

Trust in electronic learning and teaching relationships: the case of “WINFO-Line”

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Abstract- Electronic relationships in the context of electronic commerce and especially in the context of electronic learning and teaching are on the rise. However, besides the well known technological or infrastructure security issues many other problems and questions still exist concerning the constituent elements and dimensions of electronic relationships. This leads to a high degree of uncertainty at the intersections between actors in electronic relationships. It becomes obvious that to build up trust in order to reduce uncertainty at the intersections becomes a crucial success factor in these relationships in general, and specifically in electronic learning and teaching relationships. Different means of how to create trust from a relationship marketing perspective are discussed against the background of the Web-based learning and teaching environment WINFO-Line. Finally, we support the idea of elaborating a “Level-Concept for Trust-based Electronic Commerce Relationships” (LeCoTrust).

I. ELECTRONIC LEARNING AND TEACHING RELATIONSHIPS AS PARTS OF ELECTRONIC COMMERCE

Internet and its hyper- and multimedia service “World Wide Web” (the Web) gain in importance concerning electronic relationships, specifically in the context of business or commerce with diverse goods and services [1], [2], [3]. Decisive reasons are at least the use-friendliness of the Web and its growing spreading. For instance, the US-American Department of Commerce estimates the worldwide market volume of electronic trading up to 325 billion US-Dollars until the year 2002, International Data Corporation (IDC) even up to 425 Billion US-Dollar. However, Forrester Research shows that 78 percent of all sales are exclusively transacted between companies [4]. As far as that goes, only 22 Percent are spread over the other important actor relations “companies-to-public administration”, “public administration-to-private customers”, and in particular “private customers-to-companies”. Still, one important area [5] which is interlocked with all four actor relations are electronic learning and teaching relationships between “students” (individuals, groups, or institutions, at home, at private or public schools/universities, or at work) and “instructors” (individuals, groups, or institutions, the latter also including corporate universities for example), at least due to the growing need for life-long learning.

Compared to the U.S.A. European companies perform far worse in Web-based electronic relationships [6]. Germany might take a leading position until the year 2002 in Europe due to positive market growth, increasing consumption, and deregulation of the telecommunication industry [7]. However, the Main Federation of the German Retail Trade for example does not rate electronic commerce as a realistic competitor for the conventional trade in real stores [8]. In this sense business is very rarely transacted over the Web. Reasons therefore might be: the shortage of appropriate transaction concepts and/or insufficient electronic security and payment standards. Accordingly, initiatives from both sides, theory and practice, mainly focus on security or infra-

structure issues respectively, like for example the new research program of the German Research Association (DFG) “Security in Information and Communication Technologies” [9] or practice initiatives like “Global Trust Enterprise” [10] or “TeleTRusT Germany” (<http://www.teletrust.de>).

II. CHARACTERISTICS OF ELECTRONIC LEARNING AND TEACHING RELATIONSHIPS FROM A “CUSTOMER’S” PERSPECTIVE

In general, along with the use of the Web in order to reach students directly and interactively, the “customer interface” virtually shifts towards the students. The reason therefore is that Web-based electronic learning and teaching services allow students:

- to study *time-independently* (24 hours; “day and night”),
- to study *room-independently* (from wherever she or he has Web-access),
- to *actively surf/demand for many data/information or problem solutions/knowledge*, and most importantly
- to be *more (inter-)active concerning the (co-)design, realization, and control of learning processes* than they were before (e.g., accessing learning units, working through learning units, controlling learning processes, solving tests, carrying out exams).

As a result of offering and using electronic learning and teaching services within new or additional distribution channels, processes in instructors’ environments and also in students’ environments change. A new kind of process emerges [11], which can be called a “virtual” or “electronic” learning and teaching process. Within these new (interorganizational) processes students are not just the “consumers” at the end of the teaching value chain, anymore. Rather, they take over the role as a specific collaborative partner [12] for instructors. They become “co-producers” within cooperative “virtual relationships” [13]. In so far organizational boundaries are transcending.

