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A PROCESS VIEW OF TRUST BUILDING IN VIRTUAL ORGANISATIONS

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This paper examines the role of trust in a virtual organisation using a process view. Electronic Commerce is used to illustrate the issue of trust building within a business process. The 'trust as credit' mentality in Commerce is found more useful than 'trust as security' in modeling the dynamic nature of trust building. The paper presents a vision of enabling users to be in better control over the behaviour of ICT systems. To achieve this, we need a model which addresses trust policy and feedback, and makes a distinction between contract and production phases of a business processes.

1.0 Introduction

The purpose of this paper is to examine the issue of 'trust' which will have a pivotal role in conducting business in our 'Electronic Society'. This issue will become more pervasive in all corners of the Society as economic pressure drives us towards globalisation which requires people to work together from different background or culture; and towards a lean and flat structure where bureaucracy (essentially a checking and control mechanism) is undesirable. All these will require us to place a higher level of trust on other people (e.g. empowerment). However, misplaced trust could lead to undesirable consequences.

In business transactions, the level of trust (or the lack of it) has a great influence over the behaviour of 'traders' and their choice of trading methods in the history of commerce. The use of golden handshake, for example, illustrates the reliance of trust from the trading partners; whereas the insistence of exchanging goods/payments simultaneously illustrates the lack of trust. Other mechanisms have since been evolved to reduce the level of risks, hence facilitating trust in trading (e.g. the issue of credit by companies such as VISA). Perhaps we can learn from electronic commerce in its handling of trust and see if we could push the forefront of Information and Communication Technologies (ICT) to support other processes in our emerging virtual organisations more effectively. At present, the traditional ICT is very inflexible when it comes to supporting the evolutionary nature of trust building. It may be the time for us to look for a more flexible approach so that ICT systems can accommodate different user

behaviours which are adjustable by individual user depending on his/her trust relationships with the other participants.

In this paper, a process view is adopted in analysing where and how 'trust' plays a role in a credit card transaction conventionally and over the Internet. A discussion of the inadequacy in the treatment of trust by some of the Information and Computing Technologies (ICT) will be provided. It concluded by suggesting a way forward by building a more flexible, evolutionary 'trust' model for the ICT systems in supporting virtual organisations. Users must bear in mind the limitations of ICT systems in our Electronic Society and not to overlook important, and very often covert, human activities which bind the society together - trust building is one example.

2.0 Trust and Virtual Organisation

Trust may be defined in many ways (Brigham & Corbett, 1996; Kramer & Tyler, 1996). However, in our project, we have developed the following as a useful working definition:

An act of trust involves placing yourself at hazard to another's actions, in a belief, at least partly without explicit computability of risk, that they will act to your benefit.

There is also considerable discussion on the meaning of "virtual organisation" and whether such a thing is a new phenomenon (Davidow & Malone, 1992; Norton & Smith, 1996). The concept of virtual organisation has been applied in areas such as

- 'concurrent engineering' with the design team working in parallel to marketing and manufacturing teams so that the lead time from conceptual design to marketing the product will be shortened;
- 'supply-chain' where retailers are more tightly coupled with their suppliers so that orders will be fulfilled quickly;
- 'technical laboratories' where expertise could be provided remotely; and
- 'education' where learning can be acquired at a distance with knowledge and support provided from anywhere in the world (O'Leary et al, 1997).

These implementations relied heavily on the use of Information and Communications Technology (ICT) and physical constraints such as time and location of the participants have become less of a barrier. The following is the definition we adopted for a 'virtual organisation':

A virtual organisation is a group of separately owned organisations that for specific group(s) of activities behave as if they were a single entity and

coordinate their behaviour through relationships based on trust and shared information systems.

Trust is seen as one of the two main characteristics which bind the virtual organisation together (Davidow & Malone, 1992; Handy, 1995). Pratt captured the building of trust into a model which suggested that "information leads to predictability which, reinforced by feedback, yields trust" but she also pointed out that technology can engender distrust (Pratt, 1997):

Information $\longrightarrow$ *Predictability* $\longrightarrow$ *Feedback* $\longrightarrow$ *Adjustment of trust level*

3.0 Trust and Commerce

Let us look at the role of trust in commerce before comparing it with its 'Internet' version. In the example of a usual credit card purchase in a departmental store, there are three main players in the process, each has their own feedback loop for trust in the system (see figure 1).

