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A Case Study in the Development of Collaborative Customer Care: Concept and Solution

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Abstract: We describe the concept of Web-based collaborative customer care and our experience designing a proof of concept solution for a real-world customer. The paper describes the requirements for collaborative customer care and the features of the implemented system. They differ from the requirements for work-group collaboration due to differences in users, tasks and goals, and context of use. We also discuss the design process with a focus on how particular design activities revealed key requirements for integrating collaborative customer care into the business' organizational and information systems infrastructures. We found the use of concrete methods and artifacts to be effective techniques for discovering design requirements for this new technology.

Keywords: collaboration, customer care, QOC, system design, scenarios, Web.

1 Introduction

Synchronous collaboration tools have typically been designed to support work-groups. For example, consider shared writing tools (Ellis et al., 1991; Olson et al., 1993) and shared whiteboard tools (Bly, 1988; Greenberg, n.d.). However, as more consumers gain access to the World Wide Web and as businesses increasingly use the Web as a channel for commerce, the Web has become a potential medium for collaboration between a business and its customers. As the Web offerings become more complex, there is a need to supplement Web-based self-service with human assistance on demand. Furthermore, businesses are beginning to realize the importance of human assistance in establishing and maintaining a relationship with customers, and are exploring ways of doing this over the Web (Conway, 1998).

For the past several years, we have been developing a system to support collaborative customer care over the Web. We have worked with several customers in a joint research relationship to better understand the business, technical and usability requirements for collaborative customer care. These requirements differ from those for work-group collaboration due to differences in users, tasks and business goals, the organizational context and the information technology infrastructure.

This paper focuses on the design of collaborative customer care based on our experience doing joint research with several real-world customers. We will draw heavily on our experience with one customer, mbanx — a division of Bank of Montreal, with whom we worked with for about 15 months. We will describe several aspects of our experience:

- The design process — System design involves more than technology design. It involves understanding the business, organizational, and social context into which the technology is integrated with the customer. In addition, the design process includes many shareholders, and needs to employ methods that are accessible and comprehensible to all of them. We found the use of concrete methods and artifacts to be effective techniques for discovering design requirements.
- The requirements for collaborative customer care — We describe the features of the implemented system, as well as the requirements that could not be implemented within the project time-frame. The description of the requirements focuses on the functionality from the users' and organization's perspectives. A detailed technical description appears in (Kobayashi et al., 1998).

The next section provides the background for the development of the collaborative customer care concept, a scenario of use that illustrates many of the capabilities of the resulting solution and overview

of the solution's components. This is followed by a discussion of the design process and the resulting requirements and features. We conclude with 'lessons learned' that can be applied more generally.

2 Customer Care

We developed the key elements of the vision for collaborative customer care in 1995–96. They were encapsulated in a nice demonstration that was used to convey the vision to businesses. We used an approach similar to the one described in (Wolf & Zadrozny, 1998) for bringing research technology to the marketplace. In order to understand the real requirements for collaborative customer care and to evaluate the technology, its usability and potential value to businesses, we entered into a joint research agreement with mbanx, a direct banking division of Bank of Montreal. As part of this arrangement, we agreed to deliver a working prototype solution that would be used in a limited pilot with real bank customers.

From the initial seed of the demonstration prototype, the joint research and business team identified goals, requirements, and applications of the collaborative customer care solution for online banking (Fischer et al., 1998). The following scenario illustrates the result of our efforts. It gives an idea of what we mean by collaborative customer care over the Web and illustrates the main features of the technology (see Figure 1). Then, we summarize the components and framework of the solution deployed within the bank's environment (see Figure 2).

2.1 Scenario of Use

Iris Cashman opened a bank account two months ago. From home, she connects to the Internet and to the bank Web site with her modem. She looks at the Credit Card page to see what the online bank has of interest. She notices an icon labelled 'Ask us about our Magic MasterCards'. She remembers the last time she looked at the MasterCard choices; it was hard to figure out which one was best for her so she didn't apply for any of them.

