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USABILITY
EFFECTIVENESS | EFFICIENCY | SATISFACTION | CONTEXT OF USE
SPATIAL | SOCIAL | TECHNOLOGICAL | HYGIENIC | PHYSICAL | ACTIVITY
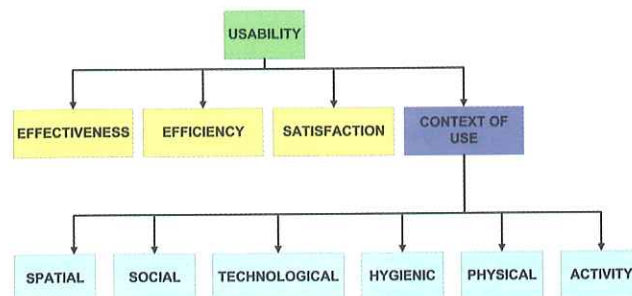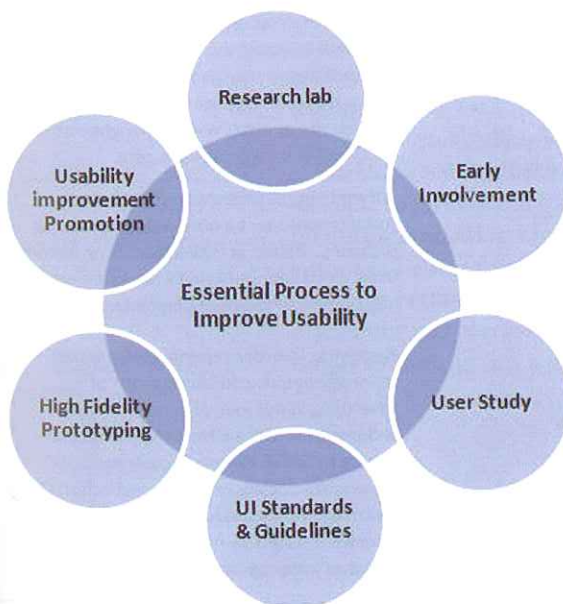
Enterprise Applications Can Be *Both* Feature Rich *and* Easy to Use

BY ABBAS MOALLEM

Well-accepted software starts with support from top managers and the early and close involvement of customers and other elements within the company.

Traditionally, software products designed for the information technology (IT) industry put more focus on feature richness than on ease of use, the assumption being that IT professionals are expert users who should be able to figure out the functionality of the application regardless of how complex or poorly designed the user interface (UI) is. As a result, IT software companies allocate more of their limited resources to engineering teams that can build as many features as possible in a short time rather than improve overall user experience.

As the industry has matured, there has been an increasing shift in focus toward ease of use. This shift is attributable to two factors:

- The general trend of maturing markets is that competing products offer similar feature sets. Thus, ease of use and the overall user experience become an increasingly important differentiator and a key factor in buying the product.
- The market demand for reducing the cost of infrastructure and increasing the productivity of IT resources means that IT software applications should not require long training or specialized skills that only highly specialized technicians can run and maintain. These factors again relate to better user experience of the applications, which is believed to increase productivity.

In addition to these two factors, IT products must include additional important drivers for ease of use. Let us take the example of enterprise e-mail security applications. In today's market, no enterprise can sustain a failure or misconfiguration of any of its e-mail or Internet communications even for a short time. When e-mail stops, business stops. Similarly, enterprises are subject to increasingly strict government regulations regarding the security of Internet communications and other data sources or file transfers. Failure to secure these data can lead to large fines, not to mention damage to the enterprise's credibility for exposing its customers' sensitive information to malicious sources.

Imagine not receiving any e-mail for a day. All businesses would be slow. Considering the speed of employees' response to e-mail – research suggests that the majority of employees respond to e-mail within 6 seconds (Jackson, Dawson, & Wilson, 2001) – you can also imagine how many times you might have to call your server provider or IT department to investigate the problem. And after service has been reestablished, imagine the number of e-mails that accumulated awaiting your review. Then consider the pressure on IT professionals to resolve the problem. Consequently, it is crucial that the application handling e-mail security be built with user experience in mind so that it is easy to use and very intuitive. This would also allow IT professionals to quickly and efficiently solve problems, should any technical issues arise. The application should also be easy to set up and configure, which is critical to the enterprise, especially given that ease of use is no longer a luxury but a critical necessity for many IT products.

