Enabling Trust Online

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Abstract

Trust is one of the mainstays of commerce. However, as more and more individuals and businesses participate in electronic commerce, it is becoming apparent that much of what supports trust in the traditional commerce setting is unavailable online. This paper explores the nature of trust online, identifying the ten principles underpinning the concept of trust and the online mechanisms that promote it. Label Bureaus that capture authoritative third party ratings and Reputation Systems that capture user feedback and opinions (second party ratings) are examined with respect to these ten principles and it is shown that neither type of rating system satisfies all ten of them. Finally, a new hybrid form of trust infrastructure is proposed that integrates first party information, second party opinions, and third party ratings and, in so doing, addresses all ten of the principles of trust.

1. Introduction

Trust has been embodied in market structures and processes throughout the centuries. The condition of trust is an important enabler to personal and market transactions of many kinds, even where there are sophisticated legal remedies available. As traditional frameworks of business evolve rapidly in e-commerce, it is becoming obvious to all players that the underlying trust mechanisms of the offline world are not present in the online world in the same way or to the same degree. The absence of a universal consensus on how trust is established in virtual markets and the difficulties in communicating tailored information needed to develop trust among disparate parties is one of the most significant inhibitors to the development of e-commerce [13].

Trust is a belief or expectation that the word or promise by the seller can be relied upon and the seller will not take advantage of the buyer's vulnerability [17]. Trust and risk are closely interrelated [27]. Risk is the core of trust in that trust is the degree to which a truster holds a positive attitude toward the trustee's goodwill and reliability in a risky exchange situation [15].

A corporate trust reputation embodies the history of other constituent's experience with the company and signals the overall attractiveness of the company to all its constituents, including employees, customers, investors, reporters, and the general public. It is the extent to which buyers believe that the selling organization is honest and concerned about its customers [11] and is the result of trustworthy behaviour [20].

Consumer trust is built upon information that reflects a company's reputation, policies, practices and performance history. It can be communicated directly by the company, by other parties that have interacted with the company, or by trusted third parties. These information sources are referred to as first party, second party and third party information sources respectively. Over the past few years a number of different mechanisms have evolved on the Web to deliver information from all these sources to the consumer.

First party information is communicated online by businesses through many types of information including privacy and security statements, mission statements, guarantees and assurances, fulfillment schedules, past performance reports, customer support phone numbers, and company information which may include addresses, history, investor information, news releases and biographies of the major executives. The advantage of first party information in establishing trust is the directness of the communication between trading parties; the disadvantage is that this information is not unbiased, and is not subject to independent validation or verification.

Second party opinions are captured on the Web through the use of *reputation systems* that capture word-of-mouth feedback and a history of the previous performance of these parties. Reputation systems typically operate in the context of an online community. One of the most popular examples of a Web reputation

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system is the Feedback Forum at eBay (www.ebay.com) where comments and ratings are gathered from buyers and sellers about each other after each transaction. The summarization of the feedback helps reduce other customer's perception of risk. The primary advantage of second party information in establishing trust is that it communicates the experience of others in performing similar transactions; the disadvantages are that such information is typically unstructured, potentially unreliable, and comes from unknown or anonymous sources.

Third-party ratings are communicated online in a number of ways including seals of approval, trustmarks, directories of trusted sites, trust infomediaries, and label bureaus. To date, the use of seals of approval and trustmarks are the most popular means of communicating trusted third-party ratings on the Web. Examples include BBBonline (www.bbb.online.org), TRUSTe (www.truste.org), and VeriSign (www.verisign.org). Research has shown that displaying licensed Web based seals of approval can help to establish trustworthiness [7]; however, these seals can easily lose credibility if they fail to enforce the standards they represent. Although directories of trusted sites and trust infomediaries are being developed, it is too early to predict how successfully they will emerge as trust brokers. There are many challenging issues to be addressed around the issues of scope, auditing, and economic feasibility.

Section 2 of this paper explores the nature of trust online in a set of ten principles. Section 3 examines reputation systems and label bureaus as examples of second and third party rating systems, respectively, with respect to these ten principles. In Section 4, we propose a new hybrid form of trust infrastructure that integrates first party information, second party opinions, and third party ratings in a single system that addresses all ten of the principles of trust.

