

**DESIGNING ELECTRONIC COMMERCE ENVIRONMENTS ON TRUST-
BUILDING PRINCIPLES**

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Abstract

Overcoming the trust barrier is one of the main challenges facing electronic commerce today. The formation of trust is still an open issue largely because previous research efforts have failed to realize that trust formation is a process which can be influenced through a number of discrete interaction stages with the vendor. We present a theoretical model that describes these stages and provide empirical evidence which shows that users come to trust incrementally as they assess the online vendor's benevolence, competence, integrity and predictability. Based on these findings, we derive a set of principles for developing trust-centric web stores and present a prototype environment illustrating their practical relevance.

1. INTRODUCTION

The role of trust becomes prominent for the achievement of customer retention and loyalty in e-commerce. Firstly, there is an imperative need for trust for the conversion of Internet visitors to online shoppers, dictated by the reported reluctance of consumers to engage in Internet purchases. More importantly, trust is an essential prerequisite for establishing and maintaining customer relationships which are the vehicle for customer retention and business longevity online. Hence, characterized as the “*sine qua non* of the digital economy and the future currency of the Internet (Urban *et al.*, 2000), trust becomes a necessity for e-commerce, not only as a facilitator of customer acquisition, but also for enabling relationship building and ensuring customer loyalty.

As a topic of research in electronic commerce, trust has recently received attention in a growing number of studies and has been addressed from different viewpoints and to different levels of analysis. The emerging body of literature has focused on a range of issues covering why trust is needed (Urban *et al.*, 2000), antecedents and consequences (Jarvenpaa *et al.*, 2000; Gefen, 2000; Kini and Choobineh, 2000; Einwiller *et al.*, 2000), barriers contributing to the lack of trust (Hoffman *et al.*, 1999; Schoder and Yin 2000) and possible remedies against it. The emphasis is placed to the role of trust for e-commerce adoption and the short-term transactional value. However, there is still a gap in understanding how trust is formed and evolves in a long-term perspective and as a means for relationship building.

Although to a large extent traditional principles for building trusting relationships may be still valid in e-commerce, the ‘physical-to-virtual’ transfer dictates that they should be revisited if their effectiveness is to be guaranteed. For example, the absence of salespersons and the interpersonal face-to-face contact with the customer, used as a basis for judging a vendor’s trustworthiness in the bricks-and-mortar commerce, cannot be easily replaced in an electronic environment. With this in mind, we suggest that e-commerce web sites should be transformed to customer-centric servicescapes offering a digital experience closer to the physical one that can contribute towards the development of an indelible relationship between the business and the customer. Looking at the issue of building trust in an electronic setting from a practical viewpoint leveraging the capabilities of available technology, the powerful features of agents and virtual reality can be effectively used to facilitate the design and implementation of environments that offer the expressiveness of a traditional commercial context, required for the formation of trust.

In this paper we present such an environment that delves away from the purely transactional-based flavor that the majority of web sites project today, and allows for ongoing relationship

building, with trust being infused into every step of the customer-business interaction. The environment serves as an example of how the functionality of a conventional online store can be provided to project a vendor's trust-building attributes, by offering a shopping experience which is close to the physical one. The design of this prototype environment has been informed by a model that explains the formation of trust in the broader context of building long-term relationships. Extending current research focus on trust in terms of determinants of decision to purchase or not online, the model describes the establishment and evolution of trust as an iterative and progressive process. In addition, instead of simply treating trust as a unidimensional construct, the model makes a conceptual distinction of trust facets. The model has been empirically tested in a recent survey, using a validated instrument with existing and new measures, the results of which provide support for the underpinning theory.

In the next section of this paper, we describe our theoretical model for trust and relationship building and provide some empirical results. In the third section we present the prototype online store, the design of which has been guided by a number of trust building principles derived by the model. Conclusions and issues for further research follow.

2. HOW TRUST IS FORMED IN ELECTRONIC COMMERCE

Drawing from established theoretical work on trust and relationship marketing, our aim was to capture and distinguish the conceptual meanings of trust and the dynamics of its formation in commercial relational exchanges. This attempt to understand the concept of trust has been aided by an excellent typology of interrelated types of trust constructs (Table 1) proposed by McKnight and Chervany (1996). Referring to relationship marketing literature in order to understand the nature of trust and its development in commercial relationships, we focused on five trust-building processes (Table 1) as described by Doney and Cannon (1997). Building upon this work, we have added another trust building process, the credibility process, differentiating it from the capability process as originally proposed by the authors.

Trust Constructs [McKnight & Chervany, 1996]	Trust-building Processes [Doney & Cannon, 1997]
Dispositional trust	Intentionality
Institution-based trust	Capability
Trusting beliefs:	Prediction
Benevolence,	Transference
Competence,	Calculative
Honesty / Integrity,	<i>Credibility</i>
Predictability,	
<i>Confidence in beliefs</i>	
Trusting Intention	
Trusting Behavior	

TABLE 1: TRUST CONSTRUCTS AND BUILDING PROCESSES

The above, representing trust dimensions and development modes, have been synthesized and theoretically interrelated, resulting in an integrated model and a vertical understanding of how trust is formed in a relational exchange between two parties (Figure 1). The model has been based on the assumption that customer trust in an e-commerce business is built through repeated interactions with promises made, enabled and kept (Bitner, 1995) within an electronic servicescape (Figure 1). A servicescape¹, according to Wanninger *et al.* (1997), is one of the three primary components that comprise an ‘e-commerce information system’. The other two are the supporting infrastructure plus the customer database and analytical tools to support relationship marketing activities. The functions of making, enabling and keeping promises describe a service encounter and the associated relationship building between a business and the customer. In this context promises are made in terms of offerings to show the business intentions, setting customer expectations from the service encounter. Promises are then enabled through facilities offered by the servicescape to service the customer and meet his expectations raised earlier. Keeping the promise, the last stage of promise fulfillment, as it was originally made is the most critical activity for building trust.