In this article, I present the process, techniques, and results obtained in implementing a user-centered approach to extensively improve user experience of the enterprise software applications of Axway Software.

The Axway Case Study

The case of Axway is an excellent example for the following reasons:

FEATURE AT A GLANCE: In this article, I review the procedures and techniques used to significantly improve the ease of use of enterprise software applications in the framework of a medium-size company with limited resources. The achievements and lessons learned from applying these techniques to the development process are presented. Then several examples of screens before and after implementing the user-centered design approach and user and market reaction to this achievement are provided.

KEYWORDS: enterprise application, ease of use, task-based design, rich functionality, feature richness, user experience, user interface, usability testing, prototyping

- Axway provides critical software to enterprises around the world for securing Internet communications into and out of the enterprise.
- Axway's customers require applications that are feature rich but very easy to install and manage. The applications must allow users to easily manage and scale complex networks stretching across the globe that process millions of e-mail messages a day, while ensuring no security holes, malicious intrusions, or system downtime.
- Axway has made ease of use a companywide priority and, despite its modest size, is committed to building a strong user experience program.

After a review of the procedures and techniques used to significantly improve the ease of use of enterprise software applications, I discuss the challenges, achievements, and lessons learned. I conclude by providing several examples of screens before and after implementing the user-centered design approach and the user and market reaction to this achievement.

Fundamental Axes and Philosophy

Management. In the creation of easy-to-use products that are intuitive and that satisfy the needs of users, three factors are important to consider at the management level: top-level management commitment, representation and coordination of user experience professionals with top management, and awareness of a usability culture among all company professionals.

Without a significant commitment from top-level managers, one can expect that any extensive improvement to user experience will fall substantially short of expectations (Rogers, Hunter, & Rogers, 1993).

Dramatic user experience improvements are possible when usability becomes a core part of the company culture.

Although UI design is now part of the software development process, and interaction designers are playing an active role in this endeavor, the user experience of products is not improving. In many large and small companies, user experience professionals are working on products, yet these companies do not necessarily offer products with good user experience. Experience shows that without strong management commitment to and understanding of user experience, and without adequate resources and support for a user experience program, significant improvements in the user experience with the products is unlikely. Many large companies have centralized user experience teams and do have representation at the level of vice president (Oracle, SAP, and eBay, to name just a few). Such top-management support is particularly important in smaller companies, in which financial resources are limited and there is a continuous struggle to make sure that resources are allocated appropriately.

Consequently, creating a product that focuses on user experience is a management choice that requires investment and must be considered a top priority. Thus, top-level managers should make a deliberate choice to consider usability improvement a priority.

Top-level management also requires top-level accountability and reporting by user experience professionals. Generally, whenever user experience professionals report to lower-level managers, the impact of user experience becomes very narrow, and designer's efforts cannot have a significant impact on overall product design. Reporting to higher-level managers makes it possible for user experience professionals to participate in the design process before the requirements are finalized; thus, they can have a more significant impact on overall product design. In the Axway Software case, all effort at the level of top management was devoted to improving the user experience, and sufficient resources were allocated for this purpose.

Dramatic user experience improvements are possible when usability becomes a core part of the company culture (Moallem, 2005). A higher level of management commitment and top-level reporting of user experience facilitate the consideration of product usability, and all decision making contributes to a strong culture and awareness of user experience.

User study and evaluation. To provide features that are easy to use as well as functional, we need to understand users. This understanding helps us design better products and evaluate their effectiveness and enjoyment. The importance of user research in creating good user-centered products is largely documented and researched (e.g., Hackos & Redish, 1998; Wixon et al., 2004). Even though techniques to collect user data are often abandoned in smaller companies, especially those using an agile development approach with short product release cycles and limited resources, it is always valuable to spend time on user studies even when everything seems to be planned for the short term.

Adopting a fast and efficient infrastructure to collect data from users is an important success factor. Having an accessible pool of users in the participant program for quick study – such as through online surveys, remote interviews via video conferencing, and usability evaluations – is very efficient and productive. Online survey tools and teleconference applications are often part of the existing company infrastructure and can be obtained without cost or specific budget requirements. In the case presented in this article, most of the participants, who were existing customers, were not compensated and took part in the study voluntarily. (Many companies do not allow their employees to receive a gift worth more than $25.)