2. Ten principles of trust

From traditional marketing literature, consumer trust is seen to be more easily developed when the consumer has a positive trusting stance in general, has had prior interactions with the merchant, interacts with a knowledgeable salesperson with similar or familiar background to the consumer, is protected by strong social and legal structures, and expects to be patronizing the merchant for a prolonged period [16]. However, many of these sources of trust are not easily available to businesses and consumers in the online world of electronic commerce. In the offline setting, a consumer's trust is affected by the seller's investments in physical buildings, facilities, and personnel. Online, concerns over the impersonal electronic storefront, the low cost of entry and exit in the Web marketplace lead many consumers to regard Internet merchants as fly-by-night operators [11].

There exists a vast amount of literature on trust, from the perspectives of both sides of a transaction. The following ten main principles surrounding trust online have been distilled from this literature.

Principle 1: Trust depends on identity.

Trust accrues over time between individuals and companies that build a shared history of positive interactions. In this way trust depends on identity, the condition of being distinguishable from others, for without identity there is no way to group together separate interactions into a history. Offline, identity can be established by visual recognition or by authoritative identity tokens such as driver's licenses and passports. Online, individuals and companies may have virtual identities whose mapping to their identities in the offline world are masked, but so long as these identifying tokens remain constant they can be used to tie together individual interactions into a history of interactions. Online identity is a many-shaded concept. In designing online trust infrastructure one must decide what balance between the freedom engendered by anonymity and responsibility that identity brings is best in establishing the desired environment of trust.

Principle 2: Trust is based on information.

To trust someone or some organization one must first "get to know them". In the business setting the information required to "know" another party has many dimensions as it must capture knowledge about complex behaviours surrounding issues such as privacy, reliability and past performance. Online there are many dimensions to trust and a lot more information may have to be communicated to get the same level of trust engendered from personal contact and word of mouth in the offline world [34]. It is becoming clear that buyers and sellers need models that help them to make better decisions and these models depend on detailed multi-dimensional information [26].

Researchers [7, 13, 33, 34] have found that many features enhance trust in B2C (business-to-consumer) e-commerce sites. Currently, most sites describe themselves in terms of information about security, privacy, guarantees, and assurances. However, there are many other dimensions that consumers would like information on in order to help establish trust.

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Principle 3: Trust is a function of the perception of risk.

Trust is a belief or expectation that the word or promise by the merchant can be relied upon and the seller will not take advantage of the consumer's vulnerability [17]. Trust and risk are closely interrelated [27]. Risk is the core of trust in that trust is the degree to which a truster holds a positive attitude toward the trustee's goodwill and reliability in a risky exchange situation [15]. Trust is the non-rational choice of a person faced with an uncertain event in which the expected loss was greater than the expected gain [10].

Trust evolves through the process of a growth of knowledge and understanding of the people with whom we interact plus the actual experience of working with them. Part of getting to know somebody is becoming aware of the extent of their commitment to us plus the circumstances under which we can trust them. Indeed, recognition or awareness of another's trustworthiness may only arise, not through everyday experiences, but through their behaviour in exceptional, and therefore infrequently occurring, circumstances [4].

Principle 4: Trust deepens over time and with increased reciprocity.

Most theorists agree that trust is intimately associated with risk and when a trustee realizes that a truster has taken considerable risk in trusting them, they tend to be motivated to behave in a trustworthy manner. Such reciprocity has been found to be a key element in trust building. Firms do not blindly take unjustified risk in the hope of developing a trustful relationship but rather adopt a gradual approach in which partners start with limited incremental investment when risk and uncertainly levels are high [5]. A firm with a reputation for being honest, fair and trustworthy has the necessary first piece of evidence for other parties to undertake some initial risk and pursue transactions with them [3]. Customer loyalty theorists believe that building trust leads to more enduring relationships and more profits over time and that the high cost of acquiring customers is only recaptured in the later years when the volume of their purchases rises [29].

The strategy of beginning with a low risk exchange and then moving to greater levels of interdependence (e.g., the possibility of both greater profits and greater losses) has only recently begun to be studied in the experimental social dilemma literature [22]. Given that most people do not extend blanket trust to others, if someone wishes to demonstrate their reliability and trustworthiness, it follows that an important question is with which elements of behavior should they first try to demonstrate their trustworthiness [4]. In the end, trust is earned by meeting expectations. As small commitments are met, customer confidence grows in the belief that companies will also fulfill larger expectations [34]. If a person found that a group of people with whom he or she had conducted economic transactions in the past had acted according to their obligations, he or she would be more likely to trust this group in the future [19].

Principle 5: Trust is a matter of degree.