Iris clicks on the icon and this pops up a new page asking her to wait until a customer service representative (CSR) is found to handle the call. Behind the scenes, this search process is initiated. Within seconds, Iris is connected to Marianne Banks, the bank's credit card specialist. The 'Waiting for a CSR' page is minimized and Iris sees the original page from which she initiated her call. Marianne's Web browser displays the same document. She and Iris are also able to talk over a voice channel carried on the same telephone line as the Internet connection. She asks how she can help. Iris explains that she was thinking about getting a MasterCard, but was confused by all the choices.

Marianne takes Iris to the MasterCard choices page. She asks Iris a few questions to determine her credit needs. Marianne shows Iris the Midas MasterCard plan. Using the remote pointer, Marianne points out the interest rate and annual fee. She underlines the special frequent flyer mileage option, leaving a red trail of digital ink. Iris uses her remote pointer as she asks a question about the cost of the frequent flyer option of the card.

Iris is convinced the Midas MasterCard is the one for her so Marianne now takes Iris to the online application form. Since Marianne is connected to the Web server by a high speed Intranet connection, she is likely to see the page before the customer. Marianne glances at a synchronization indicator embedded in the browser's title bar to see if it has turned green. Once this indicator has turned green, Marianne is assured that the two sides are synchronized. As Iris speaks, Marianne clicks a field in the form to begin entering information. When she clicks in the field, a corner turns red, providing feedback to Iris that Marianne is about to type in the field. Iris notices that Marianne has misspelled her mother's maiden name. She clicks in that field (a corner of the field turns blue) and corrects the spelling. While filling in the address information, Iris mentions that she is saving to move from her apartment to her own home. Marianne makes a note in Iris's customer record to follow up with a call from a mortgage consultant next month to suggest ways Iris might be able to finance a home.

2.2 Technology Description

The collaborative customer care technology (known as CLIVE) allows a customer connected via a modem to speak and share data with a CSR located behind the bank's electronic firewall (see Figure 2).

Customers connect to the Internet using IBM's Internet access service. They run software that transmits voice and data over a single dialup line to the Internet access point (Zhang et al., 1998). There, the voice and data are split apart. The data portion is routed over the Internet and redirected to the collaboration server while the voice portion is routed over the telephone network. The collaboration server filters all bank Web page requests and forwards them to the bank's Web server. Both of these servers are on the Internet. The collaboration server scans the retrieved Web pages for CLIVE comment tags and substitutes them with appropriate

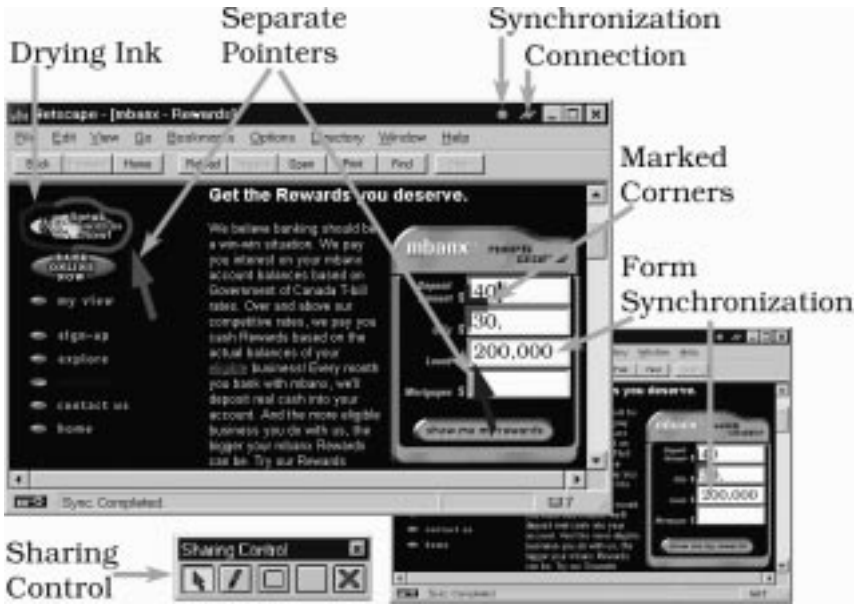

Figure 1: User interface features of CLIVE.

text and icons to show CLIVE information and functionality.