FIGURE 1 THE PROCESS OF A CREDIT CARD TRANSACTION

Note: the steps of the process are labeled from 1 to 5
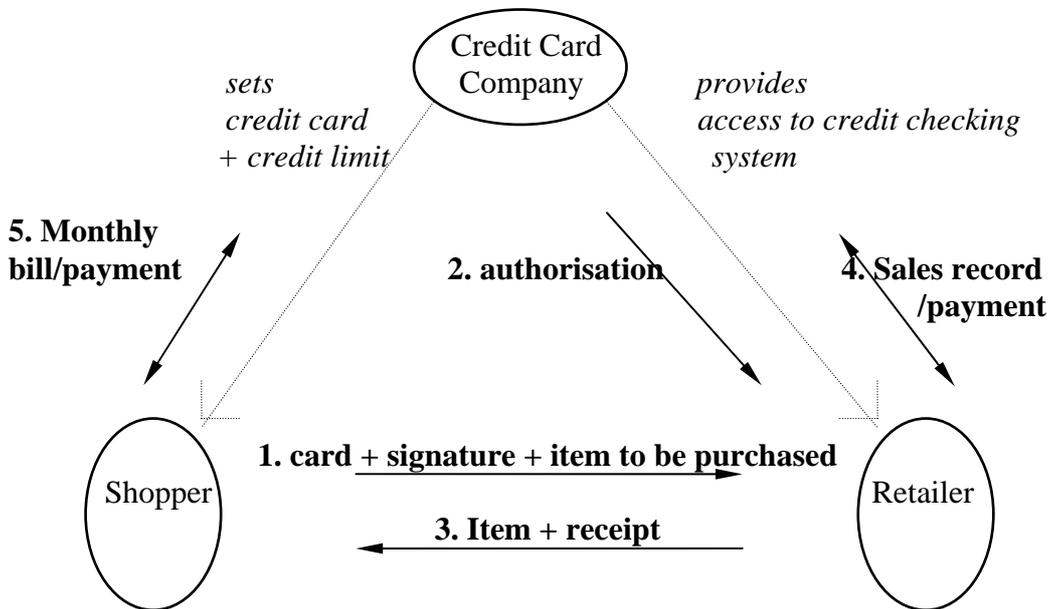
From a **retailer**'s viewpoint, when a shopper uses a credit card to purchase an item, the information on the card together with the logo of the credit card

company, the hologram and the shopper's signature enable the retailer to predict that the item will be paid for in some way. Feedback from the previous transactions reassured the retailer that the system can be trusted as the credit card company is seen to have provided measures to guard against fraud. From the **credit card company**'s viewpoint, their trust level on the shopper is reflected by the credit limit set. Information such as profession of the shopper, annual salary, committed regular expenditure and credit record will be used to predict the ability of the shopper to pay the bills. Monitoring on the level of usage and payment records provides the feedback for adjustment of the credit limit in the future. Similarly, the credit card company also monitor the retailer's track record in some way. From the **shopper**'s viewpoint, trust is placed on both the retailer and the credit card company that they will record the amount of the transaction accurately and the information acquired during the transaction will not be misused elsewhere. With the gaining of confidence in credit card transactions, shoppers are increasing trusting in departing their credit card numbers and details over the telephone to make a purchase, not worried by the risk involved.

From this example, we can see that the issuing of a limited amount of credit in advance provides a way which 'oils' the business process and reduces the level of risk for all participants. The progress of the process is also governed by the 'trust policies' adopted by each participant. Trust is built by a process of confirming the identity, demonstrating competence, generating a good track record and providing evidence of appropriate use of shared information throughout the five steps in the illustrated transaction. If there is any dispute, records such as receipt and its associated documents will be used as audit trail. How would this model work when transfer to a virtual environment such as a cybermall?

3.1 Trust and Internet Commerce

In the world of Internet Commerce, the industry is so young that track record is not easily available, competence of the players is usually marred by the occasional incompetence of the technology in use, and stories of hackers and misuse of electronic information did not provide reassurance to users. Its future indeed seemed rather dim when earlier stories such as the 'failure' and 'lack of interests' in on-line shopping mall began to appear (Computing October 1996, June 1997).

For the business sector, Internet Commerce enlarges the potential market and hence continuing effort has been put in to make Internet Commerce a reality (Computing August 1997). The issue of trust is crucial. Retailers need reassurance that the Credit Card Companies and Banks will trust this method of

transaction as there will be no signature nor hologram to check. For the shopper, it might be problematic as there is no longer the visual clue for reassurance from the physical location and interior of the 'shop', or even the voice/name of the person with whom he/she is dealing. Information such as the URL and the information on the Web pages are not sufficient to predict the 'authenticity' of the retailer. Furthermore, providing credit card details electronically is perceived to be at risk for hacking and misuse; as those electronic details could be stored or passed onto other systems.

