The Lonely Comate: The Adoption-Failure of an Intranet-Based Consumer and Market Intelligence System

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The Lonely Comate: The Adoption-Failure of an Intranet-Based Consumer and Market Intelligence System

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EXECUTIVE SUMMARY

The case study concerns the disappointing reception of an intranet application at TopTech, a prominent player in the field of electronics. The application in question, called Comate, which stands for "Consumer and Market Intelligence Technology Environment," was conceived and built by the central staff department for Consumer and Marketing Intelligence (CMI) of the company. When this application was introduced some years ago, its purpose was to smooth information flows between CMI departments worldwide and to enhance networking between these departments. The organization decided to form a project team to investigate the reasons for the lacking acceptance of the system by intended users and to establish what would be the most appropriate reaction on the part of Central CMI: change the system, initiate new, supportive initiatives, or abandon the Comate project altogether. The case study examines how this project team tackled the problem. The team decided to address the evaluation, diagnosis, and redesign of the system and its possible contribution to CMI from the perspective of the system's acceptability. Key component in its methodology was the integrated use of the Technology Acceptance model (TAM) and Task-Technology Fit model (TTF).

BACKGROUND

A few years ago, a large global electronics company, that had its headquarters in The Netherlands, introduced an application to support its consumer and market intelligence. This application, called Comate (Consumer and Market Intelligence Technology Environment), was offered via the company's intranet facilities to staff departments all over the world. The main rationale for developing and introducing the application was twofold. First, its aim was to channel information requests from local departments to the central Consumer and Marketing Intelligence (CMI) Department and to enhance the communication between these departments. Second, by using the system, the central CMI Department hoped to achieve standardization and efficiency gains in its governance of local departments. The functionality of Comate included access to market reports, product data related to consumers and markets, consumer and market monitors, facilities to support communication with the central CMI Department, address and expertise information of departments and people from all over the world, access to information about ongoing and finished projects, and the like. However, the figures concerning actual usage of Comate showed that the system was not being used to the extent that was expected and intended. In fact, because of the disappointing reception, the organization deemed the Comate Project a failure. A regional component proved to be present in the figures signaling this failure. In some countries, the system was used on a regular basis by at least a small group of people; in others it was hardly used at all. However, in none of the countries did the reception and usage of the system meet the standards defined beforehand.

Despite its name, the system apparently did not encourage "mating behavior." This was a big disappointment to the head of the CMI Department, Hans Broekmans, as it was his initiative to start the Comate Project and his initial ideas that constituted to a large degree the basis for the current content and operation of the system. He realized that a decision had to be made regarding the future of the Comate system, for the sake of improving the flow of CMI information, but also to prevent the failure of the system from affecting his career within TopTech or elsewhere. How should he react? Should additional functionality be added to the system? Were the datasets presently offered perhaps not the ones Comate's users desired and should others be added? Was the interface perhaps difficult to use, and if so, why? Should additional measures be taken to instruct, support, and guide the users of the system? Or should the discontinuation of the Comate Project be considered?

At the time Hans Broekmans had only some vague notions as to how to answer such questions. He had no clear idea as to which reaction to the disappointing reception of Comate would be most appropriate. He therefore decided not to rush things, as apparently he had done when the system was built, but to look into matters a little more carefully. He formed a project team with a threefold task. First, the team should evaluate the use of the current system to identify reasons for the current lack of usage. Second, he requested an exploration of possible redesign alternatives based on a diagnosis of the current situation of how CMI information was produced, distributed, and used. Third, he asked the team to specify the lessons to be learned from the evaluation of the current system and the diagnosis of CMI's operations, and to use these lessons for substantiating a recommendation as to what the appropriate path to follow would be, i.e., redesigning the current system, reconsidering the procedure of its introduction, or abandoning the project altogether. He decided to appoint the head of his IS department, Johan van Breeveldt, as the project team leader. He selected

two of his Information System (IS) developers and two marketing specialists as team members. As it happened, a student from the Nijmegen School of Management had just applied for a position as an apprentice in order to conduct her final thesis research. She and her thesis supervisor were also added to the team.

With a total turnover of approximately 30 billion euros in 1998, the company in question (a multinational electronics firm that will be referred to as "TopTech" in this case study) is a Top 10 player in its field. TopTech is a strongly diversified concern operating in some 80 business areas varying from consumer electronics to medical systems and from software to semi-conductors. These activities are clustered into eight divisions. The case studied here involves the division TopTech Consumer Electronics (TCE). Together with the Domestic Appliances and Personal Care division, TCE constitutes the Consumer Products product sector. In terms of sales, TCE is the biggest division of TopTech (a 28% share in total sales; the other divisions' shares range from 2% for Software and Services to 23% for Components and Semiconductors). The products of TCE are marketed in the fields of information, communication, and entertainment. In this market TopTech is one the world's top three market players. The total workforce of the division consists of approximately 46,000 people worldwide. The organization of the division is based on two combined principles: a product principle, leading to six business groups (television, video, audio, peripherals, consumer communications, and digital networks) and a regional principle, leading to four regions (Europe, Asia and Africa, North America, and South America). The intersection of regions and business groups leads to 24 Business Planning Teams (BPTs) that are accountable for their own results.

The case study concerns the Consumer and Market Intelligence (CMI) function of TopTech. CMI closely relates to what in the literature is more commonly referred to as Business or Competitive Intelligence (BI or CI). Kahaner (1996, p. 16) offers the following description of CI: "Competitive Intelligence is a systematic program for gathering and analyzing information about your competitor's activities and general business trends to further your own company's goals." CMI at TCE is organized as a central staff department located at headquarters (Central CMI), and CMI departments for each individual business group (CMI BG TV, CMI BG Video, etc.) as well as for each individual region (CMI Europe, CMI NAFTA, etc.) located at various places in the world. The overall goal of the whole CMI organization is (1) to ensure the representation of ideas and perceptions of consumers and business partners in TCE decisions and processes, and (2) to provide an objective judgment of the outcomes of these decisions in terms of sales, shares, prices, and distribution. Within this context, the mission of Central CMI is to: "Proactively provide accurate, reliable, and valid Consumer and Market Intelligence to TCE Units worldwide within a clearly defined structure of professional methods and TopTech's values" (TopTech internal memo).