When the user clicks the CLIVE icon or text to collaborate with a CSR, the collaboration server communicates with the call handling process, located at the computer-telephony integration server to find an available representative. Once one is found, the two voice portions of the call are connected by software running at the Internet access point. At the same time, the collaboration server sends the CSR a copy of the page that the customer was looking at just before initiating the call. Both parties can collaborate on this and any other pages.

During the session, the collaboration server replicates Web page requests from one party to the other (URL synchronization). Static and dynamic pages are shared through a proxy-like process managed by the collaboration server (Barrett & Maglio, 1998). This process forwards only one request for the page to the bank's Web server and on behalf of the customer. When the response returns, the process forwards it to the customer. It also caches the response on the collaboration server so that it can forward a copy to the CSR. Secure Web pages are handled in a similar fashion except that secure sessions are established to process the request.

While collaborating on a page, a CLIVE plug-in, hidden in the Web page, replicates form inputs, cursor positions, inking data, mouse clicks, and page scrolling actions to the other CLIVE plug-in. The plug-ins support the page synchronization and form synchronization features of CLIVE.

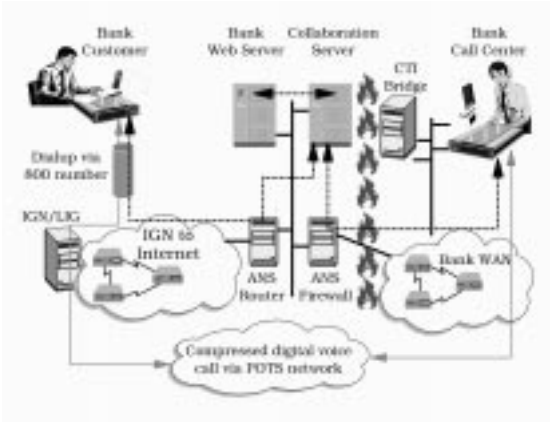

Figure 2: CLIVE solution architecture.

3 Design Process

The research agreement was made between the information systems (IS) organization of the bank and our research lab. The actual project team involved people from several organizations of the bank, organized into two overlapping teams, the business team and the technical team. These teams met every other week for discussion and decision-making. Since this paper is concerned with design requirements from the user and organizational perspective, we will

focus on the design process within the business team. The business team included representatives from the bank's information systems organization, marketing, call centre operations, market research and training, as well as, the authors and a project manager from our organization.

This section gives several examples of methods used to understand the requirements for collaborative customer care in the bank's environment. The process was an iterative one, as the developers' understanding of the bank's operations and the bank's understanding of the technology evolved. The design process involved many other activities not discussed here. Our discussion has two main themes:

- There are requirements for the effective *use* of CLIVE technology beyond those features that directly support customer-CSR interactions. Many of these are needed to integrate a new way of doing business into the existing organizational and information systems infrastructure.
- Given the differing backgrounds and knowledge of the team members, it was both effective and productive to use techniques that allow all participants to develop a common understanding and a means to brainstorm jointly. The techniques involved the use of concrete methods and artifacts as vehicles for team members to think and communicate about the uses of novel technology and to discover requirements.

3.1 Setting Objectives with QOC

The first task in the design process was to understand and agree on the objectives of the project. It was assumed that the system would deliver functionality similar to that illustrated by the demo system. In order to determine how the technology should be modified and how it would be applied, we needed to come to an agreement on the project goals. However, it proved difficult to move the discussion of goals beyond high level statements such as "test the viability of the technology and the value of the technology to the Bank".