Trust is a matter of degree. There is no such thing as blanket trust. In fact trust can be defined as the degree to which the truster holds a positive attitude toward the trustee's goodwill and reliability in a risky exchange situation [8]. The degree to which trust is given varies with the individual, the organization and the situation at hand [25, 31]. It has been found that a buyer's need for information or advice varies with product type. If the purchase decision involves certain attributes such as high price, complexity, learning, rapid change or risk then the information needs in order to build trust will be greater [34].Hence, there is a need for the ability to customize the degree to which a truster places importance on different aspects of trust commensurate with their individual risk tolerances and the situation at hand.

Principle 6: Culture affects trust.

As the globalization of markets by the Internet makes it necessary to establish trust in disparate foreign markets, jurisdictions and cultures, it is important to understand the impact of national culture on the trust building process. Cultural attitudes influence trust [7, 14]. For example, the Cheskin study [7] concludes that cultural differences result in different responses to risk. They found that "US and Brazilian consumers are more cynical about the ability of governments and Web sites to control identity and other forms of risk than Spanish speaking Latin Americans" and that both Latin Americans and Brazilians gained more trust from the presence of credit card symbols on sites than the US. As each culture's "collective programming" results in different norms and values, the processes trusters use to decide whether and whom to trust is heavily dependent upon a society's culture [10]. The fundamental bases of trust varies across nationalities with consumers coming from individualistic countries having a higher trusting stance in general and being more willing to base their trust in the merchant on factors that are inferred from an impersonal Web site than consumers from collectivist countries [9]. It has been found that personal and impersonal sources of information have different impacts on individuals across cultures [12].

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Principle 7: Third party ratings are important in developing trust.

Trust is affected not only via first hand interaction, but also by the opinions of other parties. An important source of opinions is trusted third parties. In the offline world such parties include organizations such as the Better Business Bureau, Consumer Reports, and the media in general who render "expert" opinions based on research. In the online setting, seals of approval from trusted third parties such as Visa, TRUSTe, and BBBOnline, have been found to reassure consumers that they can trust a site or online business [6]. In fact, third party ratings may be even more important online than offline, due to the absence of visual and social cues traditionally found in the bricks and mortar world. Reputation is formalized and amplified by trusted third parties. Several organizations have formed to offer a "seal of approval" that will encourage trust among consumers, including TRUSTe and WebTrust [23]. Such seals of approval are usually small graphics that indicate that a particular online site conforms to the standards certified by the organization providing the seal. It has been found that the use of trusted third parties to mediate the exchange of information can enhance privacy and trust in electronic communities [21].

Principle 8: Second party opinions are important in developing trust.

Trust can also be affected by the opinions of second parties that have had experience in conducting similar transactions with a business. In the offline world such parties might include friends and acquaintances that render "personal" opinions based on experience. In the online world, which is better able to facilitate communication among strangers, such parties may be just about anyone who has conducted transactions with the same business.

Presenting user feedback reduces the customer's perception of risk and enhances trust [34]. Robert Axelrod's "shadow of the future" theory states that the expectation of future consequences, such as reciprocation or retaliation, to current actions creates an incentive for good behaviour [1]. Reputation systems, which include user feedback systems, seek to establish the shadow of the future to each transaction by creating an expectation that other people will look back on it [30].

Principle 9: First party information is important in developing trust.

First party information, i.e., information that businesses provide concerning themselves is critical to developing trust online. The first party needs to clearly present information about their services (e.g., delivery methods, insurance, payment methods), policies (e.g., privacy, security, returns) and products (e.g., description, pricing, availability).

In the offline world, expectations around transactions are often established and reasonably constant within a local context. For example, when we buy shoes at a local store we expect: 1) they will not divulge personal information (e.g., shoe size); 2) that we can expect to take the product directly away with us; and, 3) that unless otherwise stated we can return the shoes so long as we have not worn them and we have the receipt. In the online world that covers a much wider geographical and cultural area, much more information concerning transactions must be explicitly stated by the business (first party). In particular, firms online must reveal their policies more fully given the lack of other means to establish customer relationships such as personal contact [31].

Principle 10: Formal and social controls are important in developing trust.

Both formal controls and social controls are important to the development of trust. Although these could be separated into two separate principles, one for formal controls and one for social controls, we have opted to combine these into a single principle based on the notion of "control". Formal controls employ codified rules, goals, procedures and regulations that specify desired patterns of behaviour and penalties or sanctions to be applied in cases of nonconformance. They serve to influence the behavioural patterns of companies and individuals by delineating clear boundaries [8]. Other types of formal trust infrastructure that are important online are voluntary in nature. These include seals of approval and third party certification systems.