The usability evaluation process is another important factor in designing UIs (Dix, Finlay, Abowd, & Beale, 1998; Nielsen, 1993). Automating usability evaluation to collect

users' feedback is essential for a successful user experience. The effectiveness of expert evaluation (heuristic and cognitive walkthrough) and user evaluation (usability testing) is extensively supported by numerous studies and experiences.

User-centered design methodology. In the user-centered design methodology, the user's needs, priorities, and behaviors must be determined at the earliest phase of the project and should form the context and inspiration for all subsequent design activity. This understanding can help to guide early designs and product requirements before rough prototypes can be tested by users. In addition, one must perform a more extensive assessment and evaluation test at the late phase of the design cycle, ideally with a fully interactive product.

The practice of gathering information from users and involving them in the interactive design process is the only way to design products based on the user's mental model and behaviors rather than the developer's, which may differ greatly from the user's perspective (Hackos & Redish, 1998). Tracking ease-of-use metrics and monitoring usability improvements should also be determined in this process (Sherman, 2006).

There are many challenges in implementing a user-centered design in agile development cycles, including lack of overall architectural design and lack of time to investigate user studies and to conduct ample usability testing (Moallem, 2008). However, research and experience show that relying on a user-centered design methodology is a key to success for a user-friendly product.

UI guidelines and standards. Human-computer interaction and UI guidelines and standards are fundamental steps for creating friendly UIs. Designers should identify common UI principles that have been shown to improve the usability of a given product and apply them globally, which enhances the usability of all products in the product suite. Standards and guidelines include the following:

- Ensure consistency throughout a product and/or an entire product suite, which significantly adds to the learnability of the product and maximizes efficiency and satisfaction among users.
- Facilitate the transfer of information about common UI standards and usability principles across the company. The same principles apply to every product; having a common vocabulary makes communication much easier.
- Simplify prototyping tasks so that the wheel does not have to be reinvented with each new design but, rather, new designs can reference common standards. This simplification enables designers to focus on unique aspects of design and spend more time on user evaluation.
- Allow for greater delegation of minor designs to junior user experience professionals or developers while still maintaining a high level of quality and consistency.

Three categories of guidelines and standards are essential in software development (Stewart & Travis, 2002):

1. *UI guidelines:* The collection of the best practices that are accepted by experts and are generally accepted in the field.
2. *UI standards:* Formal UI standards documents that are published by standards organizations or major companies, such as the World Wide Web Consortium (W3C), the main international standards organization for the World Wide Web; Microsoft (n.d.-a; n.d.-b); Apple (n.d.); or SAP (n.d.).
3. *Style guides:* The collection of rules within an organization, software company, or development group that ensures the visual consistency of applications or interfaces. This includes but is not limited to font colors, layout, and formatting. Such guides enable a large design team to produce visually consistent work.

> The user's needs, priorities, and behaviors must be determined at the earliest phase of the project and should form the context and inspiration for all subsequent design activity.

Because of aggressive project schedules and limited resources, smaller companies tend not to create and implement reliable UI standards and guidelines (Apple, n.d.; Microsoft, n.d.-a; n.d.-b; Oracle, 2004; SAP, n.d.). However, regardless of the company's size, constructing a proper set of standards and guidelines inevitably saves time and contributes significantly to the overall user experience of the products. The lack of standards in UI design results in a variety of related bugs that are very time-consuming to fix. These UI-related bugs are generally rated low in priority because they do not affect the product's overall functionality. For that reason, the bugs are not fixed quickly but are usually delayed to future releases. Consequently, the product is released with an inconsistent UI, common examples of which are inconsistent error handling, labeling, and messaging.

Prototyping. Proper prototyping is one of the major steps in creating a product with high standards of usability. Effective and efficient prototyping

- facilitates communication among user experience professionals and all other design team members,
- provides opportunities to test a product before coding,
- facilitates development,
- helps documentation professionals understand the product and be proactive,
- helps quality assurance professionals write the test scripts and compare expectations with the delivered product, and

- helps marketing and sales professionals preview the future product.