We made better progress in identifying goals and also functionality requirements when we focused on the applications to be supported. We adopted a modified version of the QOC (Questions, Options, Criteria) method to structure the discussion (MacLean et al., 1991). We used a tabular format in which potential application options or tasks to which the collaborative technology might be applied were listed vs. selection criteria. The cells of the table were filled in with the group's evaluation of the applications on each criterion. The QOC method had the benefit of making the selection criteria explicit and caused the evaluation discussion to proceed in an orderly way. While more elaborate methods for representing design rationale exist (Jarczyk et al., 1992), this approach was easy for all team members to understand without training.

The process of determining the criteria for application selection and the discussion evaluating the applications on the criteria produced a more specific set of goals for the technology and project. The vague concept of 'value' was translated into the more specific application selection criteria of increasing sales, market share, customer retention, satisfaction, and CSR productivity. When thinking about the specific candidate bank applications, the team was able to articulate the goals for the use of the technology. These criteria, thus, became business goals for the CLIVE technology.

The selected applications include the following:

Customer acquisition. The goal was to enhance the self-service function with collaborative assistance on-demand (i.e. *customer support*). Collaboration would be used to make the process easier and speedier for the customer, to reduce input errors due to misunderstandings, and to increase the completion rate for the process, thereby increasing market share.

Determining the pay-back for doing various types of business with the bank. This consisted of what-if calculations that determined a customer's pay-back for having a mortgage, savings account, loan or other types of relationships with the bank (see Figure 1). Collaboration would facilitate *sales and marketing* as the CSR discussed the pay-back for different services and products.

Overview of bank services. This consisted of pages containing text and graphics information describing the products and services. Collaboration would *generate leads* and *open opportunities for cross selling* (i.e. selling a customer who called about one product an additional product).

Adding billers for electronic bill payment. With collaboration, customers could view and point to a list of billers while talking to the CSR. Without collaboration, customers needed to specify billers in a separate telephone call;

perhaps, disconnecting from their session to do so. CLIVE was expected to facilitate *customer service* by making biller registration easier to use and more convenient.

Many of the end-user collaboration features in these applications had been incorporated in the demonstration and the challenge was to implement them in a working system. However, the business team discussions suggested that a number of changes and additions would be needed for the technology, the Web pages and the bank work practices in order to meet the bank's business goals for collaborative customer care. Some examples of these and the design processes used to elucidate the requirements are described in the following sections. Many implementation issues were also uncovered in the course of the technical team's work, but these are discussed in (Kobayashi et al., 1998).

3.2 Call Centre Observations

In order to understand the Call Centre environment and work practices, we observed the customer service representatives in action and followed up with discussions with the Call Centre manager. This led us to formulate recommendations for changes to the environment and work practices to effectively utilize collaboration. We give an example for impact on the environment and impact on work practices based on our Call Centre observations.

We observed the CSR wearing telephone headsets and using two desktop computers (for access to different systems). To maintain CSR productivity, it was necessary for them to handle Web collaboration calls as well as telephone calls. The introduction of CLIVE technology would add another system and also an independent audio channel. Clearly, CSR productivity would be adversely affected if they had to constantly change headsets and shift from system to system. While we were not able to solve the multiple computer problem, we introduced some hardware which allowed the CSRs to switch between the two sources of audio without changing headsets.

Also, we observed that in the self-service mode of customer acquisition, customers would fill out several forms containing substantial explanatory materials. A few days later, they received a telephone call from a customer service representative to gather additional information needed to complete the process. Before calling the customer, the CSR typically did a credit check. With the introduction of collaboration, several modifications to the process were desirable so that collaboration would enhance CSR productivity and sales. One modification would be to eliminate the explanatory material in the forms and to collapse several forms when the CSR was assisting the customer. This would reduce the number of pages required and thus the wait time while the next page was retrieved from the server. The bank did not adopt this proposal because this would require either maintaining two sets of pages or developing a different approach to page creation that allowed the appropriate pages to be dynamically generated depending on whether self-service or collaboration mode was used. Another desirable modification was to enable the CSR to perform the credit check in real time while collaborating with the customer in order to complete the process in one interaction. This was expected to be possible to do in most cases.