CMI generates and uses both internal and external sources. External sources range from contracted research by investigation bureaus to United Nations reports and monitors, and from statistical data from national bureaus of statistics and other commercially available panel data to publicly available intelligence on the Internet. Internal sources involve marketing, financial, and logistical data. The users of these sources are intermediate and end-users. Intermediate users are staff at various CMI departments who may benefit from reports from other departments (reports drawn up for one region or business group may also be relevant to others, etc.). End-users are product and marketing managers in the business planning teams as well as general management of TCE.

SETTING THE STAGE

At the end of 1996, Central CMI came up with the idea of developing a database application for the data sources the department distributed. At the time, the customers of Central CMI received most data via hard copy and some data via e-mail. The department recognized that both methods had several shortcomings. Delivering in hard copy implied delays because one would have to wait until the full report, usually referred to as a "book," was printed. Producing and printing these "books" was a time-consuming and costly process because of their size and number. Further delays were introduced by the delivery method of hard copy, particularly when destinations such as Sao Paulo or Singapore were involved. It was also very difficult, if not impossible, to make the necessary adaptations once the "books" were printed. E-mail often caused attachments to arrive in mutilated form because of the usually complex graphics included. Also, the department often ran into problems because of the size of the attachment. E-mail also involves risks of security. Reasons such as these induced the department to develop a system to handle these problems.

Early in 1998 the Comate system that resulted from this idea was put into operation. Comate was built on IBM's Lotus Notes functionality and was offered to users on TopTech's intranet via the Domino system. Comate consisted of the following five applications:

1. Market Data: offers processed data and analyses in the form of presentations concerning markets, market shares of competitors, distribution, price movements, market predictions, and socio-economical and technological trends;
2. Research Projects: contains the results of research projects completed by internal and external investigators;
3. Project Informer: contains information about planned, current and completed research projects run by Central CMI;
4. Let's Japan: provides a monitor of technological developments in Japan and follows the main competitors and their investments in consumer electronics, research and product development in that country;
5. CMI Contacts: contains organizational charts of the TCE organization, and a knowledge map of the connections of Central CMI inside and outside the TopTech organization.

Access to Comate has to be authorized by Central CMI. The home page of the system, which is accessible to all TopTech employees, offers a registration form to request permission to use the system. At the time the project team led by Johan van Breeveldt started its work in the spring of 1999, some 250 people all over the world were granted this permission. The first two applications mentioned, Market Data and Research Projects, were the most popular in Comate. To illustrate the functionality of Comate some examples from Market Data will be presented. The application can be regarded as a collection of search tools on top of a large set of documents, with some additional functionality loosely linked to search actions. Search actions for documents or their authors usually start by selecting one of the categories "Product," "Region," "Contact," and "Publications," with an additional entry "New Publications." Clicking, for instance, the option to search for documents related to specific products offers a taxonomy of products at several hierarchical layers, based on the standard classification of TopTech with which all employees – in varying degrees of detail – are familiar. New layers will appear when users zoom in on a specific class of products (or if they choose at any point in the hierarchy to "expand all"). Documents are typically connected to the base categories of the taxonomy. Apart from the hierarchical menu system organized around

products, regions, etc., some additional search functions are offered. Most of the additional functionality in Comate is introduced for the purpose of stimulating communication among Comate users. For all documents, additional meta-information is stored, including the names of the authors. A typical example is the response button that is connected to every document. Clicking this button will open a new window allowing the user to send remarks or questions to the authors in question. When the user files his or her comments, an e-mail message is sent to the authors to notify them. To read these comments, they have to log in to Comate and navigate to the document to which the comments apply. These comments and reactions are accessible to all users of the system, allowing them to contribute to the discussion.

With regard to this case study, it is important to note that the Comate system was developed on a top-down basis. Central CMI, and particularly Hans Broekmans who considered the project "his offspring," pulled all the strings in the project. Its customers, the intended intermediate and end- users of CMI sources, were hardly involved in its development and implementation. Also, when the system needed to be expanded or adapted, no customers were involved. No systematic consultations with people outside Central CMI's development staff ever occurred. This may appear as more surprising than it actually is; the system was conceived primarily as an extension of the work of Central CMI, and not as an aid to make life easier for the customers of Central CMI. It was intended to help streamline existing procedures and speed up current routines in the work of that department. The rationale was that if requests for information could be processed faster and at less cost through Comate, this would be to the benefit of all parties involved.

CASE DESCRIPTION

Perception of Failure and Call for Clarification

Comate was put into operation in January 1998. In the spring of 1999, approximately a year and a half after its introduction, the reception of Comate proved disappointing. The data in the login database of the system showed that only a few dozen of the 250 people authorized to use the system did so on a regular basis. The data also showed that users typically only inspected a few pages per visit and that the duration of an average stay in Comate was short. Although the central CMI department did not keep track of the number of e-mail and hard-copy requests for information, the undisputed impression existed that, contrary to the intentions and expectations, these numbers did not decrease during the period of Comate's operation. These data led Central CMI to conclude that the introduction of Comate was a failure and that the system did not live up to the expectations of its designers. As described in the introduction, this assessment induced the staff responsible for Comate, and more particularly the head of Central CMI, Hans Broekmans, to ask for an explanation of this failure and to inquire what users would regard a useful and usable system. These questions formed the starting point for the investigation by Johan van Breeveldt and his team. Their task was to uncover the information needs of designated system users, present or potential, both by looking in retrospect at reasons for the current lack of usage and by identifying variables influencing a broader acceptance of the system in the future.