¹ The notion of *servicescape* was introduced by Bitner (1992) to describe the physical environment in which a service encounter takes place

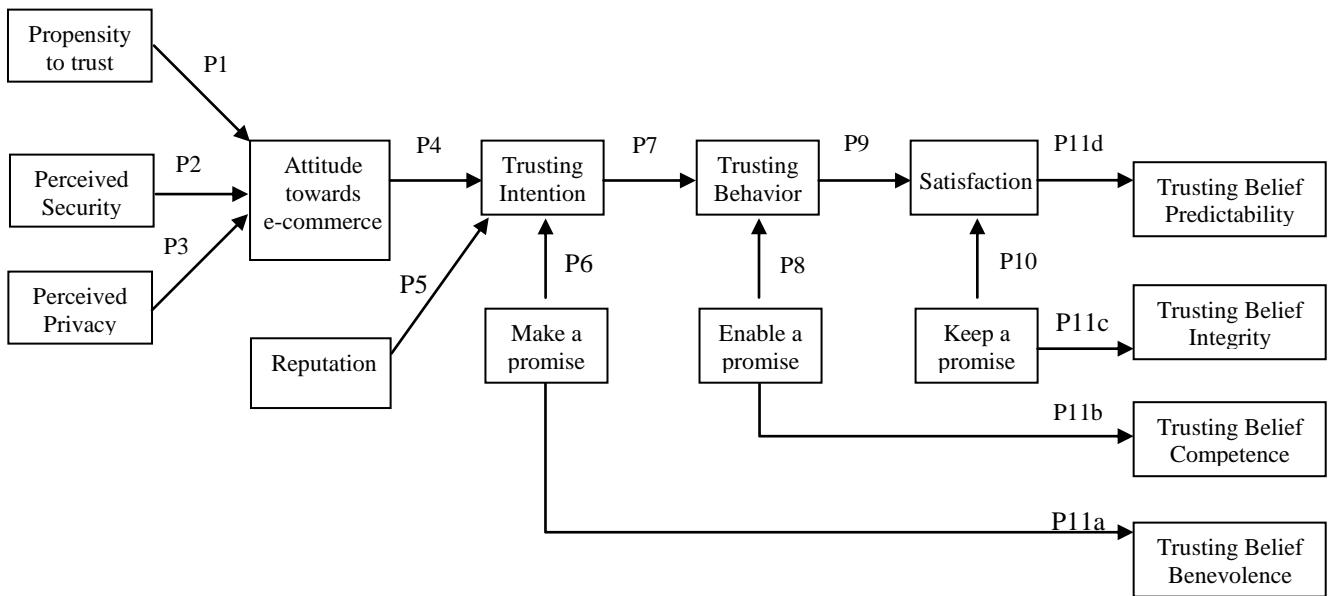


Figure 1: Research model - Trust formation through promise fulfillment within the e-servescapes

As is evidenced in the literature, trust is characterized by a lack of consensus regarding its definition. Divided in two dominant conceptualizations, trust is viewed by many as a belief or expectation implying a notion of confidence and trustworthiness stemming from the partner's expertise, reliability, or intentions (Blau, 1964; Pruitt, 1981). From another perspective, trust is seen as a behavioral intention or willingness to be vulnerable and rely on another party, accepting the risk and uncertainty emanating from the assumption that the party will behave within accepted norms (Williamson, 1975; Coleman, 1990; Deutsch, 1960). Researchers adopting this view have separated beliefs from trust conceptualizations and defined them as antecedents of trust (Mayer *et al.*, 1995). While discriminating between beliefs and behavioral intention, a third research stream has argued that both are necessary components of trust (Moorman *et al.*, 1992; McAllister, 1995; McKnight *et al.*, 1998).

Following the theory of reasoned action (Fishbein and Ajzen, 1975), our model for trust formation in B2C e-commerce relationships encompasses both trusting beliefs² and trusting intention, as distinct yet related facets of trust (Table 2). The core idea underlying the model is that trusting beliefs lead to a trusting intention which is manifested in a trusting behavior. More importantly however, the model emphasizes that the development of trust in an e-

² **Trusting beliefs** are defined as the extent to which one believes (and feels confident in believing) that the other person involved in a relational exchange is trustworthy. Four main categories of trusting beliefs are identified (McKnight *et al.*, 1996).

commerce setting is dependent upon the fulfillment of promises. The model suggests that prior to interaction, trusting beliefs are formed from *reputation*, which in conjunction with *attitude towards e-commerce* affect *trusting intention* (Figure 1). Attitude towards e-commerce is the result of *propensity to trust* and institution-based trust, which is analysed in *perceived security* and *perceived privacy* of the e-commerce context. Trusting intention is also influenced by the *promise that is made* by the online vendor. Trusting intention in turn and the *enabling of the promise* made influence *trusting behavior*. The latter together with the *keeping of the promise* will determine customer's *satisfaction from the overall interaction* with the online vendor. Finally, satisfaction from the encounter will prompt a reevaluation of the pre-interactional trusting beliefs which will replace the initial trust bases. Each repetition of the customer's contact with this environment acting in a trusting behavior will further enhance his trusting beliefs resulting in the continuation of the trusting relationship with the business via the repeated use of the servicescape.