Unlike rule based formal controls, social controls use organizational and cultural values and norms to encourage desirable behaviour. They are about dealing with other people within the context of a community or organization. Social control is manifested by a certain level of confidence in members' judgment and competence, laying the foundation for trust. It is more effective for long-term alliances as it takes a long-term orientation toward a relationship for cultural systems and norms are nurtured more slowly. Social controls in alliances often take the form of socialization, interaction and training [8].

In the short term, formal controls are more important to the development of trust. Social controls develop over time. Formal controls have different information requirements, and typically more information, than social controls. Both formal and social control mechanisms need to provide a "track record" for those who perform well. A track record and an objective evaluation process are more conducive for generating trust than a subjective evaluation process [18]. In the online world, such social and formal

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controls include the use of reputation systems and label bureaus. Each of these has its own infrastructure considerations.

3. Reputation systems and label bureaus

While many aspects of trust online are similar to trust offline, new mechanisms and infrastructures are required to communicate the diverse information that trust is built on. Offline, much of the information pertinent to trust is carried in visual and cultural cues. One of the principle challenges in developing online trust mechanisms is finding ways to communicate this same information in a digital medium. This section examines two trust infrastructures; reputation systems and label bureaus with respect to the ten trust principles identified above.

3.1 Reputation systems

Reputation systems, which are often referred to as feedback systems in the online context, are repositories for second party ratings. A reputation system collects, distributes, and aggregates feedback about participants' past behaviour. The expectation of reciprocity or retaliation in future interactions creates an incentive for good behaviour. Fundamentally, reputation systems are a type of trust infrastructure that supports social controls. By imposing what Robert Axelrod [1] refers to as the "shadow of the future" on the participants in a trading environment reputation systems seek to create a culture in which good behaviour is rewarded and bad punished.

The strengths of online reputation systems include the following:

- **Community building.** Communities of responsible members who share a value system and a sense of future in the community can create online reputation systems.
- **Perception of risk.** Viewing user feedback reduces a potential customer's perception of risk by helping them understand the past history of the experience of others [34].
- **Robustness.** Online reputation systems ay be robust to error or systematic bias because numerous participants are involved.
- **Positive Reinforcement.** Once a participant has established a positive reputation there is a very great incentive to maintain and improve on it [24].
- **Mixed Format:** Reputations systems often rely on both unstructured free text comments and quantitative summary measures, adding to the richness and the utility of the feedback.
- **Dynamic.** Reputation systems are highly dynamic as their free text component can capture judgments expressed by the participants that may not be easily or completely recorded by the current set of structured data fields being employed.

Reputation systems are a critical component of a trust infrastructure as they support several key trust principles in a way that label bureaus do not. In particular, they provide a vehicle for second party opinions (Trust Principle 8) and help to establish social controls (Trust Principle 10). Reputation systems support Trust Principle 2 (Trust is based on information) in providing information about people's experiences with past transactions. This is a different type of information than is captured by label bureaus. Reputation systems also are potentially much more dynamic than label bureaus because the work in creating ratings is spread over a much larger number of participants. This dynamic nature is particularly important in supporting those trust principles represented by judgments that may change over time, namely principles 3, 4, and 5.

3.2 Label bureaus

Label bureaus are an approach to the communication, structuring, management, and processing of both first and third party trust information [32]. Anyone can create a rating system by defining categories, describing ratings within those categories and placing the information on a label. A common format for labels may be articulated so that any compliant selection software can process any compliant label. The labels can accommodate any set of labeling dimensions used to describe Web content, as well as any criteria for assigning labels. As a result, a single site or document may have many labels that may be developed by different organizations. Web users, by choosing their selection software and label sources or bureaus, can control which sites they access through their selection criteria [35].

The strengths of rating systems and label bureaus include the following:

- **Multiple Dimensionality.** The ability to rate a document along multiple dimensions and, within each dimension, the ability to rate it from any scale of values. This feature meshes with the need for a system that reflects the culturally and ideologically diverse attitudes towards trust and is flexible enough to reflect the changes in values as trust evolves over time.
- **Multiple Perspectives.** The freedom of each third party rating service to choose its own labeling criteria leads to the development of rich labels that reflect the diverse viewpoints of users on the Web.
- **Transparency.** Transparency is important because labels are only really meaningful when

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users understand the process by which labels are created.

- **Filtering.** Such systems enable users to control what is blocked through the use of a diverse set of filtering labels and criteria.