The problem that faced the project team at the start of its work was how to find an appropriate and workable restriction of its domain and how to provide the best direction to its work. The team members were well aware of the fact that the success and failure of information systems (ISs) refer to matters of great complexity, linked to great diversity of

individual issues, and addressed in divergent ways in multiple IS development approaches and methodologies (e.g., see Currie & Galliers, 1999). The team decided first of all to focus on the acceptability of Comate to users and to direct the investigation towards reaching an understanding of the elements that determine acceptability. Following Grudin (1992) and Nielsen (1993; 1999), the acceptability of ISs can be split into social acceptability (standards, existence or absence of pressure to use the system, etc., see also Venkatesh & Speier, 1999) and practical acceptability (costs, reliability, usefulness, etc.). The project team then decided to concentrate on the latter concept, because it felt that understanding matters of practical acceptability had a greater urgency. The next question was how to define this domain and how to expand the definition into researchable issues and, eventually, questions to be asked of the actual and intended system users. The domain of practical applicability is usually broken down into the concepts of usefulness and ease-of-use (e.g., Nielsen, 1993, 1999). As these two concepts surfaced in the initial meetings of the project team, they met with considerable enthusiasm, as team members were well aware of the fact that these concepts constitute the cornerstones of the well-known Technology Acceptance Model (TAM; see next section). The cause for this enthusiasm was the fact that TAM was recognized as a well-established, robust model, thus providing the investigation with a strong theoretically based rationale for identifying relevant variables. The decision was quickly made to use the two concepts of usefulness and ease-of-use as the main vehicles for establishing the information needs vis-à-vis Comate.

TAM and TTF

As indicated above, the project team decided to start its work by exploring the concepts of perceived usefulness (PU) and perceived ease-of-use (PEU) in order to establish how a definition and elaboration might enable them to identify reasons for the failure of Comate and specify the diagnostic questions that the team should answer. These two concepts are the key independent variables influencing the attitude towards IT and intention to use IT, as specified by the Technology Acceptance Model (TAM, see Davis, 1989; Davis, Bagozzi, & Warshaw, 1989). PU is defined as "the prospective user's subjective probability that using a specific application system will increase his or her job performance within an organizational context" (Davis et al., p. 985). PEU refers to "the degree to which a person believes that using a particular system would be free from effort" (Davis et al., p. 985). The project team decided to study the vast literature on TAM to establish whether or not the model could provide an appropriate perspective for answering the evaluative and diagnostic questions Hans Broekmans had asked. The team found that TAM is a generally accepted and successful model (selective overviews of TAM research are, for instance, available in Lederer, Maupin, Sena, & Zhuang, 2000; Venkatesh & Davis, 2000), undoubtedly owing to its common sense nature, appealing simplicity, and robustness (empirical tests invariably show significant relations between the independent and dependent variables in the model, compare Lederer et al., 2000; Szajna, 1996; Venkatesh & Speier, 1999). However, it was also noted that the explanatory power of the original model is not very high, not to say mediocre, with a typical value for explained variance of around 40% (Dillon, 2000). Besides, the team found multiple equivocalities, with regard to the nature of the relationships and interactions between PEU, PU, and usage (for an overview, see Lederer et al., 2000), the importance of new constructs that some researchers introduced, and the various ways new variables appeared to affect the relationships among the original variables (e.g., Gefen & Straub, 1997; Veiga, Floyd, &

Dechant, 2001). This, it decided, was bad news for the investigation, because it implied that TAM alone could not provide the firm ground it needed for detecting weaknesses in the current Comate and for directing prospective diagnosis. A quote from Doll, Hendrickson and Deng (1998, p. 839) may serve as an accurate characterization of the general opinion of the team at that time, as these authors note that: "Despite its wide acceptance, a series of incremental cross-validation studies have produced conflicting and equivocal results that do not provide guidance for researchers or practitioners who might use the TAM for decision making." From its study of the accumulated writings on TAM, the project team drew two conclusions. First, it felt the need for further elaboration of the two concepts of PU and PEU at the conceptual level in order to establish their constituent elements. Second, the team decided that an exploration of other explanatory variables in addition to PU and PEU was called for.

In an additional literature review of the broader class of technology acceptance models, the project team found particularly interesting ideas, useful for both these purposes, in the task-technology fit (TTF) model (e.g., Goodhue, 1995, 1998; Keil, Beranek, & Konsynski, 1995; Lim & Benbasat, 2000; Marcolin, Compeau, Munro, & Huff, 2000). The basic suggestion of TTF is that whether or not the qualities of the system will induce people to use it depends on the task concerned. As Goodhue (1995, p. 1828) puts it: "A single system could get very different evaluations from users with different task needs and abilities." While TTF is newer than TAM and has not attracted as much research attention, research results for this model equally show its robustness and explanatory power (see references above). Just like TAM, TTF has a strong common-sense appeal in its suggestion that IT usage can only be understood if the reason to use the IT, i.e., the task, is included in the picture. The project team concluded that while TTF involves a different perspective on utilization behavior than TAM, these models appear to be complementary rather than contradictory. For instance, it found that Mathieson and Keil (1998; see also Keil et al., 1995) had shown that neither task characteristics nor technology features in their own right can explain variations in PEU, but the interaction between the two classes can. TTF therefore influences or defines PEU. Similar suggestions have been made as to the relationship between TTF and PU (e.g., see Dishaw & Strong, 1999; see also Venkatesh & Davis, 2000: their "interaction between job relevance and output quality" closely resembles TTF). Research by Dishaw and Strong (1999) corroborates the fruitfulness of the idea to integrate the basic concepts of TAM and TTF, as these authors show that a combined TAM/TTF model outperforms an individual TAM model as well as an individual TTF model.

Rethinking Comate

The project team decided to use the combined insights of TAM and TTF to direct its evaluative and diagnostic work. It reached this stage of its investigation some three months after its inception, which was a bit later than anticipated mostly due to the large amount of IT acceptance literature it encountered. The task it faced at this stage was to find a useful interpretation and combination of the conceptual foundations of both models and the cumulative outcomes of studies applying the models. The team was well aware of the fact that these studies do not translate automatically into design directives for ISs. IT acceptance studies pay much attention to issues of significance in assessing the contributions of variables explaining IT usage, which was not the main concern of the investigation at TopTech. In one of the meetings where – again – numerous figures and statistics representing

the explanatory power of the models crossed the table, Johan van Breeveldt stood up and exclaimed: "I am not the least interested in how things work in 90, 95 or 99% of the cases! My only interest is in finding out how things work in one case— ours!" These discussions led the project team to define the following agenda: first, it needed to specify and elaborate on the concepts of usefulness and ease-of-use within the context of TopTech's Consumer and Market Intelligence. Next, it needed to identify indicators to serve as hooks for two task realms: the diagnosis of the appropriate organizational context and the redesign and evaluation of the system. The third issue on the agenda concerned the translation of these indicators into questions to be put to selected staff. The fourth task it set was to identify, define, and specify other factors in addition to PU, PEU and TTF. As to this class of additional variables, the team adopted the pragmatic approach of not defining these beforehand but identifying them by inviting respondents to name such factors after considering PU-, PEU-, and TTF-inspired questions. The remainder of this section will focus on the first item on this agenda. The other items will be addressed in the next two sections, describing the data collection strategy and the outcomes of the empirical part of the investigation.