TRUSTING BELIEF	DESCRIPTION
Benevolence	The belief that the other person cares about the welfare of one and is therefore motivated to act in one's interest. It includes the motivation of an Internet vendor to provide security of transactions and protect privacy of consumer information
Competence	The belief that the other person has the ability to do for one what one needs done. It includes the ability of an Internet vendor to guarantee the security of conducting online transactions and the privacy of consumer data. This involves the use of appropriate and effective technological infrastructure, protocols, standards, techniques and mechanisms for secure transactions and protection of privacy as well as the adoption of security and privacy policies
Honesty/Integrity	The belief that the other person makes good faith agreements, tells the truth and fulfills any promises made. Integrity includes the actual application and enforcement of the adopted security and privacy policies
Predictability	The belief that the other person's actions are consistent enough that one can forecast what one will do in a given situation

Table 2: Trusting beliefs

Any interaction with a promise being made, enabled and kept, at any point of its fulfillment presents an opportunity for the organization to build trust by influencing the customer's trusting beliefs. Each stage of promise fulfillment reflects a particular attribute of the vendor which is assessed in comparison to the initial perceptions. This evaluation resulting in the establishment of trusting beliefs is performed through six trust-building processes. When a promise is made, the intentionality process is initiated to help the customer determine the business motives and intentions, influencing his trusting belief in the business benevolence. Enabling the promise invokes the capability process, an assessment of the business ability to

realize its promise, which affects the customer's trusting belief in the business competence. Keeping the promise triggers the credibility process by which the customer evaluates the extent to which the business has actually delivered on its promise and develops the trusting belief in the business integrity. The entire interaction with the servicescape results in the activation of the rest of the trust building processes. Relying on the prediction process the customer makes inferences about the business consistency in delivering the promises it makes, enhancing his trusting beliefs in the business predictability. Finally, with the calculative process the customer assesses the costs and benefits of the business possibly acting in an untrustworthy behavior to increase his confidence in the trusting beliefs.

An empirical study has been performed to assess the validity of the model and the depicted relationships. A measurement instrument was developed using multiple items scales for each construct, based on Churchill's (1979) paradigm. Items were generated on the basis of previous measures for trust, as suggested by Straub (1989) and adapted with slight modifications where necessary, a review of the relevant literature and interviews. A pretest was conducted to refine the initial item pool and derive the final instrument which was used for the study.

Data were collected by administering an online questionnaire to a sample of 132 university students on a postgraduate Information Systems course yielding an effective response rate of approximately 86%. The data were submitted to factor analysis and item correlation examination. 13 factors emerged with eigenvalues greater than 1.0 showing discriminant and convergent validity and explaining 77,1% of the total variance. The reliability of the constructs was assessed by calculating Cronbach's alpha coefficient for each construct, with values above the recommended .70 threshold (Nunally, 1967). Sample items from the questionnaire used can be found in the Appendix.

In order to test the hypothesized relationships multiple regression analysis was used. The results, presented in Figure 2, provide empirical support for the cause-effect relationships described by the model. It should be mentioned that considering the purpose of this study, for the remainder of this paper we only focus on the constructs and the relationships involved in the three stages of promise fulfillment as it is this specific part of the model that describes customer experience within the servicescape while the rest is associated with factors generated prior to interaction. In the next section we will show how agent and virtual reality technologies can offer the contextual expressiveness for enabling trust formation as specified in the model, thus giving an example of its practical applicability.