Since Web-based electronic learning and teaching services can offer benefits for both sides, teachers and students, we do not have to discuss whether these services should be offered or not, any more. It becomes clear that both channels, electronic and traditional learning and teaching, have to be provided in order to serve students’ needs. Rather, the question remains how to coordinate the new interorganizational processes within transcending boundaries. As we will see, an important issue related to this question is the high degree of uncertainty in electronic relationships.

The first *aim of this research paper* is to explain and analyze the high degree of uncertainty in electronic relationships,

which includes also electronic learning and teaching relationships (see III.). Secondly, trust is introduced and conceptually specified as an important vehicle to reduce this uncertainty. A complementary view integrating both rational and social perspectives of trust superimpose this general trust concept (See IV). Eventually, the paper aims at pointing out diverse means to build up trust electronically against the background of the Web-based learning and teaching environment “WINFO-Line” (see V.). Within the conclusions we will propose a general level concept for trust in electronic commerce relationships, at the end (see VI.).

From a *methodological* point of view, this research paper describes a conceptual approach to trust. The focus lies on means to build up trust. Certain known trust building means from the literature on relationship marketing are taken in order to normatively design respective elements of the Web-based learning and teaching environment.

III. HIGH DEGREE OF UNCERTAINTY IN ELECTRONIC RELATIONSHIPS

In the following three paragraphs we will at first show the high degree of uncertainty in electronic relationships with regard to their constituent elements and relevant dimensions. Second, we look at different types of products (including services) in order to explain different levels of uncertainty from this perspective. Finally, we explain the impacts of different ways how products can be electronically presented on the level of uncertainty in electronic relationships.

A. Unsolved Problems and Open Questions Concerning Elements and Dimensions of Electronic Relationships

Besides *technological* issues (see I.) there are a variety of other still unsolved problems concerning the *constituent elements of electronic relationships* in the broader business context mentioned above [14] (see Fig. 1), and with it specifically also in the context of electronic learning and teaching. For example the question arises which shifts, substitutions, or combinations of traditional and electronic *market structures and rules* are to be expected. Taking a look at *value chains* it is not clear in how far a new distribution of roles and functions between the actors within value chains will happen (business network redesign), for instance the avoidance of established intermediaries and the development of so-called cyberintermediaries. Open questions with regard to *diffusion and acceptance* affect aspects like the development and costs of infrastructures, positive network externalities via the increase of individual benefits with the enlargement of the total number of users, cognitive and emotional expectations on the potential benefits of electronic relationships, and the development of new actor constellations like innovation partnerships, network cooperations or virtual corporations. *Strategic options for taking action* refer to possible unsolved problems concerning the strategic positioning of organizations and the strategic benefits they can gain from electronic relationships.

In addition the diverse *dimensions of electronic relationships* leave many questions open, for instance which *market types* will be successful (e.g., virtual universities, stores, malls, auctions, fairs, exchanges, brokers, consultants, agencies.), which *products* will be used or sold most likely (e.g., simple or complex products and services), how *market phases* (e.g., information, agreement, transaction phase) and