Label bureaus offer the flexibility and expressive power required to support many of our trust principles. For example, it supports the capture of trust information across many different dimensions (i.e., Trust Principle 2 – Trust is based on information). Label bureaus also support the formal controls of Principle 10. Label bureaus also facilitate filtering of ratings by users in order to support their cultural sensitivities, and changing risk tolerances (i.e., Trust Principle 6 – Culture affects trust; Principle 4 – Trust deepens over time and with increased reciprocity; Trust Principle 3 – Trust is a function of perceived risk, and Principle 5 – Trust is a matter of degree).

4. Integrating label bureaus and reputation systems

While both label bureaus and reputation systems have strengths, neither of them can address in isolation the full range of trust principles listed in Section 2, above. Specifically, reputation systems do not address Principles 7 or 9 or the formal controls required in Principle 10, while label bureaus do not address the issues of Principle 8 or the social controls required in Principle 10. Therefore, we propose a hybrid architecture.

The proposed hybrid system (Figure 1) is a label bureau centered on the behaviour of companies and individuals in the context of e-commerce transactions. It holds two types of labels: 1) standard third party labels; and, 2) a new type of second party label that is a summarization of ratings captured in an associated reputation system. The third party labels are used to capture ratings of e-commerce sites along multiple dimensions and allows users to customize the degree of importance of each dimension according to their own value system. These third party labels are based on the layer cake model developed by the members of the Information Society Project at Yale Law School as a model to distribute the work of rating and filtering between first parties and third parties [2]. The first layer consists of a basic vocabulary of terms that would be used by first parties to present information about their services (e.g., delivery methods, insurance, payment methods), policies (e.g., privacy, security, returns) and products (e.g., description, pricing, availability). The second layer of the cake consists of rating "templates" created by third parties and permits rating along multiple dimensions and using different scalar orders. Thus, these third party labels incorporate first party information.

The second party labels are computed aggregations across ratings in an associated reputation system. Each of these labels corresponds to a set of second party ratings that are individually available to the users. As with the third party label system, users can customize how labels are created according to their own value system. The main difference here is that the templates and rating rules that perform these computations must specify how multiple instances of second party feedback are to be combined into a single label.

In some ways this hybrid system is both obvious and easy to imagine; however, among the critical issues that must be addressed to make it work well are how to establish the identities of the parties involved in the transaction and how to represent information about the many different types of transactions for different individual communities.

Such a hybrid system must be able to manage the trust dimensions of both identity and transaction related issues.

4.1. Identity dimensions

What is important in encouraging trust in e-commerce is not the specific product or service features, but the behaviour of the parties involved and whether they deliver on their promises. Consequently the focus should be on maintaining feedback on an individual and a company's behaviour during the course of the transaction and rate the dimensions that indicate that the parties have delivered on their promises to one another.

User information or identity is defined as the condition of being a specified person or thing that is particular and clearly distinguished from others [28], and is a critical element in the establishment of trust and part of our hybrid model. Depending upon the application, the characteristic that clearly distinguishes one person from another will be different. For some applications the distinguishing characteristic may be a name, address, and telephone number, while for others a user name, and password or even a digital certificate may be used.

The purpose of developing a system to establish identity for e-commerce is twofold. It must tie the transactions together in order to establish history for a specific virtual identity. Secondly, it may be used to tie the virtual identity to a physical identity. In our system, the only property we are going to attribute to virtual identity is transaction history.