Different types of prototypes serve different purposes in the user-centered design process. Low-fidelity, high-fidelity, horizontal, and vertical prototyping are all necessary to communicate the design during a specific phase of the design cycle. A variety of tools are available for each type of prototyping. Numerous studies document the use and effectiveness of each tool or technique (Beaudouin-Lafon & Mackay, 2008), but it is important to emphasize that a high-fidelity, interactive prototype helps communicate design rules and behavior among all the professionals involved in the project.

Promotion and user awareness program. Promotion of a user experience program and its findings within an organization is critical to its success. Providing user insights and customer feedback to members of the organization helps them realize the positive impact of their work and provides them with valuable information to make their work more customer focused.

> In a company with a usability culture, professionals are trained to think about users and ease-of-use throughout the product life cycle. This cultural change not only extensively improves the ease of use of products and services, and consequently improves user and customer satisfaction, but it is also the most cost-effective way to significantly improve the usability of all products and services. The time of experienced professionals ultimately reduces heuristic review time, and reduces development time. (Moallem, 2005, p. 12)

It is equally important to promote user experience programs externally, especially to existing or potential customers. By creating a user experience participant program, along with building extensive communications with customers through user conferences, user groups, and informal conversations, one can communicate one's effort in creating user-friendly applications and also invite customers to help in this endeavor.

Experience shows that users like to talk about their interactions with products, and increased communication with them results in constructive feedback that can help improve the product's user experience. Listening to users also helps to create trust and better relationships that, in the final analysis, improves business relationships and customer loyalty.

Essential Process

In this section, I review the essential process that was followed and implemented to significantly improve the usability of all products at Axway. (See Figure 1.)

Building a usability culture. The most important first step in building a usability culture is getting senior managers involved. Axway provided a lot of support and had conducted
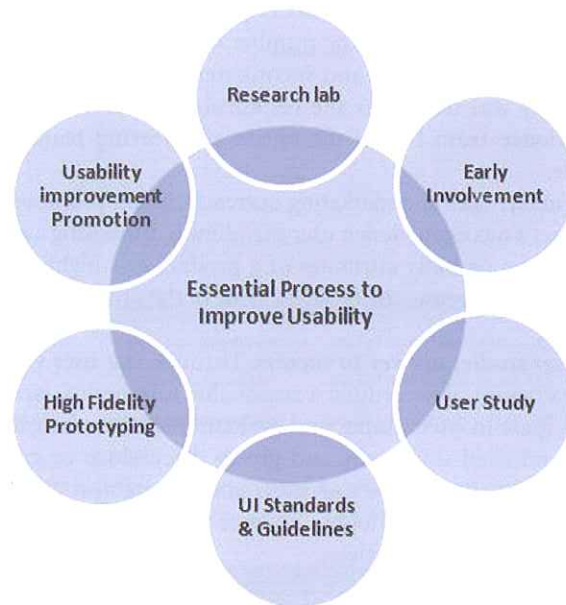

Figure 1. Essential process used to extensively improve the usability of all Axway products.

a company sales and industry survey, which highlighted ease of use as one of the top three buying factors across the customer base and the industry as a whole. This information helped to reinforce the importance of building a strong user experience program.

However, usability does not mean the same thing to everyone. For some, usability implies a good-looking interface, rather than a good user experience; many do not fully understanding what it takes to measure and significantly improve the user experience of their products. Another difficulty is that some professionals lack an understanding of the design process, and therefore the requirements may be either ill defined or overdefined. Thus, it is important to communicate a more vivid picture of what user experience involves and what would improve it. Only then can one build a common vision for the user experience of one's products that the entire company can fully support and contribute to.

Next, it is important to reach out to all customer-facing departments in the company, such as sales and support. Because employees in those departments interact with customers at different stages, each of them has unique, invaluable insights into different aspects of the customer's user experience. Through discussions with these groups, I also found easy mechanisms that we could tap to stay in better touch with customer issues, such as being able to listen in on sales or support calls and view common trends in usability-related support calls.

It is also very important to reach out to those in departments that have an effect on the product, such as development, quality assurance, and technical writing staff. By providing them with more insights into the users and sharing the UI standards and guidelines with them, we not

only inspired them to build better products for the users but also exponentially grew the number of eyes we had looking for usability problems and inconsistencies in our designs. Usability was no longer the responsibility just of the user experience team but of the entire engineering team as a whole.

Finally, sales and marketing outreach should promote the product's successful design user friendliness. Increasing awareness of the usability attributes of a product and highlighting those areas increases the business value of the product.