The Call Centre observations gave us a concrete understanding of the environment and work practices into which Web collaboration was to be integrated. Although we were unable to implement all of the proposed optimizations to take best advantage of Web-based collaborative customer care, the team gained insights into the work practice and technology requirements that could be applied in the future.

3.3 Scenarios

We used scenarios to envision how business might be conducted using the CLIVE technology. We describe two effects of using scenarios. One effect was to illustrate how the collaboration technology could improve an existing process, such as customer acquisition. A second effect was to show how the technology could radically transform the business.

Scenarios were used to determine where the CLIVE icon or text link would be placed for the various applications. Initially, some team members assumed an icon should be placed only on the top-level page for each application. This assumption was motivated in part by a desire to minimize the number of pages that would need to be changed. In order to meet the goal of improving ease of use for the customer, however, the icon had to be offered wherever the customer would be likely to need help. In the case of the customer acquisition application, one could imagine a customer starting to fill in the form in self-service mode, but then needing assistance at some point in the process beyond the top level page. We created detailed scenarios of use that concretely illustrated the need for collaboration at particular points in the applications. These scenarios succeeded in convincing other team members of the need for the multiple access points.

Scenarios were also used to illustrate how CLIVE could be used to sell more products and services to customers. The QOC discussions revealed the goal

to increase sales to customers. We suggested that Web-based collaboration had the potential to turn service interactions (e.g. pay-back application) into sales opportunities by enabling the CSR to propose new products and to show the information to the customer. To illustrate this potential value, we presented several detailed scenarios using the bank's Web pages. However, the Call Centre observations revealed that sales and marketing operations were largely separated from service and support operations (handling customer problems and inquiries). In fact, to implement some of these scenarios, it would be necessary to retrain Call Centre personnel, change work practices, and support session transfer to another bank specialist. This was beyond the scope of the project. Instead, the team decided that the CSR should use information gathered while collaborating with the customer to generate leads for referral. Looking beyond the research project, the scenarios revealed valuable insights into the technology, work practice and organizational requirements for future business transformations.

4 Requirements

Three sets of requirements surfaced from the design meetings and the observations at the Call Centre. They correspond to the user, organizational, and task-specific elements of integrating Web collaboration into a self-service banking Web site. A number of the end user features differ from those required for work-group collaboration due to the characteristics of the users and the activities to be supported. The organizational and task-specific elements of collaborative customer care raised requirements not found for work-group collaboration.

4.1 End User: Features

Our conception of collaborative customer care supplements a bank's existing self-service Web site with human assistance on demand. The object of the collaboration is the content of the Web browser. This is different from generic application sharing for work-groups. First, full screen sharing is not required as only the browser's content needs to be shared. Second, sharing the browser content means sharing a small number of application objects (i.e. URL for a page, page's contents including form fields) but not a bitmap of the browser window. This makes sharing more efficient due to lower bandwidth requirements. Third, the operations that the users would perform in a collaboration are few in number (i.e. navigation and form submission) but quite powerful in their effect (e.g. sign-up online, what-if calculations, make purchases). Thus, optimizing collaboration on Web browser contents resulted in a powerful yet simple and comprehensible tool for customer care.

Ease of use and ease of comprehension were important for other reasons. Collaborative customer care is a novel service for customers. Unlike work-group members, who may be willing to invest some time in mastering a powerful collaboration tool, bank customers have little motivation to learn a tool that they will use casually and infrequently. In view of this, simplicity rather than power was an important goal in the design of the customer interface. Instead of having only a single pointer or requiring users to use a turn-taking protocol to attain floor control as in NetMeeting, each party has their own coloured pointer which they individually controlled; red for the CSR and blue for the customer. Each party is able to see the other party's pointer. The voice channel could also be used to allow the two parties to negotiate their actions. When either or both parties are interacting with a form field, both parties are aware of this because coloured marked corners appear in the form field that they are working with. As well, we did not provide the customer with the sharing control panel which provided options for switching between pen and pointer, clearing ink, refreshing ink, or to disconnect from a session. We decided that it was better to let the CSR act as the control surrogate for the user because the CSR received formal training on the technology and would be more familiar with the technology through frequent use of CLIVE.