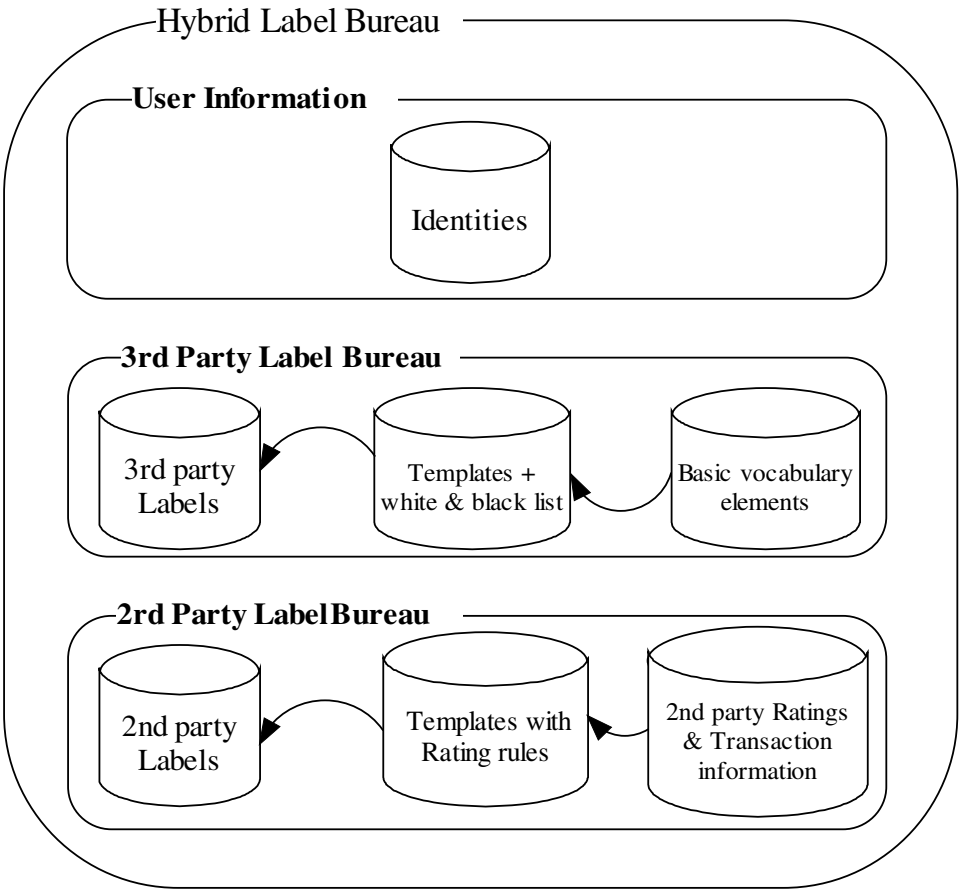

Figure 1. A hybrid label bureau

Legal names, addresses, business numbers, brands and logos can be used to identify businesses. Identities of businesses are stable. There are good commercial reasons for businesses not to change identities because so much is invested in the development of brand equity and reputation that are tied directly to their unique identity. In our proposed solution (hybrid label bureau), we would use legal business name and URL to establish business identity.

In order to establish the trust necessary to conduct business on the Internet, it is necessary to find new methods to accurately establish the identity of individuals participating in e-commerce transactions. There are a number of identity authentication systems used in electronic commerce including password authentication and digital certificates. We would recommend using these two in combination with third party database verification of consumers' personal information for a hybrid label bureau like the one shown in Figure 1.

4.2 Transaction dimensions

The trust principles outlined in Section 2 stress the need for tailored information in the online context. It is this diversity of information that is, in part, to replace the visual and social cues present in traditional commerce. Our trust principles suggest that different types of transactions will need to be rated on very different dimensions. For example, Trust Principle 3 states that trust is a function of risk so we must represent the different elements of risk that are associated with a given transaction type. For example, the risks associated with auction-based transactions are after all very different to those associated with retail transactions. Trust Principle 2 (i.e., trust is based on information) and Trust Principle 5 (i.e., trust is a matter of degree) both argue that different types of information (i.e., dimensions) must be captured in different types of transactions in order to support trust. Therefore, our hybrid label bureau will be based on a multiple criteria ratings system. The exact rules for performing the combination should be user specified via a

simple user interface. An example of multiple criteria combination is outlined in [32].

5. Summary

Trust is considered to be one of the mainstays of commerce and has been embodied in its market structures and processes throughout the centuries. In this paper we have explored the nature of trust in the online context and have identified trust principles and mechanisms that support the promotion of online trust. These trust principles represent aspects of trust that need to be addressed when building infrastructure to support online trust. They include:

1. Trust depends on identity
2. Trust is based on information.
3. Trust is a function of perceived risk.
4. Trust deepens over time and with increased reciprocity.
5. Trust is a matter of degree.
6. Culture affects trust.
7. Third party ratings are important in developing trust.
8. Second party opinions are important in developing trust.
9. First party information is important in developing trust.
10. Formal and social controls are important in developing trust.

We have examined two forms of trust infrastructure: label bureaus and reputation systems. Label bureaus can be used to capture authoritative third party ratings and first party information. Reputation systems capture second party feedback and opinions.

Finally, we have proposed a new form of trust infrastructure called a hybrid label bureau. Hybrid label bureaus integrate first party information, second party opinions, and third party ratings in a single unified system. As shown in Figure 1, it consists of a repository for user information, and second and third party labels. Second party opinions and ratings are captured in a separate reputation or feedback system and are integrated into the hybrid label bureau by the generation of labels which summarize ratings across many second party raters. First party information, based on a standardized vocabulary, is encapsulated within the third party labels. Rating templates, created by third parties to capture their different ideologies and values, are used to produce third party labels/ratings. In this way first, second and third party information can be brought together into a single common framework.