User studies are key to success. Through our user volunteer program, we recruited a reasonable number of users to participate in user studies and evaluations. With their help, we conducted interviews and group discussions to gain a solid understanding of our users and to establish contacts with whom we could follow up later in the project for user tests and targeted questions.

We held most of these discussions on the phone, with the assistance of Web conferencing tools to help share information and view configurations on users' systems. These conversations with users, who were often in distant geographic locations, were extremely helpful and took little time out of our day. The time spent with users served to inspire us, focus our efforts, and bond the project team as a whole, for it was the customer's words that we focused on and worked collaboratively to address.

User research laboratory. Although access to a formal usability-testing environment equipped with tools such as software and hardware devices is nice, it is not always available in a small or medium-sized company. In addition, elaborate, well-equipped usability testing labs are not always fully used, and it is hard to justify their cost. However, having a location in the company that physically identifies user experience groups and provides a place where all internal partners can meet to discuss design issues promotes user experience and facilitates design meetings, usability evaluations, and user studies.

Consequently, we quickly established an inexpensive user experience lab primarily using existing equipment to provide a plug-and-play environment for doing remote tests and recording phone interviews. This helped cut down on configuration time for each test and also increased our user experience presence in the company. Finally, to save time constructing interactive tests, we built a common Web-based framework and survey mechanism that could be adapted easily for individual usability tests.

The lab became an interesting area of the company for all departments because we had created a competitive evaluation whereby we could perform UI analyses of the different technologies.

By following the methods outlined earlier, we were able to integrate significant user feedback into very tight project schedules. In addition to improving our designs, the experience encouraged team members and built excitement among our customers, who left our user studies energized and eagerly awaiting the next release.

Early involvement. In the software industry, major usability principles are not taken into consideration in product design unless they are part of the product roadmap and are applied early in the design cycle (Mayhew, 2003). One of our major achievements and success factors was early involvement of user experience professionals in design. We found it useful to form a core group of four individuals at the outset of the project, who represented product managers (market requirements), project managers (schedule and scope management), architects (technical feasibility and time estimates), and user experience professionals (user perspective and design). Building this core group allowed us to quickly assess the value and cost of features being considered for the release at a high level and come up with an achievable plan that still met market requirements and provided significant value to customers. Early on, it also built consensus among these historically contentious groups, which reduced obstacles downstream in the project.

Our early involvement in these discussions empowered us to introduce major design changes that extensively affected the ease of use of products. These included changes to the information architecture, from being feature based to task based, and tied together the disparate features into larger holistic features based on the user's goals and tasks. By working with project managers early in the design cycle, we allocated the required time in the project schedule for the user experience team's involvement in conceptual design, interactive prototyping, evaluation, and final design.

Building and enforcing UI standards and guidelines. Not having UI standards and guidelines to establish consistency posed a serious challenge at the beginning of our design process. Therefore, we created a UI standards document that included standards for overall design and layout, naming conventions, information architecture, abbreviations, and message and error handling, as well as common objects and widget behavior. We evolved this document in parallel with the project cycle as new design challenges emerged.

We created a consistent look and feel for the search pages by introducing standard labeling conventions and common features, such as basic and advanced search. This consistency ensured the same user experience when viewing any table in any application across our product lines. Figure 2 shows a common search page template and its look and feel.