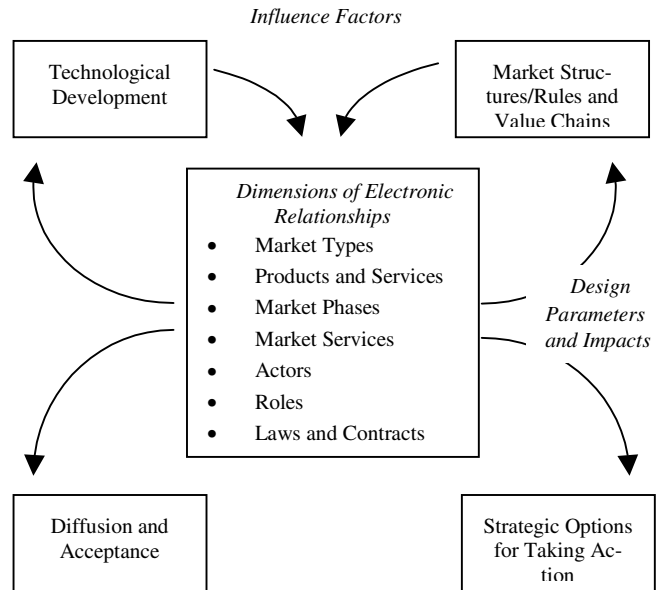


Fig. 1. Constituent elements and dimensions of electronic relationships (following Klein/Szyperski 1997)

market services (e.g., for communication, logistics, market research) have to be designed efficiently, how *actors* (companies, public administrations, people in private households) will get into contact with each other, which *roles* the respective actors will take over (e.g., seller, consumer, broker, person running an enterprise, developer, producer, distributor), and finally how *laws and contracts* will be designed.

The multitude of the problems and questions pointed out above and the *high degree of uncertainty* which comes along with these problems and questions stand for possible reasons why electronic relationships have not fulfilled the high expectations yet.

B. Types of Products/Services and Uncertainty

Taking a closer look at the nature of products (including services), we can distinguish between so-called *contract goods*, or goods of secondary needs (not everyday products), in contrast to so-called *exchange goods*, consumer goods, commodities, or goods of primary needs. Compared to exchange goods the complexity of contract goods – like education and training, insurances, or consulting for example – is higher, and also the value of related transactions and the complexity of the related purchasing processes are higher. This leads to a higher level of uncertainty [15], [16] at the intersections between customers, or students in our case and companies or instructors, respectively where the related interorganizational processes are virtually connected.

Considering the *complexity of the product*, sources of the uncertainty from the students’s perspective – in terms of “buying” the right good in order to fulfill their needs – are that contract goods are more difficult to understand, that it is not easy to find comparable products, and especially that it is difficult to evaluate the overall quality of these products. Regarding the *high value of transaction*, the source of uncertainty lies in the high economic risk and insecurity about the

potential payback of the investment (“return on invest”). Finally, it often becomes not clear to the students which processes the instructors carry out before accepting the student’s demands [17].

Though uncertainty at the intersections between students and instructors exists from both sides, usually the uncertainty from the students’ perspective is higher. This is due to the fact, that students do not have the same power and specialized knowledge as instructors have (“size differential” and “expert-layman differential” to the debit of students [18]).

In order to reduce uncertainty, in general students try to get information or problem-specific know-how about possible problem solutions, i.e. about characteristics/qualities of products. For this, the differentiation between “search products”, “experience products”, and “credence products” is important [17], [19], [20]. “*Search products*” are those which allow to control/prove product characteristics (“search qualities”) before buying the product, like a stereo system; services are no search products in general. “*Experience products*” only offer the opportunity to control/prove the product characteristics (“experience qualities”) after buying the product, for example in the case of a washer or the use of a catering service. Finally, in the case of “*credence products*” the control/prove of product characteristics (“credence qualities”) is neither possible before nor after buying the product. Since institutions in the case of “credence products” can only offer – immaterial/“virtual” – promises of service at the date of selling, a good in the traditional sense does not exist at the date of purchase; drugs, insurances, consulting, and education and training belong to the group of “credence products”.

The less product characteristics can be controlled/proved before the date of purchase the more has the customer to *believe* correctly in the product “qualities” in order to *reduce uncertainty*.