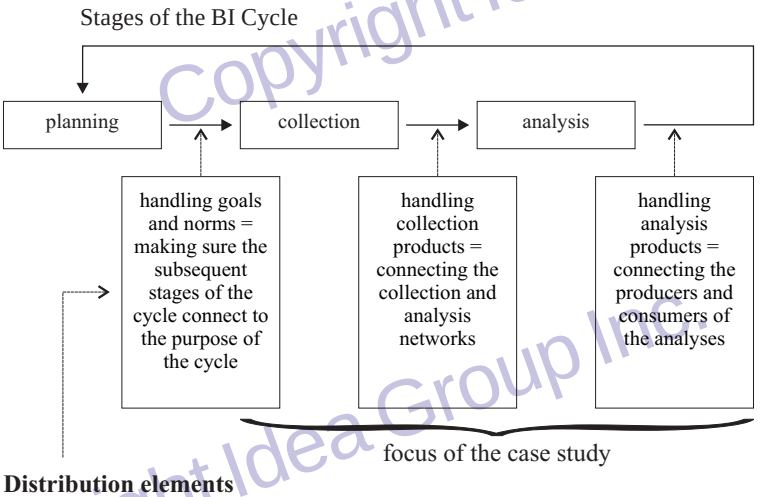
The challenge facing the investigators, given their decision to use TTF as a key component in the definition of perceived usefulness and ease-of-use, was to link the functionalities of Comate to a description of the tasks involved. They decided upon the following three-step procedure for meeting this challenge: the identification of an appropriate model of the tasks, the recognition of a suitable model of the technology functionalities, and the connection of both models. For the first step—identifying the classes of tasks involved in gaining and enhancing the intelligence of markets and customers—the team adopted the commonly accepted model of the Business Intelligence (or BI) Cycle (e.g., Kahaner, 1996; Pollard, 1999; Prescott & Miller, 2001). The BI cycle typically includes four stages: *planning and direction* (identifying the mission and policies of BI, etc.), *collection* (data collection and initial processing of these data), *analysis* (processing data so they can be used for BI-related decisions), and *distribution* (getting the analysis outcomes on the right desks). The first stage of the BI cycle, planning and direction, falls outside the scope of the Comate case, which only relates to the tasks of collection, analysis, and distribution. As to the second step in defining TTF—modeling the functionalities of the technology—the project team decided to build its elaboration on the 4C framework of groupware functionalities (Vriens & Hendriks, 2000), which is an adaptation of the 3C framework (Groupware White Paper, 1995). The four C's are circulation, communication, coordination, and collaboration. *Circulation* involves the distribution of information to a broader audience, not aimed at establishing some form of interactivity with that audience. *Communication* concentrates on the establishment of interaction between senders and receivers of information. *Coordination* refers to matters of sharing resources, sequential and other correspondence among the subtasks of a larger task, and overlap between individual tasks that are not constituent elements of some overarching task. *Collaboration* occurs when two or more people are working together on the same task. Functionalities of Comate implemented at that time or considered for future implementation may refer to any of these four classes.

While it had not taken the team long to come up with the three-step procedure and to decide that it would provide a good and useful structure for its definition work, it encountered some irksome problems when it got to the third step of the procedure: How to connect the BI cycle and the 4C framework? and Where did the distinction between usefulness and ease-of-use come into the picture? Should these two concepts be treated on a stand-alone basis,

leading to two separate applications of the whole procedure, or could they be included in one procedure through some mutual connection point? It took the team several rounds of sometimes heated discussions to work towards a solution of these problems. The breakthrough moment in these discussions occurred when Maartje Zijweg, one of the marketing specialists, proposed to distinguish between the content and process sides of the CMI tasks. This distinction, so she argued, would provide the basis for two different but related perspectives on tasks and their connection to the functionalities of the technology. Examining this connection from a task-content perspective would lead to the recognition of issues of usefulness. Starting from a task-process perspective would enable the team to recognize issues of ease-of-use in the connection between these tasks and the functionalities of the technology. The other team members applauded this suggestion.

There is no way of telling any more who made the second suggestion that helped the project team out of its deadlock. Several team members claimed authorship of the suggestion, leading to endless back-and-forth discussions. This suggestion was to detach the distribution stage from the BI cycle, to reintroduce it within and between the other stages of the BI cycle, and to elaborate it using the 4C framework. The reinterpreted BI cycle that emerged as the result of this reshuffling is shown in Figure 1. The four C's come into the picture when the question is asked how an application such as Comate may support the tasks within the main classes of the BI cycle (the upper sequence in the figure) and between the stages of the cycle (the lower sequence in the figure). The concepts of circulation, communication, coordination. and cooperation then appear as an elaboration of the way in which connecting to other individuals with similar or related tasks may enhance the task performance of an individual. The four C's are four different ways in which these connections may materialize. They are also the classes of functionality in which the Comate application may prove valuable. When these functionality classes are studied in terms of leading to more *effective* task performance, the usefulness of the application is at stake. Ease-of-use issues are at stake when the question is asked as to whether using Comate leads to more *efficient* task performance.

Figure 1. An Adaptation of the BI Cycle



Data Collection Strategy

The data in the case study—both for the evaluation and the diagnosis/redesign steps—were collected by means of interviews with several classes of interested parties: actual users, designated users who appeared to use the system hardly or not at all, potential users who had not been included in the Comate-related efforts before, system designers and content specialists at the central CMI department. As to the subclass of actual or potential users, the group of interviewees consisted of intermediate users and end-users of the system. Most of the intermediate users were marketing managers at the corporate, regional, or business-unit level. The end-users included product and marketing managers for individual classes of products and other staff members of the local consumer and market intelligence departments.