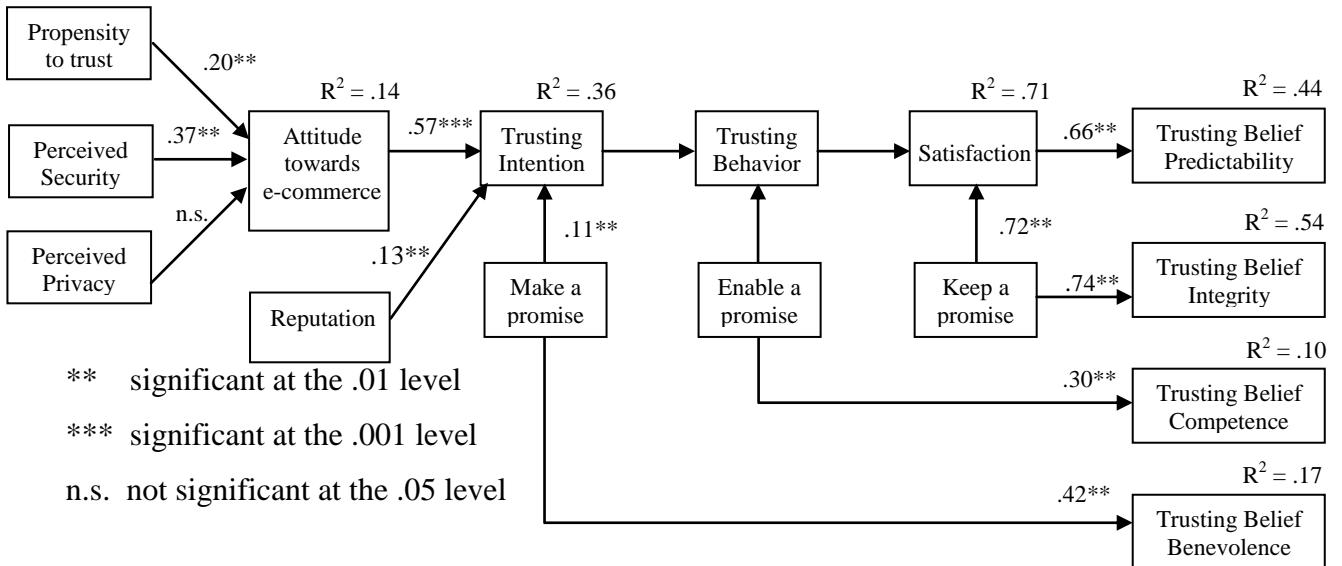


Figure 2: Trust formation through promise fulfillment within the e-servicesscape

3. DESIGNING E-COMMERCE ENVIRONMENTS ON TRUST BUILDING PRINCIPLES

As presented in the previous section, the validated model provides a set of principles that can inform and guide the design of a trust engendering e-commerce environment. Informed by it, we have developed a prototype servicescape as an agent mediated virtual environment enabling customer interaction with business promises being made, enabled and kept. In this section we explain how agent and virtual reality technologies were utilized to provide for the contextual expressiveness needed so as to enable the formation of trust as specified in the model.

Our scope in the context of this paper is to examine how trust can be built during customer interaction with an online vendor. Whilst our model integrates trust-related antecedents and constructs at both levels of initial, prior-to-interaction trust formation and during interaction, we focus on the part of the model that is associated with trust resulting from interaction per se instead of trust resulting from prior-to-interaction factors. The empirical results show that customer interaction with an online vendor can build trust in the vendor in three distinct yet related stages reflecting a promise being made, enabled and kept. The findings indicate that each stage of promise fulfillment has a separate impact on trust, by influencing, directly or indirectly, one of the trusting beliefs and intention about the vendor. This means that based on the interaction characteristics and satisfaction yielding from it at each stage of promise fulfillment, the customer makes inferences about a vendor's attributes reflected by that stage, i.e. benevolence, competence, integrity and predictability (see Figure 2). In addition our

results indicate that interaction with the vendor when a promise is made contributes to trusting intention³. Thus, our empirical work highlights the importance of promise fulfillment for conveying vendor's attributes and for generating satisfaction from the interaction which ultimately result in the formation of trusting beliefs and intention.

At a functional level, in an electronic environment, promise fulfillment is achieved through the set of services available by an online store. Making a promise is conducted through recommendations and search facilities. A promise is enabled through order placement and payment facilities. Keeping a promise involves the prompt and correct, physical or electronic, delivery of the order, including order-tracking mechanisms. As already mentioned, the stages of promise fulfillment reflect vendor's attributes which are assessed to form the respective trusting beliefs and intention. Thus, these facilities, underlying the stages of promise fulfillment, are the tools for exhibiting a vendor's attributes and delivering a satisfying interaction so as to build customer trust.

Thus, we identify two facets of promise fulfillment in an electronic setting. The first facet is related to the type of services provided to the customer for his convenience in conducting transactions with a vendor, while the second is related to how these services are provided to clearly show evidence of a vendor's benevolence, competence, integrity and predictability to the customer so as to make respective attributions of the vendor. While the functionality of an online store enables the conduct of transactions, the way this functionality is provided enables the assessment of the vendor's trustworthiness. The interface of an online store has a dual role, as a medium/point of transactions and as a medium/point of communication with the vendor. Serving as the medium for conducting transactions, it offers the required functionality through recommendations, search, order placement, payment and order tracking services. In this vein, it provides *what* is needed at a functional level for the fulfillment of promises in terms of commercial activities. At the same time, the online store interface is the only medium of contact with the vendor. In the absence of personal, face-to-face buyer-seller interaction, it provides the medium for judging the vendor's trustworthiness, through the way the facilities underlying promise fulfillment are given. The provision of its functionality, i.e. *how* it is offered, shows the vendor's benevolence, competence, integrity and predictability and enables the customer to assess these attributes for building trust.

Therefore, we argue that the interface of an online store should be designed so as to deliver its functionality for promise fulfillment with the expressiveness needed to surpass the lack of

³ Trusting intention is also predicted by prior-to-interaction factors, which are out of the scope of this study

interpersonal contact and allow for the evaluation of the vendor's trust-related attributes. The recommendations and search mechanisms associated with making a promise is the means for showing benevolence. Satisfaction from the interaction with these mechanisms influences a customer's trusting belief in the vendor's benevolence. Facilities for order placement and payment related to enabling a promise is the vehicle for showing competence. Satisfaction from the interaction with these facilities influences a customer's trusting belief in the vendor's competence. Order tracking services, beyond the delivery of an order which can be out of an electronic context, is the channel for showing integrity. Satisfaction from the interaction with these services influences a customer's trusting belief in the vendor's integrity. As a whole, these services offer a way for showing predictability, with satisfaction from the overall interaction affecting a customer trusting belief in the vendor's predictability.

The following paragraphs illustrate a prototype interface, which via the use of agent and virtual reality technologies has been designed to convey the list of attributes necessary for the building of trust.

