5.1. Case study design

The Colombian IT company identifies the need for agile methods to transfer knowledge to develop software from the Software Engineering Department to the Software Architecture Department. They identify communities of experts who have flaws in communication or interaction processes that must support KTP 2.0. To implement KTP 2.0, the IT Company defined a PTC 2.0 organizational work team as support. Later, they train the work team in the use of the Interactivity Model 2.0. To do so, they used playful didactics or serious games. Once trained, they perform some knowledge transfer simulations based on the Interactivity Model 2.0. Afterwards, they execute KTP 2.0, showing that the Interactivity Model 2.0 improves communication among the various actors of the transfer process.

5.2. A need for knowledge transfer

The IT Company has several communities of experts, such as a Software Engineering community of experts, a requirements community of experts, a Software quality model community of experts, a Software Pattern Design community of experts, a business intelligence community of experts, etc. These communities of experts state a need for knowledge regarding agile software development methods

5.3. Case study development

After defining the KTP 2.0, the OKM defines the communication protocol that they would use in each of the phases of the COOPIN Model 2.0. This procedure appears in statement “one”. This study presents a template of the communication protocol according to the type of knowledge the firm plans to transfer and its collaboration strategy (Table 1).

Taking into account the frame of reference of the COOPIN Model 2.0 and the former definition of KTP 2.0, researchers record this process. Table 1 shows that one identifies 1) networks or a community of experts who are part of knowledge transfer using the Cooperation Model 2.0, 2) collaboration strategies that support knowledge transfer using Cooperation Model 2.0 and 3) communication protocols and strategies as the basis of knowledge transfer from the Interactivity Model 2.0.

6. Results and conclusions

Result 1: KMO is able to use a formal instrument to establish communication protocols in open participation scenarios implementing Interactivity Model 2.0.

Result 2: Interactivity Model 2.0 transforms existing individual and collective communication practices in the IT organization and motivates the various KTP 2.0 participants to make contributions that generate value.

Result 3: The Cooperation Model 2.0 allows defining collaborative strategies based on the use of social media, which facilitates the recording of individual and collective contributions.

Result 4: A social-media-supported Interactivity Model 2.0 allows open, participative, transparent, and reciprocal knowledge transfer.

Result 5: Participation scenarios that the use of social media provides for organizations require the definition of clear policies to use them so that participants can obtain greater benefits.

Result 6: The communities of experts that work under the Interactivity Model 2.0 state that the communities improve their internal and external communication. Likewise, the model allows them to establish bonds with other experts who improve their knowledge bases.

Table 1
Template to record the Interactivity Model 2.0.

Sender–receiver		Request: 0001	
ID Sender: Tulio Ruiz			
ID Receiver: Willi am Solarte		Repository of knowledge: Sapiencia – Technological platform.	
Cycle 1: Software Factory			
Iteration: 1		Contents:	
Topic: agile methodologies in software development		-Introduction a scrum: frame of reference -Roles in scrum: owner of the product, Team, Scrum Master -Scrum artifacts: scrum plank, Burn-Down diagram	
Knowledge Transfer Model 2.0			
Transference Strategy: They must analyze Training with face-to-face meetings. They must have training sessions including face-to-face meetings and virtual workshops.			
Socialization Tacit Tacit	Exteriorization Tacit–Explicit	Combination Explicit–Explicit	Interiorizing Explicit–Tacit
	-Introduction to Scrum: frame of reference	-Introduction to Scrum: frame of reference	
Cooperation model 2.0			
Cooperation strategy: The software development community of experts will transfer to other communities of experts in the organization.			
Node to Node	Node to Network	Network–Network	Network–Node
	Community of Experts in Agile Methodologies	Among communities of experts	
Cooperation Model 2.0			
Collaboration Strategy: Use Sapiencia to support the knowledge transfer process			
Face-to-face interaction tele conference	Continuous task	Communication and coordination	Virtual interactions
	Workshops	LMS	
Interactivity Model 2.0			
Communication Strategy: The network of experts in agile methodologies transfer knowledge to the other networks.			
Feedback	Mutual discourse	Sensitive discourse	Monolog
	Control of a message: (Pn)	Control of a message: (Ro)	
	Direction of a message: (Pn)	Direction of a message: (Ro)	

Result 7: The Interactivity Model 2.0 allows an assessment of individual and collective contributions, and generates acknowledgments for knowledge transfer participants.

The implementation of the Interactivity Model 2.0 shows that this model moves from being a simple medium of multiple communication possibilities to becoming a scenario for participation. In this scenario, KTP 2.0 actors may exchange their roles. On the other hand, an interactivity process starts an innovative form of communication in which senders and receivers share their opinions, update, change, and create new information and new knowledge based on a social collective construction.

The Interactivity Model 2.0 implies a change in a communicative process in social contexts, allows the identification of roles, the direction and control of a message, and knowledge contributions that various KTP 2.0 actors produce in organizational contexts that have interiorized the intensive use of social media. Thus, Interactivity Model 2.0 has become an open participative dynamic intra and iter-organization communication proposal, which fulfills current communication needs that the use of social media proposes.

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