C. General Impacts on Uncertainty of Electronic Relationships With Regard to Different Product/Service Types

In the following we will look at the possible effects on uncertainty which might come along with electronic relationships for the different product types mentioned above: search products, experience products, and credence products. In principle, if the presentation possibilities of the new media, information and communication technologies to prepare search products attractively are not (!) used than these products might become experience products within electronic relationships. For example, a book that can be taken out of the bookshelf in a traditional bookstore, in which the customer can leaf through and of which the cover can be read becomes an experience product if the customer can just see the name of the author, title of the book and price in text format within a Web-based, electronic bookstore. Uncertainty increases. However if the possibilities of new media, information and communication technologies are used (!) to prepare for example a book “as in a real bookstore” (e.g., by electronically showing the book cover and information about the author), and if – if necessary – additional information is provided (e.g., reviews or hints to books with similar topics), than search products stay as search products also in electronic commerce relationships.

On the other hand, credence products might become experience products within electronic relationships supposing that

the technological possibilities are used (!) in a way that quality characteristics of such products which normally cannot made visible in reality can now be made transparent within the virtual environments of electronic commerce. An example is learning and teaching about an accident insurance of which the effectiveness can be made clear by electronically simulating an accident situation, in which the promise of insurance service would be kept. Uncertainty is reduced. However, if the technological possibilities are not (!) used in the case of credence products than uncertainty will all the more increase.

In general, we believe that one of the fundamentals for the necessary mechanisms of uncertainty reduction [21] is *trust* [22], [23], [24]. Due to the high level of uncertainty in Web-based electronic relationships we believe that building up trust in the product qualities (including services) becomes the crucial using factor, here especially in the sense of efficiently coordinating the electronic, Web-based intersections between students and instructors (for an general empirical confirmation see [25]).

IV. CONCEPTUALIZATION OF TRUST

Trust as we see it (for a more detailed view on our concept of trust see [26]; see also for example [27], [28], [29], [30]), *is a basic social disposition towards other people or institutions with individually different characteristics* [31]. *It allows to reduce uncertainty of people’s (or institutions’) actions and with it to strengthen people’s (or institutions’) capacity to act* [22].

We follow a “complementary” perspective of trust integrating both the rational and the social perspectives of trust. [32]. The *rational* view of trust is based on calculations that weigh the cost and benefits of actions between certain actors, like students and instructors in our case. Rationality is understood in practical terms where the actor chooses the course of action likely in order to gain the maximum utility [33]. The *social* view of trust is based on shared common values as the attitudinal ground for solidary relationships. The expectation is that actors will meet their social obligations and exercise responsibility [33]. The *complementary* view of trust tries to link the rational and the social perspectives. “This view does not assume that trusting is completely free from calculations [...], also, it considers how the social nature of actions undermines any effort to predict outcomes” [32, p. 140].

Our ideas which will finally lead us to focus on certain means to build up trust are based on the following general components of a *trust concept* (see Fig. 2.):

- Persons, groups or institutions *interact* with each other in order to give trust or to be addressed as trustful; they are the “*actors*”

In our case, the actors are the *students which give trust to their instructors*. The medium which supports the interaction is a Web-based learning and teaching environment which is described in more detail further below (see V.).

- Trust supports the attainment of the actors’ *targets*.

Here, *students are willing to study the topics which fulfill the requirements of the instructors and therefore also their needs, adequately*. The topics offered via the Web-based