As to the content of these interviews, a distinction was made between the assessments of usefulness and ease-of-use. Research has shown that users are better equipped to establish beforehand what they want an individual system to do than how they want it to do that (e.g., see Venkatesh, 2000; Venkatesh & Davis, 1996, 2000). The project team saw this as a justification of separating data collection procedures for the concepts of PU and PEU. As to the usefulness of Comate, the general direction of the interviews involved the sequence of diagnosis—evaluation—redesign. As to ease-of-use, they followed the sequence of evaluation—diagnosis —redesign. To identify other factors than those directly related to ease-of-use and usefulness, the wrap-up phase of each interview contained questions aimed at uncovering the relevance of such factors—both from scratch and on the basis of a list of named factors (such as awareness of the existence of the system). Separate questionnaires were prepared for intermediate and end-users.

The questions concerning usefulness were clustered into five domains of potential usefulness. The groupware functionality "circulation" was split into two domains: (1) circulation within the collection stage and in the connection of this stage with the subsequent analysis stage, and (2) circulation within the analysis stage and in the subsequent stage of connecting the producers and consumers of these analyses. The other groupware functionalities "communication," "coordination," and "collaboration" were treated as separate domains, because Central CMI deemed their importance secondary to the importance of circulation. For each domain, the following subjects were addressed via the following sequence of closed and open questions:

- characterization of the tasks involved (e.g., domain 1: receiving sources, offering sources to others), specification of elements of the task, general evaluation of the task
- identification of problems related to the task and its elements
  - ➢ designating such problems
    - identifying problems from scratch ("What problems occur?")
    - scoring listed problems ("Do these problems occur?")
    - recognizing problems that should be included in the list ("What other problems occur?")
  - ➢ assessing the importance of named problems
  - ➢ finding ways to address these problems and other issues to improve task settlement
- evaluation of Comate in relation to problems and suggested solutions for people familiar with the system
- solicitation of ideas on potential (new) functionalities for an intranet application with reference to problems and suggested solutions.

The interviews on ease-of-use started from the evaluation of the current system ("How do you like the way the system works?") and worked towards diagnostic and redesign-oriented questions concerning ease-of-use ("How would you want the system to work?"). They started with questions addressing issues at the global level of the system (registration procedures, home page of the system, instruction, manuals and utilities, general search facilities, switching between applications, etc.). The remainder of these interviews was organized around the five applications that made up the system (Market Data, Research Projects, etc.). Respondents were asked to establish the link with the groupware functionalities "circulation," "communication," etc., by presenting them with open questions relating individual functionalities to task elements (e.g., "Does the response button facilitate communication?") and open questions relating the overall application to task domains (assessing ease-of-use of circulation, coordination, etc., via the applications Market Data, Research Projects, etc.). Ease-of-use related questions were only put to actual users of the system.

Results

The outcomes of the rounds of interviews held by the investigators are presented here following the structure of these interviews, which were organized around the five TTF domains of potential usefulness and ease-of-use described above. The outcomes for these domains are then summarized, leading to the final picture of the perceived usefulness and ease-of-use of the system.

As to the first domain, the collection of reports to be circulated and their distribution to the analysts, the potential value of Comate appeared undisputed among those who were aware of the existence of the system, even if they themselves used it hardly or not at all. The main problems they faced as to the availability of sources appeared to be the timeliness of their delivery, the lack of clarity in delivery procedures, and the lack of time the end-users usually had at their disposal when facing tasks for which the use of sources was indispensable. While people recognized that solving these problems would involve more than the introduction of ICT, the general feeling was that Comate, with some adaptations, could do a good job in easing the pain. The criticisms of Comate leading to this call for adaptations included: lack of clarity in the organization of files and location of data, problems with the accessibility of data, problems of authorization, the awkwardness and limitations of the query and search facilities of the system, and the response time for some queries. One respondent observed that the external research bureau that triggered most of the criticism because of delays and vague delivery dates and procedures could do a much better job if it were to publish its reports in batches via Comate instead of in one go. At the same time, it should be noted that many people appeared to be unaware of the existence of the system, either because they forgot that they had been granted permission to use the system or because they had not been included in the circle of initial users in the first place. One respondent remarked: "The concept of 'Intelligence' these people at Central CMI appear to have would fit better in the CIA than in our company. If these people had wanted the existence of the system to remain a secret, they could not have done a better job." Several CMI staff members reported that, on several occasions, they had wanted to offer their sources on Comate, but had refrained from doing so. The reasons they mentioned were that some of them had no idea whether or not this was allowed or even possible. Others complained about the lack of transparency in the uploading procedures, especially when it concerned updating existing sources.

The second domain involves the equivalent of the first domain for the analysis stage of the BI cycle. It refers to questions as to how to support the inbound and outbound flows of sources in the analysis networks and the distribution of sources throughout these networks. Again, people recognized the potential value of Comate in this domain. They pointed to particular problems because of the confidentiality of some of their analyses and because of problems of fully understanding the "ins and outs" of these analyses when applied in contexts other than the original. Several people mentioned risks of misinterpretation and potential status loss keeping people from offering their analysis outcomes to others and from using the analysis work of others. In the words of one of the marketing managers interviewed: "What it really comes down to is sharing knowledge about how, when, and why a particular analysis is useful. Sharing knowledge is much more than distributing a set of PowerPoint files." Calls for adjustments, related to problems occurring in the processing of analyses, concerned several elements of these analyses: their number, form, time frame, and method. There were many complaints about the low availability of the work of other analysts, via Comate or other channels, even leading some people to question the raison d'être of Central CMI, as that department hardly offered any analyses. When analysis outcomes did become available, most of the time they appeared in a format that was not suited for use outside the context for which they had been generated. Particularly, long-term analyses appeared to be lacking, which was considered unfortunate as these could provide a kind of organization-wide backbone into which department level analyses could be plugged. Several critical comments were inspired by doubts as to the scientific stature of analyses that had been put on Comate. In short, many comments involved the suggestion to reconsider Comate from the position of the potential consumers of these analyses instead of from the producers' viewpoint.