The e-servicescape has been designed and implemented as a three-dimensional virtual world depicting a shopping mall comprised of virtual stores. Each store represents an e-commerce company, offering products available by it. This virtual environment is populated by anthropomorphized avatars representing customers and salespersons (Figure 3). A customer is able to visit the virtual servicescape in the form of an avatar and engage in shopping activities by interacting with a salesperson avatar, which is implemented as an agent. Each customer entering the virtual mall is assigned a salesperson agent, which is his personal shopping assistant throughout the duration of the visit. The customer is constantly in contact with the salesperson while he can freely navigate in the stores, virtually look and feel the 3D products and be aware of other customers presence.



Figure 3: The virtual servicescape

Salesperson agents have a multiple role in the e-servicescape, which is reflected in three levels of action. In the first level a salesperson agent welcomes and greets the customer visiting the virtual mall and guides him to the stores. The agent is able to perform a search and recommend the products that are best suited to the customer needs. In the second level, the agent acts as a surrogate of a company's store salesperson, serving the customer that visits a store and offering assistance in ordering products available by the business represented by the virtual store. In the third level, the agent helps the customer track the status of placed orders. In this approach, the design of the servicescape as a shopping mall of multiple stores where customers, businesses and salesperson agents are visualized allows for customer interaction within the servicescape at three distinct levels depicting the functions of making, enabling and keeping promises. At the first level a salesperson agent makes a promise, at the second level the agent enables the promise in a virtual store, while at the third level the agent keeps the promise.

As mentioned earlier, promise fulfillment is largely associated with recommendations, search, order placement, payment and order tracking facilities. Such facilities are currently typical of conventional web stores, such as Amazon.com, provided through a web interface with forms, links and text messages. However, these mechanisms only allow for impersonal transactions with a web store and do not offer the context for an interaction that conveys a vendor's

attributes, failing to give the customer the sense of a direct communication with the vendor, which is needed for building trust. The servicescape as described above, overcomes this problem by offering the expressiveness of a physical, face-to-face interaction, thus facilitating the judgement of the vendor's trustworthiness. In this way a customer can draw a parallel with the experience held from the interaction in physical settings judging on the promises and forming an opinion about the trustworthiness of the vendor.

With respect to conventional web stores, such as Amazon.com, this virtual representation of an e-commerce environment provides for an advanced form of online shopping as it offers an enhanced in intuitiveness and user-friendliness interface which replicates a traditional commercial context. In this way, it allows for a trust-building interaction with the customer at all stages of promise fulfillment. Whilst providing the functionality required for transaction needs, the virtual servicescape offers the context for conveying vendor's attributes. Typical facilities, such as search, recommendations, order placement and payment, currently found in Amazon.com, a successful example of e-commerce site, are also supported in this virtual environment, however they are offered in a way that is more apt to allowing immediacy in the contact with the customer. In all levels of the shopping process, the salesperson agent is the medium of customer contact with the Internet vendor, serving as the surrogate of a human vendor. Instead of completing forms, clicking on links and viewing messages as in Amazon.com for search and other shopping-related activities, the virtual servicescape customer engages in a personal dialog with the salesperson agent with a chat-style facility using natural-type language. As such, the faceless interaction with the usual web interface is advanced to a human-like communication, where the customer talks and has a virtual eye contact with the salesperson. With this high level of interactivity the servicescape offers the expressiveness needed for demonstrating vendor's attributes during promise fulfillment. In addition, the provision of facilities takes place within a visualized spatial representation of a store structure where a customer can see and interact with virtual products, salespersons and other customers, while moving around the environment. Thus the servicescape serves as a metaphor of a bricks-and-mortar store, creating an illusionary sense of a realistic commercial context, consistent with the customer mental model of a physical shopping experience. This facilitates the fulfillment of promises, not only at a functional, transaction level but also for inducing a customer's trusting beliefs and intention about the vendor. The following paragraphs provide a description of the servicescape functionality revolving around the fulfillment of promises, showing how the underlying facilities can be provided to transform an e-commerce transaction to a trust-building interaction.

Level 1: Trust formation by making a promise

At the first level, agents are responsible for making promises to the customer on behalf of the companies that are members of the virtual servicescape. In line with our model, their aim is to achieve customer's satisfaction from the promise being made, as this will augment the customer's trusting intention towards a business (P6)⁴, and will determine customer's trusting belief in the business benevolence through the intentionality process (P11a). In this direction, the agents provide for personalized and friendly customer communication in order to maximize the 'perceived satisfaction from the promise being made' construct of the model resulting in customer's trusting intention and benevolence trusting belief.

When a customer visits the virtual mall, a salesperson agent appears which welcomes the customers and kindly offers to help him. The customer can personally interact with his salesperson agent and converse with him using a predefined set of natural-type of language phrases. Even upon initiation, customer interaction is targeted towards satisfying the customer, showing goodwill and friendliness. The salesperson collects information from the servicescape companies and proactively presents selected advertising messages to the customer regarding business offerings, based on the customer profile. The agent recommends products to the customer based on characteristics derived from his previous purchases. The agent can also make suggestions based on previous visits and searches, but only after customer's consent, to further demonstrate business benevolent intentions. The customer can personally interact with his salesperson agent and converse with him using a predefined set of natural-type of language phrases. The customer is able to request information about the advertised offers and be directed by the agent to the virtual store of the business making a particular offer. In addition, the customer is able to declare his interest in a product to the agent, regardless of those advertised. The customer is able to make a request about a product and has the option to show his product-specific preferences to a number of criteria in a dialogue with the agent, seeking to increase his satisfaction. Then the agent performs a search based on the customer's request and according to the specified preferences and characteristics, presents the results of the search, and in doing so simultaneously making and communicating the promise to the customer. The search functionality of the agents is designed so as to deliver an objective and unbiased presentation of the findings in order to render them and the

⁴ See Figure 1 for the relationships represented by Ps in the rest of this section

businesses represented in the servicescape trustworthy, enhancing thus the customer's satisfaction from the promise being made.