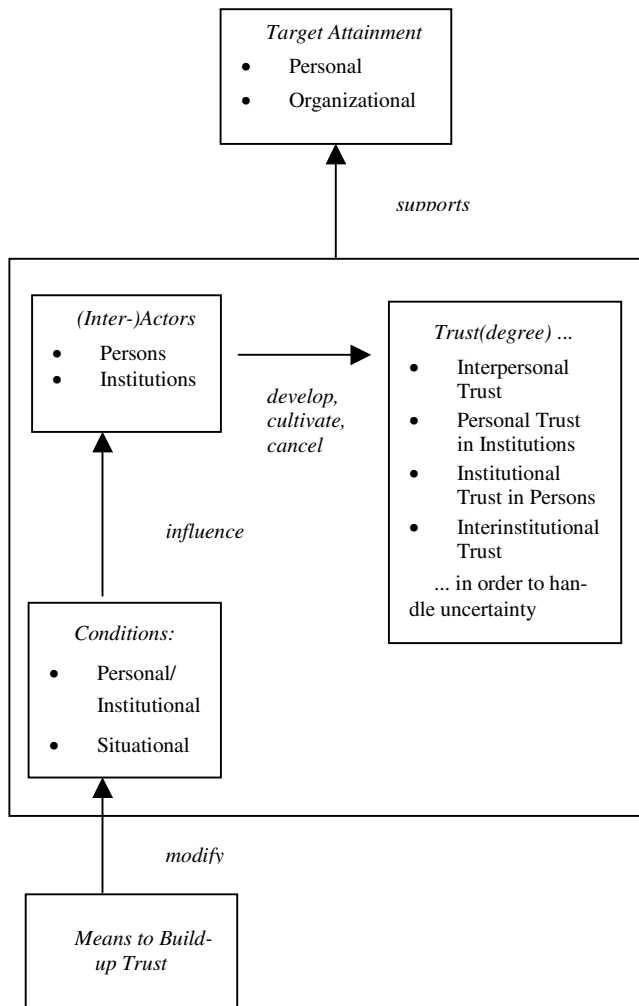


Fig. 2. A general trust concept

learning and teaching environment cannot be studied in a traditional way, anymore.

- Trust can be *developed, cultivated, and cancelled* between actors (“trust genesis/life cycle”).

Trust between students and instructors has to be developed and maintained and if possible not to be terminated neither from the instructor’s nor student’s perspective. In the case of the Web-based learning and teaching environment students and instructors also meet personally at the very beginning of the courses in order to clarify questions and especially to create a certain entrance level of trust by being personally present before the electronic study begins.

- Trust is *influenced* by certain personal/institutional and situational *conditions*, i.e. it is influenced by the readiness of the actors (persons or institutions) to trust and by normative expectations on the actors who are addressed as being trustful, as well as influenced by situational conditions like distribution of power, duration of relationship, or availability of “trustful third parties”.

In our case, *students differ in their readiness to trust and have also different normative expectations on the trustfulness of instructors, as well as they might be able or not to consult “trustful third parties” before “buying” the learning and teaching services.* A positive influence on trust is provided by the increasing media competencies of the students, who are more and more experienced Web-users.

- Trust can be *modified* by the use of certain *trust-building means*.

Here, *instructors have to use certain trust building means in order to create trust for the students.* How this is done within the Web-based learning and teaching environment will be explained in the following paragraph further below (see E.).

- (The *degree* of) *Trust* is a “functional equivalent” [22] *in order to handle uncertainty.*

In our case that means *if students trust in the products of instructors they might “buy” them even if they are not totally sure that they will “buy” the right products.*

V. MEANS TO BUILD-UP TRUST IN A WEB-BASED LEARNING ENVIRONMENT

In order to normatively operationalize the concept of trust in terms of design, diverse means to build-up trust have to be considered. Here, these means can be understood as certain demands on the trust-based forming of Web-based learning and teaching environments. Means to build-up trust from a relationship marketing perspective are “intensity”, “individuality”, “information surrogates”, “intelligence”, and “integration”, for example [17], [34], [35], [36]. In the following these means will be specified against the background of the Web-based learning and teaching environment “WINFO-Line”.

D. WINFO-Line

WINFO-Line is a virtual learning and teaching environment on the Web (see <http://www.winfoline.de> and/or <http://winfoline.wirtschaft.uni-kassel.de/>) and stands for “WirtschaftsINFOrmatik On-Line”, i.e. “business informatics online”. It is developed by the institutes or chairs respectively of the Universities of Kassel, Saarbrücken, Göttingen and Leipzig, and it is funded by the Bertelsmann Foundation and Heinz Nixdorf Foundation within the “B.I.G.-Initiative”. Though WINFO-Line is free for the students of the Universities of Kassel, Saarbrücken, Göttingen, and Leipzig at the moment it might be commercialized in the near future for executive education.