Another requirement was to make system constraints transparent to users (Beaudouin-Lafon & Karsenty, 1992). Latency and asymmetry in the users' connections existed due to differences in the way the customer and CSR were connected. To ensure that collaboration proceeds naturally, awareness tools were provided. The synchronization indicator on the browser title bar (see Figure 1) kept each party abreast of when their pages synchronized. A message box popped up when one party navigated to another page to remind them to wait until both sides were synchronized. Finally, when the CSR highlighted things to the customer with a pen, the ink trail would change colour as it was echoed to the customer. Latency and asymmetry in users' connections may also exist in some work-group environments, and similar feedback may be desirable.

The last end-user requirement was to design for casual use and errors. This was particularly important for customers because of their infrequent interactions with CLIVE. We describe two instances where this was necessary. The first instance occurred when the

user clicked to collaborate with a CSR. A 'Waiting for CSR' page popped up and remained up until a CSR was found. This page gave guidance to the customer about what was happening, what they should and should not do, the hours of service and disconnecting from the call. The second instance occurred when either party inadvertently clicked on a CLIVE link or icon in the midst of a session. If this occurred, a message popped up to remind both sides that they were already in a collaborative session. We found this to be a necessary precaution because there was no special visual appearance on the hyperlink or image icon to indicate the collaborative session. The bank did not want to maintain separate appearances for being in and not being in a session.

4.2 Organizational: Call Centre and Work Practices Integration

One of the bank goals revealed in the QOC discussions was to improve CSR productivity. They wanted the CLIVE CSR to handle Web collaboration calls as well as regular telephone calls. This way, the CSR did not idly wait for CLIVE calls when regular calls were waiting. CLIVE calls were routed through a call handling system independent of the one used to route telephone calls. In order for the two systems to know about the availability of a CLIVE CSR, it was necessary to link the status information and call handling capabilities of the two systems. This way, productive and efficient use of CLIVE service representatives were ensured.

This requirement necessitated that the CLIVE CSR login before they could handle CLIVE calls. They did this through the Call Control and Status panel that appeared on a third computer provided to handle CLIVE calls. This panel provided information about the CSR call status (e.g. unavailable). As well, it provided controls for allowing the CSR to become available/unavailable to take a call and to logout.

4.3 Task: Web Site Integration

At the outset of the joint research project, it was understood that the integration of CLIVE into the bank's Web site would minimally impact its operation. More importantly, CLIVE capabilities had to be integrated into the Web pages in a way that resulted in only one set of pages that would work for CLIVE and non-CLIVE bank customers. As well, the Web page changes had to be cost-effective since this was contracted to a third party. These requirements were met by embedding comment tags and attributes into the relevant Web pages. The collaboration server substitutes the tag with HTML code that displays text and/or images to CLIVE customers. Non-CLIVE customers went directly to the bank's Web server and did not have the additions made.

Scenarios were also effective in surfacing the bank's Web design goals. Initially, we had created explanatory text for CLIVE that integrated with the text in the bank's Web pages. However, on seeing the text, team members from the bank declared it too lengthy. In their experience, users were unlikely to read it all. In fact, they preferred a consistent identifying 'catch phrase' similar to an identifying image button for CLIVE. The image button appeared in the same location, alongside the main menu located in a standard place on the pages. Using one of their own design goals (to provide information about bank services), we were able to convince them to add several CLIVE application-specific information pages. The additional Web pages explained, for instance, the collaborative customer care service and listed the bank applications supported by the service.

5 Concluding Remarks

In this paper, we presented the concept and business solution for Web-based collaborative customer care. They were developed through a joint design process with a real-world bank, seeded by a demonstration prototype. We used concrete methods and artifacts, like QOC and scenarios, during the design process to flesh out user, task, and organizational requirements for collaborative customer care. The use of concrete design methodologies was instrumental in helping the design team develop a common understanding and a means to brainstorm jointly. The team needed to consider not only technology issues, but also to understand the business, organizational, and social context into which the technology was to be integrated. Only when technology and work practices co-evolve do we create a solution that will integrate effectively into the business' organizational and information systems infrastructures. We discussed the requirements for collaborative customer care and how they differ from work-group requirements.