The third domain concerns the communication aspects within all stages of the BI cycle considered in the investigation. It was hardly surprising that the interviewers found multiple examples of communication in all stages of the BI cycle, between parties within and between departments, at the same geographical location and across locations, and concerning a wide variety of subjects and situations. Typical means that were used in these communications were telephone, e-mail, fax, presentations, or face-to-face contacts. But not Comate! Most people indicated that they experienced no insurmountable barriers to communication, apart from some occasional problems of time-zone differences that could well be by-passed by using e-mail. The main spot where communication support had been introduced in Comate was the response button mentioned above. All the people who knew of the existence of Comate were also aware of the existence of this function in the system. Apparently, in the limited advertising for Comate, the response button had played a significant role in highlighting the potential surplus value of the system. The assessments of this surplus value were, without exception, negative. People indicated they never used it and had no intention of doing so in the future. They offered several explanations. Getting feedback from the authors of the document would simply take too long if they used the feedback button; they preferred to pick up the phone. Also, the fact that remarks entered via the response button would become publicly available met with much criticism. It could do undue harm to both the authors of the documents and the authors of the comments. Also, most questions people appeared to have did not concern an individual document but were of a more general nature. Several people noted that if any type of functionality for supporting communication might be useful in Comate, it would be the establishment of some form of electronic discussion group or database. Such a discussion platform might, for instance, support the location of relevant

documents, which people identified as a more relevant topic when communicating in an electronic environment than discussing the contents of these documents.

The fourth domain addresses questions as to whether and how coordination within and between the stages of the BI cycle call for support. While several people did experience problems of coordination—both within their own department and in their relationships with departments elsewhere—the general feeling was that using Comate, or an adapted version of the system, for solving these problems did not make much sense. As one of the interviewees commented: "What sense is there in offering a Porsche to a baby, if it can hardly walk? They had better spend their time on making the things that are available now work, instead of offering all kinds of exotic new things."

As to the fifth and final domain that involved matters of collaboration within and between groups of collectors and analysts of CMI-related information, summarizing the opinions of people outside the Central CMI department was not very difficult, as these proved to be unanimous. None of the actual or would-be users of Comate saw the point of supporting collaboration through a computer system such as Comate. The general feeling was that supporting cooperation through an application such as Comate within their own departments was not necessary or even possible. They did not see the point of dressing up Comate with specific functionalities aimed at supporting collaborations outside their own departments. Either they did not work together with people outside their own departments, or they did have collaborative relationships with people elsewhere, but experienced no problems or challenges for which Comate could be valuable.

Summarizing the findings as to the usefulness of Comate, the conclusion was that the system was or could be turned into an appropriate system for circulating information, provided that all parties involved were willing to publish their sources. The primary function for which Comate appeared to be used was for searching information. Comate appeared not to be used as a communication system, and respondents indicated that they had no intention of using it as such in the future. The main reasons for this were a generally felt preference for personal contact, the resistance to broadcast personal remarks to an anonymous audience, the fact that hardly any questions that people had were related to an individual document, and the tediousness of writing down questions. Comate was not considered useful as a coordination or collaboration system either, because respondents indicated they did not experience problems in these realms that the system could help resolve. As to the content of the system, a key element of usefulness, respondents stated that they missed information about competitors and distribution. They also asked for an increase in the number of analyses offered on Comate. Dedicated presentations linking several sources to a specific research goal were considered even more useful than sources by themselves, either as such or as templates for performing new analyses leading into new presentations.

As to ease-of-use, the interviews showed that the user-friendliness of Comate left a lot to be desired. The respondents complained that the overviews in the system were not clear. They did not consider the system to be attractive. Comate even was characterized as tedious and not inviting to work with. Also, several controls were found to malfunction: no single respondent appeared to use the response button, and many people complained about the search functionality, which they considered below par and badly in need of improvement. Three facets of the system related to ease-of-use were mentioned in particular. First, the indistinctness and intricacy of the registration procedure form appeared to deter people from requesting access to the system. Second, updating, while recognized as crucial for the system to be useful, was generally considered as a cumbersome procedure, particularly because no

clarity existed as to what were the responsibilities of individual users and departments regarding updating and which documents could be updated by specific users and which could not. Third, respondents complained about deficient explanation facilities within the system, the lack of a help desk for handling individual problems, and the absence of short training courses. Giving explanations, as several respondents suggested, could clearly demonstrate that using Comate will save time and could, as a result, help convince people to supply their own information.

CURRENT PROBLEMS/CHALLENGES FACING THE ORGANIZATION

The case study that we described follows the work of the project team led by Johan van Breeveldt whose task it was to provide TopTech with the ammunition needed to decide what to do with the Comate information system. The team's work, and therefore also the focus of the case study, concerns the connection of the first and a possible second life cycle of that information system. We have described an individual life cycle as consisting of the stages of diagnosis, design, implementation, and evaluation. The focus of the case study is on the evaluation stage of the first cycle, which we staged in such a way that it could be connected to the diagnostic and redesign stages of the second life cycle without a reconceptualization of the issues at stake. As we have described in our account of the project team's work, TopTech has also gained insight into some elements of the initial stages of the second life cycle. No full account of the start of a second life cycle for Comate can be given as yet. The elements presented appear as isolated pieces of a puzzle that has yet to be laid down. The key problem the organization currently faces is to decide whether or not extending the life of Comate is a good idea. Responsible for making this decision is Hans Broekmans, the head of Central CMI. While the initiation of Comate's first life cycle took place almost completely on his desk, in the current state of affairs it is no longer conceivable that Hans Broekmans alone will be able to make the decision. Several other stakeholders will want to have their fingers in the pie. Among those stakeholders are the managers of the CMI departments of the business groups and the regional CMI departments. They enter the decision-making stage as representatives of TopTech's internal BI network. Also, the external parties that play a role in TopTech's intelligence network are players interested in steering the decision in the direction that suits their interests, including the much criticized external research bureau that produces most of the externally commissioned reports or "books." Because of the perceived failure of the initial version of Comate and the criticisms it generated concerning the overall operation of Central CMI, the project has also attracted the attention of the board of directors. The board's critically inquisitive interest puts an additional pressure on Hans Broekmans to do things right this time, or at least better than the first time.

From the work of the project team, it has become clear that four areas are crucially important when dealing with the interests of the stakeholders: issues of leadership style, knowledge-sharing and cross-cultural issues, usefulness and ease-of-use-issues, and organizational change and system introduction issues. We will discuss these four areas subsequently.