The WINFO-Line concept builds on the idea that the participating institutes and chairs contribute their core skills and resources to the virtual educational cooperation project. The core skills in this respect are the subject matters from lectures that are closely related to the main research areas of the respective institutes. The WINFO-Line curriculum includes the following educational products: Architecture of Integrated Information Systems (ARIS), Databases, Development of Application Systems, Management Support Systems, Information Management, Information Systems for Service Enterprises, Information Systems for Industrial Enterprises, Internet, and Intranet. That is each of the institutes and chairs is responsible for developing Web-based educational products

and software, according to its particular core skills. The use of new media, information and communication technologies like the Web enable the cooperation partners and the students to communicate with one another and to coordinate their activities.

WINFO-Line is based on conventional Internet standards, hence ensuring that any student who is equipped with a normal multimedia PC and internet connection has access to the WINFO-Line educational products and services. Features of WINFO-Line are the uniform structure of learning applications, flexible use of multimedia, additional online learning materials, online student advisory service, and online examinations for example.

E. Means to Build-up Trust in WINFO-Line

As already mentioned earlier, the means we consider are intensity, individuality, information surrogates, intelligence, and integration.

In general, high *intensity* of interaction is necessary because of the asymmetric relationship between getting trust (which takes very long time) and possibly losing it (which can happen very quickly). The demand on Web-based electronic commerce applications which comes along with intensity is to develop and maintain the student-instructor relationship on a continuous basis.

In WINFO-Line a high degree of intensity is provided by sending e-mails on a regular basis to the students. Via e-mails the students are reminded of delivery dates of papers, for example. They are also informed about diverse news like possible new examination regulations. Last but not least holiday greetings are distributed by e-mail, too. In addition to e-mail also newsgroups are used to inform or remind students.

To build up trust can only work by means of *individual* communication/interaction because one needs to identify personal characteristics which are not obvious and need time of personal observation.

In WINFO-Line a very personal communication style is implemented in order to support individuality. Personal e-mails are sent in case of students' questions concerning the content of learning units, dates, or personal appointments. Also personal e-mails are used in order to give feedback to the students about how they did their exercises. In addition to that each student has a "personal page" showing his examination results in an overall view. In case of multiple choice tests, crossword puzzles, and completion tests the feedback is generated automatically, though with personal address. This address tries to cheer the students up according to their results measured in relation to 100 % over five stages (fifth stage is under 50 %). Concerning the automated tests each student has her own learning account showing her results according to the different types of tests.

"*Information surrogates*" stand for a special kind of information which implicitly tells the actor if she or he can trust, or not. These information cannot be just information about the functioning of products. Rather, the objective is to inform the actors by means of additional information in order to get him a positive so-called "eventprofile" of being informed. In general, this kind of information has to be communicated within electronic applications, e.g. by informing

about applied security mechanisms, quality standards, or social or other activities and successes.

In WINFO-Line a lot of information surrogates are provided referring to WINFO-Line itself, the people involved, the sponsors, and the acceptance of examination results from an university administration point of view. In addition to that personal data are treated confidentially within the WINFO-Line courses. For the students it is transparent how submitted papers and thesis are handled. The judgement screens are made transparent, too.

In order to build up trust it has to be possible to get back to other persons or institutions with some experiences about the products or institutions, like so-called "lead users" or "trusted third parties". To implement this "*intelligence*" within electronic applications in general diverse discussion groups can be put into action or the results of "trusted third parties" investigations can be presented, for example.

Also in WINFO-Line discussion groups are implemented. In addition to that the students have access to students of former WINFO-Line courses and the current list of actual students. Eventually students have access to a published working report on the evaluation of WINFO-Line.