The customer can visit a specific store from which a product is available by either granting permission to the agent to transfer him to the store or by clicking on the selected product or even by moving to the store himself. In this way, the agents attempt to strengthen the customer's trusting intention while showing the business benevolence that will be assessed through the intentionality process to determine the respective customer trusting belief.

Level 2: Trust formation by enabling a promise

At this point, interaction proceeds to the second level, where agents are responsible for enabling promises to the customer, on behalf of a specific business that is virtually represented in the e-servicescape by a store of the shopping mall (Figure 4). Based on our model, the goal at this stage is to induce a customer's trusting behavior by capitalizing on his trusting intention and reaching customer's satisfaction from the promise being enabled. As suggested by the model, both these constructs will positively affect a customer's trusting behavior (P7 and P8 respectively). In addition, the perceived satisfaction from the promise being enabled will determine customer's trusting belief in the business competence through the capability process (P11b). Hence, at this level the focus shifts on maximizing the customer's perceived satisfaction from the promise being enabled so as to allow the trusting intention to manifest in a trusting behavior and develop the competence trusting belief.

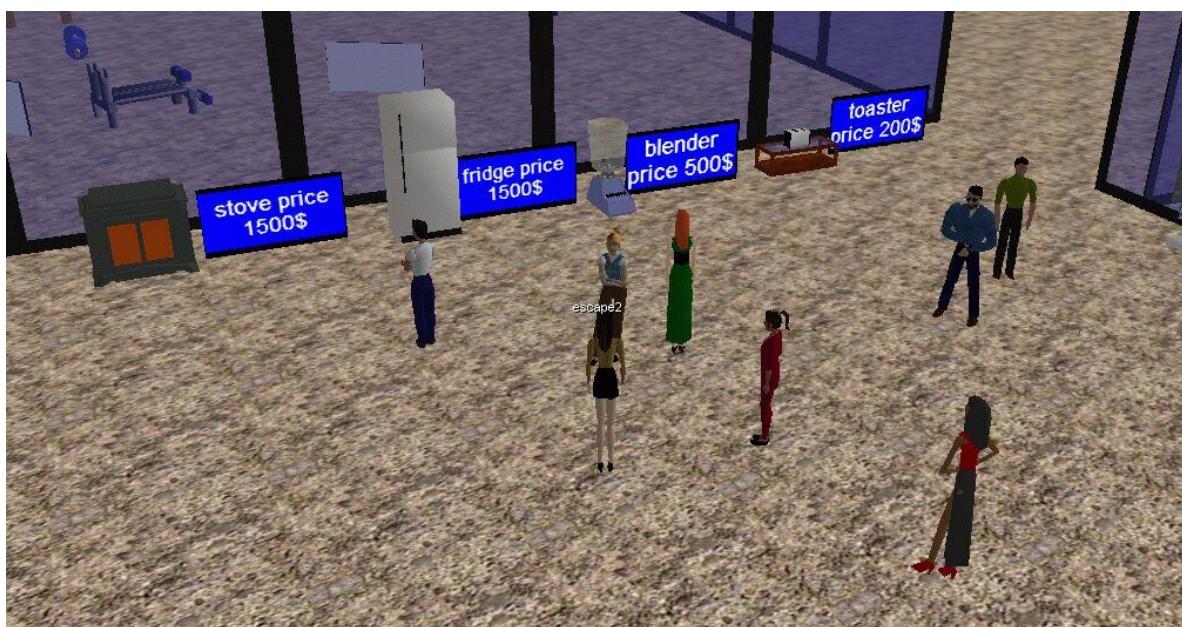


Figure 4: Customers and salesperson agents in a virtual store

When a customer arrives to a business virtual store directed by the agent, the agent assumes responsibility for offering service to the customer, serving as the business salesperson. The agent welcomes the customer to the store and takes him to the location of the requested product. All products are visually represented within the virtual environment as three-dimensional objects, allowing a customer to preview and experience them before purchase. To ensure satisfaction from the enabling of the promise, a customer is able to view a product from all possible angles and fully interact with it. Furthermore, the customer is able to see detailed information about a product by clicking on the sign that is next to it, and judge whether or not to depend on the promise. A customer can place an order by asking the agent to add a selected product in his shopping cart. To promote the enactment of a trusting behavior, the customer is allowed to delete a product in case he decides not to buy it, while an order is not actually submitted unless the customer specifically asks the agent to do so. In addition, the customer can also ask the agent to show him the content of his shopping cart before purchase. Throughout the duration of the encounter, a customer is free to move in the store and see other products, or visit other stores. The agent follows the customer closely wherever he goes into the servicescape and there is constantly a visual contact with him, showing that he is always at the customer's disposal. Aiming to provide a satisfying enabling of the promise, the agent is exclusively dedicated to the customer and persistently ready to help him, showing the business ability to meet customer expectations and impelling the customer to behaviorally express his trusting intention. Enabling the promise in this manner positively influences the customer's trusting belief in the business competence and incites the customer to act in a trusting behavior.