Issues of Leadership Style

Comate had been conceived and introduced into the organization via a top-down approach. The initial reason for starting the Comate Project was the observation that

procedures concerning the dispatch of information requests that Central CMI received could be improved, as we described earlier in this case study. It must be remembered that the justification for introducing Comate was primarily based on considerations as to the good of Central CMI. In these considerations, the good of the customers of Central CMI, i.e., BI staff in regional and local CMI departments, entered as a derivative from Central CMI's interests. Take, for instance, this characteristic statement by Hans Broekmans: "Our clients are the ones that will benefit most from smoother operations at CMI Central." The top-down nature of the introduction of Comate reflects the way Hans Broekmans conceives his responsibilities. He is a very energetic, talkative, and amiable man, but also a person who strongly believes that things will not be done right unless a strong leader sets the course and lays down a plan for others to follow. He is not the type of person who would postpone his decisions until he has consulted all interested parties or until some form of agreement or compromise has been reached. He is also characterized by the fact that he always works with his door closed. People who want to see him cannot just walk into his office; they have to make an appointment beforehand. While by and large being a sociable person, he is also known for his sudden outbursts of anger. People recognize him as champion for defending the interests of Central CMI outside the office, but at the same time he is not seen as someone who will join others putting their shoulders to the wheel when some unexpected problem occurs within the office. He will rather set a deadline for his staff to meet in fixing the problem.

While this conception of how leadership should be executed does not appear inappropriate for running Central CMI, it is bound to lead to clashes with the type of leadership and management that BI specialists in other departments expect or need. Most of these people are highly trained knowledge workers, who claim sufficient autonomy and intellectual freedom to decide for themselves what defines the quality of their work within their local circumstances. They expect Central CMI to play a facilitating role, not a strictly directing role, although they will accept that headquarters— and Central CMI as its mouthpiece—sketches the outline that defines the boundaries of their freedom. They resist others making their decisions for them. Most of these BI professionals are highly intrinsically motivated. Lifetime employment is no exception at TopTech, although regional variations exists. For instance, in Latin America, where TopTech is recognized by the public as the "number one" brand in its field and working for the company ensures high status, employees often have family-type ties with the company. In Europe and Northern America, the emotional character of the ties is different, and the average duration of the engagement with TopTech is shorter. In these two continents too, a substantial proportion of TopTech's workforce appears "married to the company" (as evidenced for instance by the fact that outsiders see TopTech as a typical example of a company characterized by the "Not-Invented-Here" syndrome, which indicates the existence of a sense of superiority). This implies that they will not consider looking for jobs elsewhere if not forced to do so. In the current situation, there is reason to ask whether the type of leadership shown on the Comate Project is the type of leadership needed to make the system a success.

Knowledge-Sharing Issues

The much criticized response button connected to documents available through Comate, that was introduced for the purpose of stimulating communication between producers and users of these documents, indicates the aspiration of the designers of the system that Comate would become a meeting place for its users. Perhaps inspired by the popularity of knowledge-management approaches, the idea was that Comate could be a

useful instrument for stimulating and facilitating knowledge sharing among BI professionals worldwide. However, in their initial development activities, Hans Broekmans and the technical developers of the system had simply introduced these functionalities into the system without any explicit consideration of how and why BI people do or do not share knowledge. The investigation of the project team led by Johan van Breeveldt did not delve into these issues in a systematic fashion either. While the prevailing opinion of the interviewees was that the current functionalities of Comate would sooner frustrate knowledge sharing than bring it about, with a clear undertone that they resisted sharing knowledge through Comate-like technology altogether, it would be too rash to jump to the conclusion that the Comate system could play no role at all in stimulating knowledge sharing and knowledge transfer. In a business realm where knowledge creation is core business, there is no lack of awareness that knowledge sharing can make the difference between successful and ineffective intelligence development. Social networking typically drives BI work. A better BI professional distinguishes him/herself from a good BI professional by the quality of his or her social network. Knowing who knows what is key business in competitive intelligence work. The attitude towards knowledge sharing among BI professionals is therefore invariably positive, and people are always interested in learning about new tools that truly enhance knowledge transfer and knowledge sharing. This also explains the strong aversion to the types of functions that were offered through Comate, because, as we saw, these were seen as frustrating rather than enhancing knowledge sharing. In a world where knowledge sharing lies so close to the heart, anything that erects barriers will be hissed down.

What makes studying knowledge-sharing practices and barriers particularly complex in the situation of TopTech with its offices in many countries is the fact that multiple cultures exist within the firm that all influence the attitude towards knowledge sharing in different ways. TopTech has clear regulations as to how specific knowledge-sharing flows should be generated. Headquarters sends out instructions, deadlines, information about targets, etc. The local offices send back their reports on a regular basis following strict formats. These flows relate almost exclusively to management information. No clear and unambiguous overall policy exists as to sharing knowledge by BI professionals at an operational level. No formal structures for knowledge sharing exist to give these people a hold. It should be recognized that coming up with such structures would be problematic because knowledge-sharing practices are very different in BI offices in different locations and cultures. The social networks that define the operation of the BI function and constitute the main backbone of knowledge-sharing flows operate very differently in different cultures, and do not connect easily to each other. For instance, in cultures with a high-power distance, as present in several South American, Asian, and South European countries, the social networks typically have a strong vertical axis, connecting individuals mutually through their supervisors. Direct horizontal linkages are usually stronger in cultures with a low-power distance, such as most West European and North American countries. TopTech does not allocate time and resources to activities aimed at transferring existing knowledge to other parts of the organization where that knowledge may be useful. In summary, connections between the various BI offices follow a clearly defined path with strict regulations and are limited to the targets, goals, and outcomes of BI, and not to the operational process of BI collection. The language of these communications is English. Mutually, BI offices have no systematic contacts, for instance, between business groups' "audio" in two different countries if these countries are in a different region, or between business groups' "audio" and "video" within the same country.

Because of this lack of connection between social networks, chances are small that someone faced with a specific problem will find another person who has experience with related problems if this person does not belong to his or her social network. Within BI circles at TopTech, there is a broad recognition of the surplus value of enhanced knowledge sharing and transfer. Defining programs to further these processes seems like maneuvering in a maze of mazes; it presumes an understanding of the different ways knowledge sharing develops within different cultural settings, as well as being able to deal with the challenges of cross-cultural knowledge sharing between offices in different locations. How ICT, in general, and a specific system like Comate, can play a role in this maze of mazes is not well understood, but it is clearly too soon to conclude that Comate has no possible role to play in this arena. The inquiry by Johan van Breeveldt has only scratched the surface of the issues involved, but it has had the effect of moving concerns of knowledge sharing higher on the agenda.