High-fidelity prototyping. Performing accurate high-fidelity prototyping, along with the detailed UI specification describing the design, facilitates the UI development phase and reduces the incidence of UI-related bugs. Whenever UI developers have the appropriate prototypes available with proper guidelines and standards, they make fewer personal judgments in UI development and follow design rules more
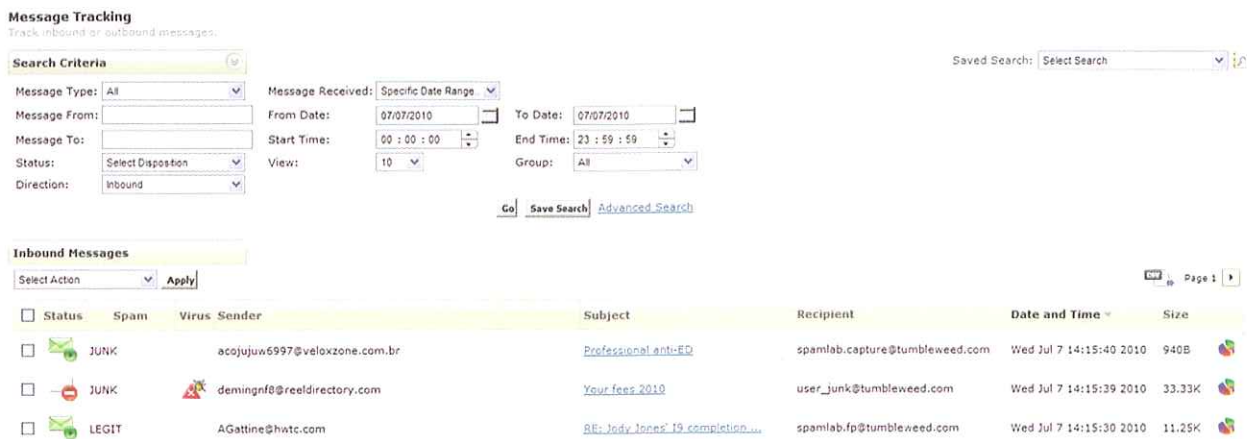
Message Tracking
Track inbound or outbound messages.

Search Criteria			Saved Search:	Select Search

Message Type:	All	Message Received:	Specific Date Range...
Message From:		From Date:	07/07/2010	To Date:	07/07/2010
Message To:		Start Time:	00 : 00 : 00	End Time:	23 : 59 : 59
Status:	Select Disposition	View:	10	Group:	All
Direction:	Inbound				

Go Save Search Advanced Search

Inbound Messages
Select Action Apply   Page 1 ►

	Status	Spam	Virus	Sender	Subject	Recipient	Date and Time	Size
☐	✉	JUNK		acojujuw6997@veloxzone.com.br	Professional anti-ED	spamlab.capture@tumbleweed.com	Wed Jul 7 14:15:40 2010	940B
☐		JUNK	⚠	demingnf8@reeldirectory.com	Your fees 2010	user_junk@tumbleweed.com	Wed Jul 7 14:15:39 2010	33.33K
☐	✉	LEGIT		AGattine@hwtc.com	RE: Jody Jones' I9 completion ...	spamlab.fp@tumbleweed.com	Wed Jul 7 14:15:30 2010	11.25K

Figure 2. Search template. Standards for behaviors and the look of the search template allow users to have a consistent user experience.

closely. Inconsistent labeling, unfriendly error messages, and incomprehensible text are among the common UI bugs that are generally ranked low in priority and rarely get fixed.

To aid in the use and enforcement of standards and to facilitate understanding of the design among development teams in different geographical locations, we developed a high-fidelity HTML prototyping environment that leveraged a central style sheet and common UI objects and that would enable anyone to easily construct a standards-compliant prototype using a drag-and-drop interface. This significantly improved prototyping efficiency and allowed us to create reliable prototyping. As a result, we were able to create a full simulation of the major products. The redesigned sections or pages were then displayed among the other pages. All the parties involved in the development could view the prototype and see the latest changes by current activity in specific product development iteration. This tool benefited all professionals involved with the design because they could easily see the behaviors and features or functionality in the upcoming product release.

Helping to promote usability improvements. We offered our expertise and involvement to help contribute to the promotion and effectiveness of marketing campaigns for product releases. First, by engaging customers during the design phase, we helped build excitement and anticipation in their organizations about the upcoming release; participants left our tests excited and optimistic about the product. We also found that at the end of the project, we could help summarize the key usability values of the new release by highlighting major usability achievements, which could then be leveraged in marketing campaigns and sales calls initiatives. One effective way of communicating these achievements was via an interactive before-and-after demo of some of the major changes to the product.