To overcome some of these concerns, techniques and technology in security had been produced. For example, to overcome the identity problem:

- Secure Sockets Layer (SSL) for ensuring the authenticity of the Web server (where the retailer's site sits) and applying encryption on the message (including credit card number) between the shopper and the retailer;
- Secure HTTP which incorporates some encryption functions in HTTP;
- Secure Electronic Transaction Protocol (SET), the development of which is supported by a number of credit card companies /banks and major Internet players. It aims to provide authentication of shopper, retailer and banking organisation; provide privacy and integrity of payment data.

To demonstrate competence, some internet companies use email to provide reassuring information on the progress of the order and delivery (e.g. UK-based Internet Bookshop), or use Web-based tracking system for customer to check the progress of the job (e.g. Fedex). These offer 'information' for a shopper to 'predict' when the item will arrive. The receipt of the item provides 'feedback' and increase the shopper's 'trust' on the company if the delivery is on-time as promised.

To provide some credibility in this mode of commerce, consortiums such as commerce.net [http://www.commerce.net] and EC's Information Society Project Office (ISPO) [http://www.ispo.cec.be] had been set up to provide a presence in the society. Initiatives such as TRUSTe began to appear in an attempt to provide seals of approval by ensuring participant (e.g. retailer) compliance with established TRUSTe principles - "TRUSTe embraces a comprehensive assurance process made up of initial and periodic Web site reviews, 'seeding', conformance reviews, online community monitoring, and enforcement" [http://www.etrust.org].

Perhaps Internet Commerce is now ready to take off.

4.0 Trust and ICT

Our survey found that the use of ICT in trust building within Electronic Commerce is the exception rather than the norm. Most traditional ICT systems employ the 'security' rather than 'credit' mentality when dealing with trust. Operating systems such as Windows NT, firewalls and conventional business applications assume a rather static behaviour of trust. Information such as 'User A trusts or does not trust User B' would be used by a designer for specifying the security requirements of a system at the outset (Chadwick, 1997). There is an abundance of quasi-military language: "attackers", "targets", "invasion" and so on, used in security policies (e.g. Herbert, 1996; Cicovic et al, 1996), leading to consequent attempt to partition the human community into "friend" or "foe". There is a tendency to assume that, as far as the technology is concerned, trust is all-or-nothing, you either have unrestricted access or nothing at all. Access is given on a "need-to-know" basis thus restricting cooperation to an exclusive group whilst at the same time tending to create too much faith that those who are "part of the team" will be honest and trustworthy in all aspects. What is lacking is a way to facilitate a feedback loop for the users [*i.e. information - prediction - feedback - trust re-adjustment*].

With the use of Electronic Data Interchange (EDI) for paperless trading, references to trust have become more prevalent, but more so in the business literature than in its technology equivalent, as EDI is used largely *after* trust has been established between the trading partners. The feedback loop hence exists mainly in the human domain.

In Groupware, trust was either mentioned or implicit in some of the real-time interpersonal systems. Research using students showed that virtual teams using systems such as video conferencing and shared white-boards for real-time interaction maintained a higher level of trust as continuous and frequent interaction was possible. They were more efficient in moving through the phases of the project, focused on the work content of their projects, and achieved sufficient amounts of social penetration during the first part of the project to increase their work effectiveness throughout its conclusion (Iacono & Weisband, 1997).

We believe that the technological components are probably available for the construction of networks that support the development and maintenance of trust. However, extension to the current 'security' mentality is needed to incorporate the '***evolutionary***' nature of trust building. This kind of evolutionary behaviour was well documented by Orlikowski (Orlikowski, 1996) who studied the effect of a groupware system, Lotus Notes, on changing the work practice in the Technical Support of a software company. What the study found, as a by-product of using Lotus Notes, was that users learned to gauge the 'trustworthiness' of a piece of advice by looking at the code of the author of the

document; and that practice evolved over a period of time by an accumulation of previous feedback.

Groupware seems promising in facilitating trust-building. However, to date, it tends to focus on a particular set of users - those who are willing to work together and are eager to have more collaboration. In a virtual setting, one might need to collaborate with people who might not share the same degree of enthusiasm. Is it possible to make more use of ICT to facilitate trust-building amongst those members?