Level 3: Trust formation by keeping a promise

Having enabled a promise and achieved the manifestation of a trusting behavior the servicescape also provides for satisfying the customer with the fulfillment of the promise. In accordance with the model, following a trusting behavior and in conjunction with his degree of satisfaction from the promise being kept, the customer forms his perception of satisfaction from the overall interaction (P9 and P10). In addition, satisfaction from the promise being kept will be assessed through the credibility process to determine customer's trusting belief in the business integrity (P11c). As described earlier, keeping a promise is mainly associated with the underlying infrastructure of the servicescape guaranteeing the correct and timely delivery of products. This involves physical aspects of the delivery process, and in the third

level, the servicescape partially covers the function of keeping a promise by offering an order tracking facility.

Upon submission of an order, the customer can ask the agent to inform him about the status of the order (Figure 5). The customer can see the products he has ordered, the date the order was submitted, the date it will be delivered and the current status of the order. In this way, the customer is able to check if the promise is being kept as expected, evaluating the business credibility. In addition the customer is able to track his orders without having to enter the virtual environment. Using a desktop application, the customer can view information regarding his order status and he is allowed to cancel an order or modify an order by removing products from it, as long as the order has not been shipped yet. By keeping the customer constantly up-to-date about the progress of his order delivery and by granting him control of his order, the servicescape aims to maximize customer's satisfaction from the fulfillment of the promise and build his credibility trusting belief. In addition, the satisfaction from the overall interaction that is intended to result from this interaction stage will shape a customer's trusting belief in predictability through the prediction process (P11d) and a customer's confidence in the formed trusting beliefs, through the calculative process.

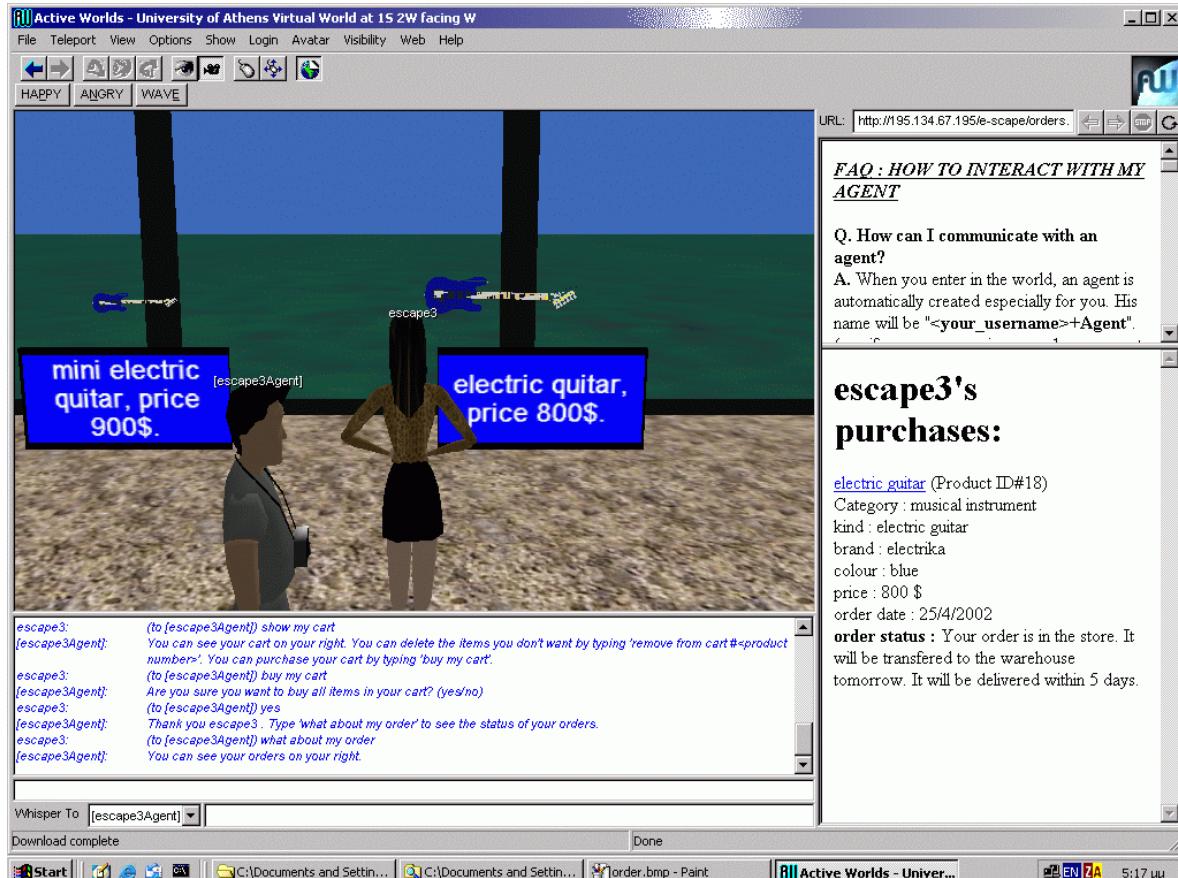


Figure 5: A salesperson agent informs a customer about the status of her

5. CONCLUSIONS AND FURTHER RESEARCH

In e-commerce trust is increasingly been recognized as the lever for achieving customer retention, rather than merely their attraction and acquisition. Due to its complex and multifaceted nature, understanding how trust is formed and maintained is an issue that still dominates our research agendas, so as to inform effectively the practice of e-commerce.