Usability Issues

The first two areas of challenges and problems—leadership style and knowledge sharing—involve elements of the organizational context influencing the success and failure of Comate. Characteristics of the system itself also play a part here. In its current form, the intended users do not consider the current system very usable. Some quotes may serve to illustrate this: "If they [i.e., Central CMI] want their pet to be a success, they had better come and take a closer look at how we do our work, and, perhaps more importantly, how we do not like to do our work." "I do not believe that the builders of Comate have much in common with my colleagues and myself. These people do not have the least clue of how our day-to-day routines run. They think more in terms of procedures and instructions, than in terms of what is needed to get the job done. Their conceptual point of departure is the technology—all the good it brings and how fancy it may look—and not our daily-life worries of picking up the right signals from customers and competitors." These comments along with others indicate that Comate does not connect to how BI professionals go about their daily routines and, as a consequence, it is not considered useful. Along with the criticisms of awkward and user-unfriendly elements in its user interface, the overall verdict can only be that Comate is currently not a usable system, which explains much of its adoption failure. Looking into issues of usability is clearly an important area of concern at the hinge point of the first and second life cycle of Comate. Deciding whether or not to continue the Comate Project depends on the question of whether its functionalities can be redesigned in such a way as to make the system usable. The investigation of Johan van Breeveldt and his team has only begun to unravel the intricacies involved here. Their study appears more as an evaluation of the current system than as a systematic and complete needs assessment.

Implementation and Organizational Change Issues

Comate has not landed in TopTech. The first version was not introduced as a pilot version, but it does not appear as the launch of a full-blown information system either. Fences have been placed around its introduction, and its promotion did not receive the attention it deserved. The question remains as to who should have been convinced that using Comate would be a good idea. Were these the local and regional BI managers, the analysts who were designated as intermediate users, the intended end-users, or the producers of reports? What appears indubitable is that attempts should have been made to convince people of the system's boons. Also unanswered is the question of whether addressing issues as to the

most effective introduction procedures should not have been taken up much earlier, by involving managers and possible users in conceiving and testing prototype versions. Establishing that things went wrong in the first round is no guarantee that things will run smoothly in a second round. But some progress has been made; it did result in an increased awareness that Comate's PR needs to be developed, as indicated by the calls for promotional campaigns, extended help facilities within and outside the system, and training and discussion meetings. But such initiatives alone will not save the day for Comate. The situation is complicated by the fact that, because of the way Comate was introduced, people cannot look at the system without looking at Central CMI too. It is hard to identify which part of the criticism of Comate is disguised criticism of Central CMI. In addition to the discussion on a possible reintroduction of Comate, a discussion seems necessary as to the overall operation of the BI function in TopTech, with its division of tasks over several offices and many channels whose cooperation is, at times, far from ideal.

Dilemmas Confronting the Organization

Currently, TopTech is considering what line of action appears most appropriate. The options from which the company – and in particular Hans Broekmans– has to choose are those that we described in the introduction: Should they continue or discontinue the Comate project? In case of continuation, which alterations should they make to the functionalities of the system? Which implementation and organizational change procedures should they consider? Questions implied are those involved in deciding which criteria to take into account when weighing these alternatives, establishing how these criteria can be met, and deciding which path to follow as to dealing with the combination of these criteria. If there is one thing in particular the investigation by Johan van Breeveldt and his team produced, it is that answering these questions is a formidable task. Looking at Comate alone will not suffice. The operation of the BI function at large is at stake, as indicated by the critical comments of the interviewees. If future versions of Comate will only serve to confirm and re-establish the role of Central CMI in the operation of TopTech´s BI function, any attempt to revitalize Comate will be futile. The four classes of issues described before define the areas for special attention. The tasks involved concern dealing with both the questions implied in each individual class and with their integration. For instance, considering issues of usability is directly related to the choice of strategy as to the cross-cultural knowledge-sharing issues and vice versa. Each of these tasks presents TopTech with just as many dilemmas. The ultimate dilemma is to decide whether or not to continue with Comate by integrating solutions and answers to the broad spectrum of problems and questions involved in these four areas and their integration.

As to Hans Broekmans himself, he is not fully convinced that commissioning the investigation was the best idea he ever had. He now questions whether he should have instructed Johan van Breeveldt to stick to the more traditional issue of software design, rather than allowing him to fan out to all sorts of organizational issues. He wonders if perhaps the inquiries have stirred more unrest than would be good for him, for his department, and indeed for the survival of the Comate system. One thing is clear to him: while decisions concerning the continuation of Comate may formally still be his department, the number of prying eyes is such that he feels a great distance between the formal and the actual situation. And he is not sure whether or not he really likes this idea. He feels as though he has lost custody of one of his beloved offspring.

FURTHER READING

Appreciating issues of usefulness and task-technology fit in the Comate case presumes an understanding of the operation of the Business Intelligence function. Any of the textbooks by Kahaner, Pollard, and Prescott & Miller that are mentioned in the references section, are a good source for furthering this understanding.

Many authors address issues of ease-of-use or user-friendliness of computer systems and their user interface. As an example that specifically targets ease-of-use related to usability consider the works by Nielsen mentioned in the references section.

For issues of leadership style, you may visit:

Fiedler, F. E. (1967). *A theory of leadership effectiveness*. New York: McGraw-Hill.

Hersey, P. & Blanchard, K. H. (1977). *Management of organizational behavior* (3rd ed.) Englewood Cliffs, NJ: Prentice-Hall.

Vroom, V. H. & Jago, A. G. (1988). *The new leadership: Managing participation in organizations*. Englewood Cliffs, NJ: Prentice-Hall.

An ever-growing stream of studies addresses aspects of knowledge sharing within organizations. Useful examples of studies that address cross-cultural issues in knowledge sharing are:

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De Long, D. W. & Fahey, L. (2000). Diagnosing cultural barriers to knowledge management. *Academy of Management Executive*, 14(4), 113-127.

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BIOGRAPHICAL SKETCHES

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