Taken as a whole, this framework supports all ten of the trust principles, as indicated by the asterisks in Table 1. The repository for user information that captures users' identity supports Trust Principle 1. Trust Principles 2, 3, 4, 5 and 6 are supported by both the second party labels (reputation systems) and the third party labels encapsulating first party information. These two label systems support different aspects of the Trust Principles in that the third party labels are "objective" ratings while the second party labels capture personal experiences in dealing with the various online entities. The formal controls of Trust Principle 10 are supported by the third party labels, while the second party labels support the social controls.

Trust Principles 7 and 9 are supported by the third party labels while Trust Principle 8 is supported by the second party labels.

Trust Principles 3, 4, 5, and 6 all highlight that trust is a highly personal construct, one that varies by risk, time, degree and culture. The proposed hybrid label bureau provides a mechanism to allow individuals to customize the system.

Trust is a complex and many faceted form of human behaviour. Ask people why they trust an individual or company and you will receive an enormous range of answers. In many cases you will find that people cannot even articulate the inner workings of their own trust processes. Trust in the physical world depends on a complex tapestry of visual and social cues. If we are to create online environments in which trading relationships are as easy to navigate, we will need to evolve rich and varied forms of online trust infrastructure and address numerous business, technical, social and legal issues.

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Table 1. Capture of trust principles in Hybrid Label Bureau

Trust Principles	2nd Party Labels Based on Reputation Systems	3rd Party Labels Incorporating 1st Party Information
1. Trust depends on identity	Repository Id Information	
2. Trust is based on information	*	*
3. Trust is a function of risk	*	*
4. Trust deepens over time	*	*
5. Trust is a matter of degree	*	*
6. Culture affects trust	*	*
7. Third party ratings are important		*
8. Second party ratings are important	*	
9. First party ratings are important		*
10. Formal and social controls are important	*	*

6. References

[1] Axelrod, R. *The Evolution of Cooperation.* Basic Books. NY, 1984.

[2]Balkin, J.M., Noveck, B.S. and Roosevelt, K. Filtering the Internet: A Best Practices Model. *The Information Society Project at Yale Law School* [online]. 1999. Available: http://www.law.yale.edu/infosociety/filtering_report.html [viewed February 27, 2001].

[3] Barney, J. B. and Hansen, M.H. Trustworthiness as a Source of Competitive Advantage. *Strategic Management Journal*. Vol. 15, 1994, pp. 175-190.

[4] Blois, K.J. Trust in business to business relationships: An evaluation of its status. *Journal of Management Studies*, Vol. 36(2), 1999, pp. 197-215.

[5] Bowman, E. H. and Hurry, D. Strategy through the Option Lens: An Integrated view of Resource Investments and the Incremental-Choice Process. *Academy of Management Review*. Vol.18(4)., 1993, pp. 760-782.

[6] eCommerce Trust Study.. *Cheskin Research & Studio Archtype/Sapient.* 1999. [online]. Available: http://www.cheskin.com/think/studies/ecomtrust.html [viewed July 30, 2001].

[7] Trust in the Wired Americas. *Cheskin Research & Studio Archtype/Sapient.* 2000. [online]. Available: http://www.cheskin.com/think/studies/trust2.html [viewed July 30, 2001].

[8] Das, T.K. and Bing-Sheng, T. Between Trust and Control: Developing Confidence in Partner Cooperation in Alliances. *The Academy of Management Review*. Vol. 23(3), 1998, pp. 491-512.

[9] Dawar, N., Parker, P. M. and Price, L. J. A cross-cultural study of interpersonal information exchange. *Journal of International Business Studies*, Vol. 27(3), 1996, pp. 497-516.

[10] Deutsch, M. Trust and suspicion. *Journal of Conflict Resolution*. Vol. 2(4). 1958, pp. 265-279.

[11] Doney, P. M. and Cannon, J. P. An examination of the nature of trust in buyer-seller relationships. *Journal of Marketing*. Vol .61(2), 1997, pp. 35-51.

[12] Doney, P.M., Cannon, J.P. and Mullen, M.R. Understanding the Influence of National Culture on the Development of Trust. *The Academy of Management Review*. Vol. 23 (3). 1998, pp. 601-620.