Finally, the more the actors have the feeling of not being excluded from the production process of products, the more she or he trusts in a product. The related demand on electronic applications is that customer "*integration*" has to be provided, for example by mutually discussing certain product features and related product characteristics or just by making some processes transparent for the customer which might be relevant for him, e.g. the logistics process.

In WINFO-Line the integration of students is influenced by the pedagogical-didactic concept of constructionist learning [37]. As a result of this concept the students have the possibility to self select the learning contents and the way how they want to learn it (by text, transparencies, audio, or video) depending on their different learning styles. The students are also indirectly involved in the design of WINFO-Line. Their evaluations slip into the production process of the system; the latter is supported by the so-called "Virtual Learning Environment Generator" (VLEG), a content management tool, so that the students' indications can be transferred very quickly into the running WINFO-Line system. After having successfully completed the WINFO-Line courses there is the possibility for the students to actively design and develop WINFO-Line further. Besides the more content-driven aspects of integration mentioned up to now, from an administrative perspective the students are offered the possibility to actively mark their learning units by means of "virtual traffic lights", i.e. "red" means not yet started with, "yellow" means in processing, and "green" means successfully completed.

VI. CONCLUSION: A LEVEL-CONCEPT FOR TRUST-BASED ELECTRONIC RELATIONSHIPS (LECoTRUST)

To summarize, there is an obvious need to reduce uncertainty within electronic relationships which can be fulfilled by creating trust between actors. This can be done by virtually implementing certain (e.g., relationship marketing-based) means of trust within electronic relationships. We demonstrated the potentials of trust creating means within the Web-based learning and teaching environment WINFO-Line.

According to this, further research should focus on the concept of trust – expressly from a more sociological perspective – as a necessary, and critical success factor concerning the design and use of new media, information and communication technologies like the Web in electronic relationships.

Besides the need for further empirical research in order to verify our conceptional arguments concerning the usefulness and design of certain means to build up trust in electronic learning and teaching relationships, it would be helpful to elaborate a kind of general “Level-Concept for Trust-based Electronic Commerce Relationships” (LeCoTrust), following the more general ideas of Zachmann [38]. This level-concept should distinguish between different *levels* (e.g., from the application level over the conceptional level to the implementation level) and the interaction between these levels on the one hand side. On the other side it should differentiate between different core processes of electronic relationships (e.g., information, agreement, transaction) and different product types (search, experience, and credence products). The result would be a “trust-matrix” which had to be filled out with certain means to build-up trust (concepts, rules etc.) from diverse scientific disciplines (business administration, business informatics, sociology, psychology, law, just to name a few) in order to set up a comprehensive trust management approach for Web-based electronic commerce relationship environments. The following example shall finally illustrate the ideas behind LeCoTrust against the background of a special electronic commerce relationship.

Starting point is the *trust-related problem* that a company offering a search product over the Web wants the customers to trust in the electronic commerce core process “confirmation of an order”. The company intends to use trust-creating means which make the process transparent and controllable from the customers’ perspective.

Transparency and control are special aspects of trust [39] and they are specified as heuristic principles in order to come from the trust-related problem to the *application level*. On this level the wish could exist to support trust by using confirmations of transactions.

On the *conceptional level* electronic notifications about the respective status of the order processing could be suggested.

Finally, on the *implementation level* this could lead to automatically generated electronic mails which are sent out to the customers according to certain milestones of the order processing like order arrival, stock audit and product release, shipment, delivery. Fig. 3. illustrates the example.

<i>Trust-related Problem:</i>	Personal trust in an institution with regard to the electronic commerce core process <i>order confirmation</i> for a <i>search product</i> Heuristic principle: <i>transparency/control</i> from the customer’s perspective
<i>Application Level:</i>	Confirmations of transactions
<i>Conceptional Level:</i>	Electronic notifications about the respective status of the order processing
<i>Implementation Level:</i>	Automatically generated electronic mails according to certain milestones of the order processing

Fig. 3. Example ‘order confirmation’ within LeCoTrust

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