In this paper we have attempted to provide a much needed focus towards this direction by a) proposing a model for relationship-oriented trust formation in virtual environments and b) by presenting a prototype trust-engendering e-commerce environment the design of which is driven by the model. The first contribution, i.e. the model, systematizes knowledge in such a way that enhances our understanding with respect to not only how trust can be formed in electronic commerce but also how it can be maintained. Previous models do not propose in a consistent manner specific methods of processes for trust formation nor do they examine trust in the broader context of building long-term relationships, where in fact, its essence lies. As far as practical relevance is concerned (Benbasat and Zmud, 1999) we demonstrated how the model was used to inform the design of a prototype environment explaining how trust can be possibly infused into a commercial transaction by the use of agent and virtual reality technologies.

This study contributes to the existing body of literature in a number of ways. First of all, it extends the focal concept of trust from a unidimensional construct as it has been treated in existing trust models, by making a conceptual distinction between its facets. Instead of trying to understand trust by identifying its antecedents and consequences we examine the formation of trust as a gradual process linking its constituent elements. As a result, trust is not approached from a short-term transactional perspective, as an enabling factor for a customer to make a purchase, but it is placed in the center of building a long-term relational exchange between the customer and the Internet vendor. Furthermore, we have explicitly addressed the role of the Internet vendor's behavior in the development and evolution of trust, an issue which has not been previously dealt with. Our model introduces aspects from the Internet vendor's side, in the form of making, enabling and keeping customer promises, and assesses the customer reaction to them and their impact to the building of trust. As such, this study also explores in a number of ways the interaction that takes place within online environments and the effects on the formation of trust in this context.

As shown by the empirical results of the study promise fulfillment develops trust during the period of customer interaction with an online store, with the satisfaction perceived from each stage resulting in trusting beliefs and intention. The stages of promise fulfillment reflect

vendor's attributes which are assessed to form the respective trusting beliefs. The satisfaction from each stage determines the trusting belief about the vendor's attribute which is reflected by that stage. We further analyzed promise fulfillment stages into (two facets,) the underlying functionality required for them and the way this functionality is provided so as to engender trust. We stressed that the functionality of an online store, beyond covering transaction needs of promise fulfillment as it stand today, should convey vendor's benevolence, competence, integrity and predictability. Driven by these findings, we presented a trust-oriented e-commerce environment as an agent mediated virtual servicescape, showing a practical example of how the functionality currently found in conventional web stores can be provided for building trust through the fulfillment of promises.

As with any empirical research, this study has several limitations. First of all, the sample used for the collection of the empirical data consisted of students who had strong computing background and were experienced Internet users. These sample characteristics may not apply to a more diverse population raising certain questions regarding the external validity and generalizability of the presented results. However the use of students for data collection is a practice widely found in empirical research. Moreover, the empirical study did not capture how trust evolves over time, through repeated consumer-vendor interactions. This evolutionary nature of trust development should be more rigorously examined in a longitudinal study. In addition, further research should focus on the empirical testing of the trust building processes proposed by the model to be invoked during customer interaction with the online vendor. It should be noted that due to the experimental nature of the study, it was not possible for the participants to engage in actual shopping activities. This was a barrier for the measurement of trusting behavior and thus the hypotheses which involve this construct were not tested. However, these will be addressed qualitatively via participant observation within the virtual servicescape, as part of our further research endeavours.

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APPENDIX: Sample items of the model variables

All constructs (except Trusting Behavior) are measured on a 5-point Likert scale from Strongly Disagree to Strongly Agree

Propensity to trust

I generally trust other people

Most people can be counted on to do what they say they will do

Perceived Security

The existing legal and regulatory framework is adequate for guaranteeing security of online commercial transactions

The available technology guarantees secure payments over the Internet

Perceived Privacy

Most Internet vendors protect consumers' privacy

Most Internet vendors will not sell consumers' personal information collected during an online commercial transaction to third parties without consumers' consent

Attitude towards e-commerce

I am positive towards buying products on the Internet

The thought of buying a product at the website of a vendor is appealing to me

Reputation

This Internet vendor has a good reputation

This Internet vendor has a reputation for being honest

Tutting Intention

I would use my credit card to purchase from this Internet vendor

I would be willing to rely on this Internet vendor to find information about a product

Making a promise

The information this Internet vendor provides me about a product is sufficient

The information this Internet vendor provides me about a product is objective

Enabling a promise

This Internet vendor provides search facilities that are easy to use

This Internet vendor provides order submission facilities that are easy to use

Keeping a promise

This Internet vendor does things exactly as promised to me

Satisfaction from overall interaction

This Internet vendor's behavior meets my expectations

This Internet vendor is very consumer-oriented in its interactions with me

Benevolence

This Internet vendor would not knowingly do anything against my interest

This Internet vendor would not take advantage of me

Competence

In my opinion, this Internet vendor is capable of meeting its obligations

This Internet vendor is capable of fulfilling its promises (e.g. regarding the delivery of orders within the time promised)

Integrity

This Internet vendor deals honest with me

This Internet vendor keeps promises it makes

Predictability

This Internet vendor behaves in a consistent manner

This Internet vendor does the same thing every time the situation is the same