The insights obtained in an extensive joint research partnership are being incorporated into a product offering being developed by our customer care organization. In addition, our work with other business partners has shown strong support for the requirements presented here. These engagements have hinted at other requirements (e.g. call transfer, three-way conferencing) and issues to pursue in the future (e.g. limiting collaboration to segments of a Web site, sharing applets, requiring form input by the customer).

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References

Barrett, R. & Maglio, P. (1998), "Intermediaries: New Places for Producing and Manipulating Web Content", *Computer Networks and ISDN Systems* **30**(***NUMBER***), 509–18.

Beaudouin-Lafon, M. & Karsenty, A. (1992), Transparency and Awareness in Real-time Groupware System, *in* M. Green (ed.), *Proceedings of the ACM Symposium on User Interface Software and Technology, UIST'92*, ACM Press, pp.171–80.

Bly, S. (1988), Use of Drawing Surfaces in Different Collaborative Settings, *in* D. G. Tatar (ed.), *Proceedings of CSCW'88: Conference on Computer Supported Cooperative Work*, ACM Press, pp.250–6.

Conway, K. (1998), *Building Customer Relationships in the Electronic Age*, Technology Solutions Company.

Ellis, C. A., Gibbs, S. J. & Rein, G. L. (1991), "Groupware: Some Issues and Experiences", *Communications of the ACM* **34**(1), 39–58.

Fischer, G., McCall, R., Ostwald, J., Reeves, B. & Shipman, F. (1998), Seeding, Evolutionary Growth and Reseeding: Supporting the Incremental Development of Design Environments, *in* ***EDITOR*** (ed.), *Proceedings of CHI'98: Human Factors in Computing Systems*, ACM Press, pp.292–8. ***BIZARRE: THE CITATION WAS 1992 THE REFERENCE 1994 AND THE CONFERENCE 1998???***.

Greenberg, S. (n.d.), A Fisheye Text Editor for Relaxed WYSIWIS Groupware, *in CHICompanion1996*, pp.212–3.

Jarczyk, A., Loeffler, P. & Shipman, F. (1992), Design Rationale for Software Engineering: A Survey, *in* ***EDITOR*** (ed.), *Proceedings of the Twenty-Fifth Annual Hawaii International Conference on System Sciences*, ***PUBLISHER***, pp.577–86.

Kobayashi, M., Shinozaki, M., Sakairi, T., Touma, M., Daijavad, S. & Wolf, C. (1998), Collaborative Customer Services using Synchronous Web Browser Sharing, *in* ***EDITOR*** (ed.), *Proceedings of CSCW'98: Conference on Computer Supported Cooperative Work*, ACM Press, pp.99–108.

MacLean, A., Young, R. M., Bellotti, V. M. E. & Moran, T. P. (1991), "Questions, Options and Criteria: Elements of Design Space Analysis", *Human–Computer Interaction* **6**(3-4), 201–50.

Olson, J., Olson, G., Storrosten, M. & Carter, M. (1993), "Groupwork Close Up: A Comparison of the Group Design Process With and Without a Simple Group Editor", *ACM Transactions on Office Information Systems* **11**(4), 321–48.

Wolf, C. & Zadrozny, W. (1998), Evolution of the Conversation Machine: A Case Study of Bringing Advanced Technology to the Marketplace, *in* ***EDITOR*** (ed.), *Proceedings of CHI'98: Human Factors in Computing Systems*, ACM Press, pp.488–95.

Zhang, Q., Wolf, C., Daijavad, S. & Touma, M. (1998), Talking to Customers on the Web: A Comparison of Three Voice Alternatives, *in* ***EDITOR*** (ed.), *Proceedings of CSCW'98: Conference on Computer Supported Cooperative Work*, ACM Press, pp.109–17.

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