[13] Friedman, B., Kahn, P.H. and Howe, D. C. Trust Online. *Communications of the ACM*. Vol. 43(12). 2000, pp. 34-40.

[14] Fukuyama, F. *Trust: The Social Virtues and the Creation of Prosperity*. Free Press, NY, 1995.

[15] Gambetta, D. Can we trust trust? In D. Gambetta (Ed.), *Trust: Making and breaking cooperative relations*. Basil Blackwell. NY, 1988.

[16] Geyskens, I., Steenkamp, J-B. and Kumar, N. Generalizations about trust in marketing channel relationships using meta-analysis. *International Journal of Research in Marketing*. Vol.15 (3), 1998, pp. 223-248.

[17] Geyskens, I., Steenkamp, J-B, E.M., Scheer, L.K. and Kumar, N. The effects of trust and interdependence on relationship commitment: A trans-Atlantic study. *International Journal of Research in Marketing*. Vol. 13(4). 1996, pp. 303-317.

[18] Goold, M. and Campbell, A. *Strategies and Styles: The role of the centre in managing diversified companies*. Blackwell Publishers, Oxford, England, 1985.

[19] Granovetter, M. Economic Action and Social Structure: The problem of embeddedness. *American Journal of Sociology*. Vol. 91(3), 1985, pp. 481-510.

[20] Hosmer, L.T. Trust: The connecting link between organizational theory and philosophical ethics. *The Academy of Management Review*. Vol. 20(2). 1995, pp. 379-399.

[21] Huberman, B.A., Franklin, M. and Hogg, T. Enhancing Privacy and Trust in Electronic Communities. In *Proceedings of the First ACM Conference on Electronic Commerce.* New York. 1999.

[22] Kakiuchi, R. and Yamagishi, T. The Dilemma of Trust, *Seventh International Conference on Social Dilemmas*, Cairns, Australia, 1997.

[23] Khare, R. and Rifkin, A. Trust Management on the World Wide Web. 1997. [online]. Available: http://www.cs.caltech.edu/~adam /papers/www/trust-management.html [viewed Jan. 21, 2001].

[24] Kollock, P. The Production of Trust in Online Markets. Final version to appear in: *Advances in Group Processes* (Vol. 16), edited by E.J.Lawler, M. Macy, S. Thyne, and H.A. Walker. Greenwich, CT: JAI Press. 1999.

[25] Korczynski, M. The Political Economy of Trust. *Journal of Management Studies*. Vol. 37(1), 2000, pp. 1-21.

[26] Mahajan, V. and Venkatesh, R. Marketing Modeling for e-Business. *International Journal of Research in Marketing*. Vol. 17(2-3). 2000, pp. 215-225.

[27] Mayer, R.J., Davis, J.H., and Schoorman, F.D. An integrative model of organizational trust. *Academy of Management Review*. Vol. 20(3), 1995, pp. 709-732.

[28] The Oxford Paperback Dictionary, Fourth Edition, Elaine Pollard (editor) and Helen Liebeck (Senior Editor), Oxford University Press, 1994.

[29] Reichheld, F.F. and Schefter, P. E-Loyalty: Your Secret Weapon on the Web. *Harvard Business Review*. Vol. 78(4).2000, pp. 105-113.

[30] Resnick, P., Zeckhauser, R., Friedman, E., and Kuwabara, K. Reputation Systems. *Communications of the ACM*. Vol. 43(12).2000, pp. 45-48.

[31] Scholder, D., and Yin, P.L. Building Firm Trust Online. *Communications of the ACM*. Vol. 43(12). 2000, pp. 73-79.

[32] Shepherd, M., Dhonde, A., and Watters, C. Building Trust for E-commerce: Collaborating Label Bureaus. *The Second International Symposium on Electronic Commerce.* Hong Kong, 26-28 April, 2001, pp. 42-56.

[33] Shneiderman, B. Designing Trust into Online Experiences. *Communications of the ACM*. Vol. 43(12). 2000, pp. 57-59.

[34] Urban, G.L., Sultan, F., and Qualls, W.J. Placing Trust at the Center of Your Internet Strategy. *MIT Sloan Management Review*. Vol. 42(1), 2000, pp. 39-48.

[35] Weitzner, D.J., and Reagle, J. Editors W3C, Statement on the Intent and Use of PICS: Using PICS Well. *W3C NOTE PICS Statement 19980601*. 1998. [online]. Available: http://www.w3.org/TR/NOTE-PICS-Statement [viewed December 8, 2000].

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