5.0 "Trust as credit" in virtual-organisation modeling

Trust-building in organisations is a dynamic activity (Orlikowski, 1996). This is especially so in virtual organisations in which the members might not be familiar with each other and might not share the same culture and beliefs. It requires a common community to be built rapidly and then disassociate according to the usual evolution path of project teams. The binary, all or nothing model of security for trust is clearly inappropriate to cope with this dynamism. We might, perhaps, apply the credit model here by allowing each participants to set a 'credit limit' for the resources that they are utilising. The resource can be time or money or other measurable quantities. An initial set of information could be established for the ICT system and to be matched with feedback at a later stage. The participants will be able to use the information and feedback to readjust their trust levels on other members; and put in place a more efficient way of collaboration, if needed.

The following sections examine firstly, how to establish the initial set of information; and secondly, how to provide the feedback.

5.1 The existence of a "contract phase" in a business process

In any organisation, one can classify its business processes into one of the following four groups (Earl, 94): core processes (e.g. order fulfilment) and business network processes (e.g. supply chain) which are primary to the organisation's value-chain; support processes (e.g. accounts payable) and management processes (e.g. project management) which are secondary. One can argue that the same set of processes would also exist in a virtual organisation.

In all of these processes, there is usually an underlying "**contract phase**" which precedes a "**production phase**". Both terms are used broadly here: the production phase is one when the actual work activities are carried out (e.g. holding review meetings for a project; or producing engineering design; or offering post-installation support); the contract may not be formal, it could be a

service level agreement or even an informal word-of-mouth deal; new contract might not be needed for every instance as 'commonly understood' contract might be applied. However, in almost every case, before expensive or finite resources are committed to a task, some level of agreement about what was wanted and on what terms must exist, implictly or explictly. One difference between the production and contract stages is that the former deals in tangibles such as components, reports or payments, whereas the latter deals in intangible intentions, forecasts, promises or threats. Nevertheless, these should provide the basis for constructing the initial set of information, which we shall label 'trust policy', to be monitored during the production stage.

Although we refer to "contract phase", it is important to reiterate that this does not necessarily imply formality: business theorists are moving towards a belief that formal contracts for complex tasks and flexible working are ineffective and are recommending a move towards informal trusted relationships as the precursor to the production phase (Ring, 1997). Hence the ICT system might be used to enable individual users to maintain his/her own sets of information (trust policies) in a discrete manner (e.g. not to be shared with other members). These policies might then be used to determine the appropriate ICT support for the rest of the business process.

5.2 Use of ICT to provide feedback

Imagine you are managing a project with members working in different locations, how would you plan, organise and monitor the progress of your virtual team members?

You might need to arrange the occasional face-to-face meetings which involve expensive and time-consuming traveling. You might need to use fax and telephone to communicate important messages. Written documentation might be produced as a means for formal control. You can also use other ICT systems, such as email and desk-top conferencing systems for communications; WWW to share on-line resources. The increasing use of these ICT systems enhances communications and hence facilitates feedback. However, these systems might also lead to a danger of information overload. The research issue is how to provide information only when needed without compromising the overall effectiveness.

If a trust policy and a process view are in place, the system can offer assistance to a user in keeping track of the feedback and flagging up potential problems at appropriate time. Similar to the credit model used in Electronic Commerce, the feedback can then be used for re-adjusting the trust level one can place on other members. Highly trusted member will require less 'human' intervention and

time can be saved for areas that require attention. In other words, ICT acts as a minder to keep track of the plan, schedule, your evaluation of the progress, flag up problems such as overdue reports and maintain a profile of 'credit-worthiness' of participants.

6.0 Conclusions

This paper highlighted the issue of trust in business processes by illustrating it in a credit card transaction. If the society is heading towards more electronic or more 'virtual', considerable effort is required in tackling areas which have been covert and natural in the human society. There is a danger that if important human behaviour is ignored, our future Electronic Society might 'malfunction'. Trust is an example of covert behaviour in human beings and it is more complex than 'yes' or 'no'. The building of trust takes time, and the trust level can vary from one situation to another. It is felt that ICT has the potential of facilitating 'trust-building' but if the issue is ignored, it can engender distrust. The discussion on Internet Commerce illustrated the amount of effort required to even start addressing the issue of trust.

The paper concluded with a vision. The formulation of an adaptable 'trust policy' for a business process is a beginning to make the issue more overt and users can then be better informed when it comes to using ICT in our Electronic Society.

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