Before and After Design

By implementing the user-centered design methodology and following the principles covered in this article, we
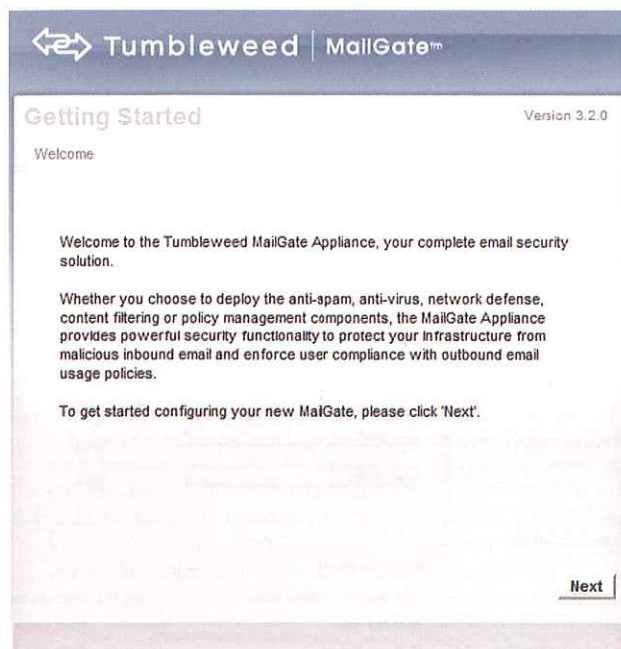

Figure 3. Installation wizard page before redesign. (Tumbleweed was acquired by Axway; thus, the screen reflects the Tumbleweed logo.)

were able to extensively improve the ease of use of Axway's applications. Summarized in this section are some of the improvements to the newest release of the Axway MailGate application.

Installation wizard. The user first experiences an application when installing the product. Thus, providing a concise, polished, easy-to-use installation process is an important phase. We redesigned the installation wizard to minimize the number of steps, provide ample user feedback and error forgiveness, and improve visual appeal. (See Figures 3 and 4.)

Intuitive navigation system. The navigation system is an important usability feature of any software application. Transforming the navigation system from a featured-based
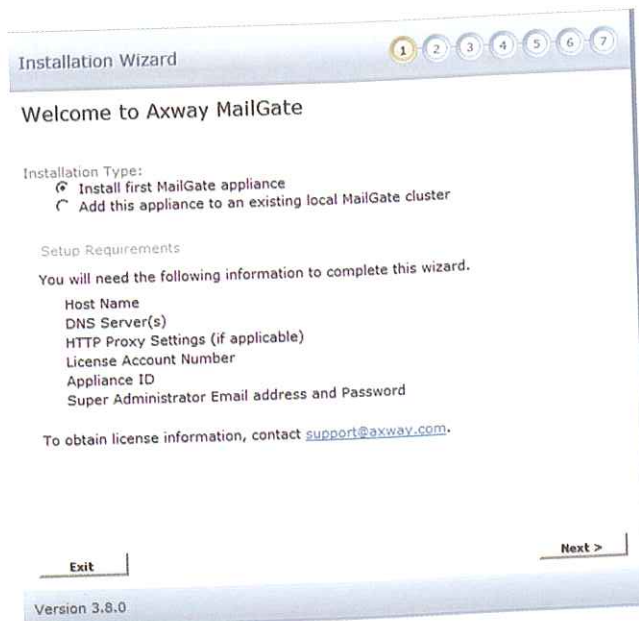
Figure 4. *Installation wizard page after redesign. (Tumbleweed was acquired by Axway; thus the screen reflects the Axway logo.)*
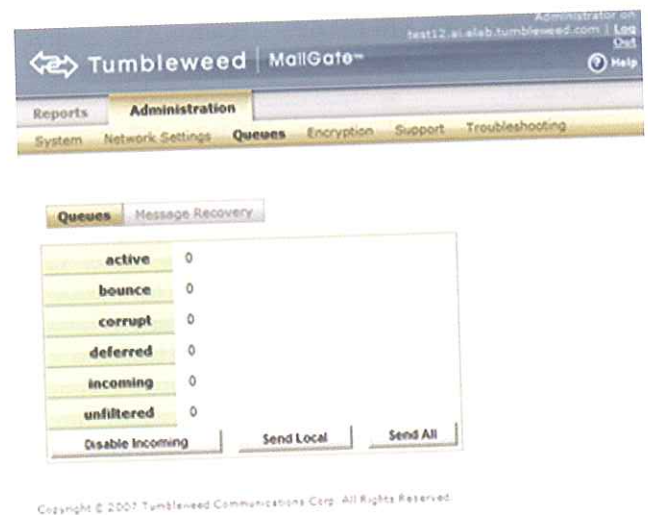

Figure 5. *The form page design template and navigation system before redesign. (Logo refers to Tumbleweed Corporation, which was acquired by Axway in 2008.)*
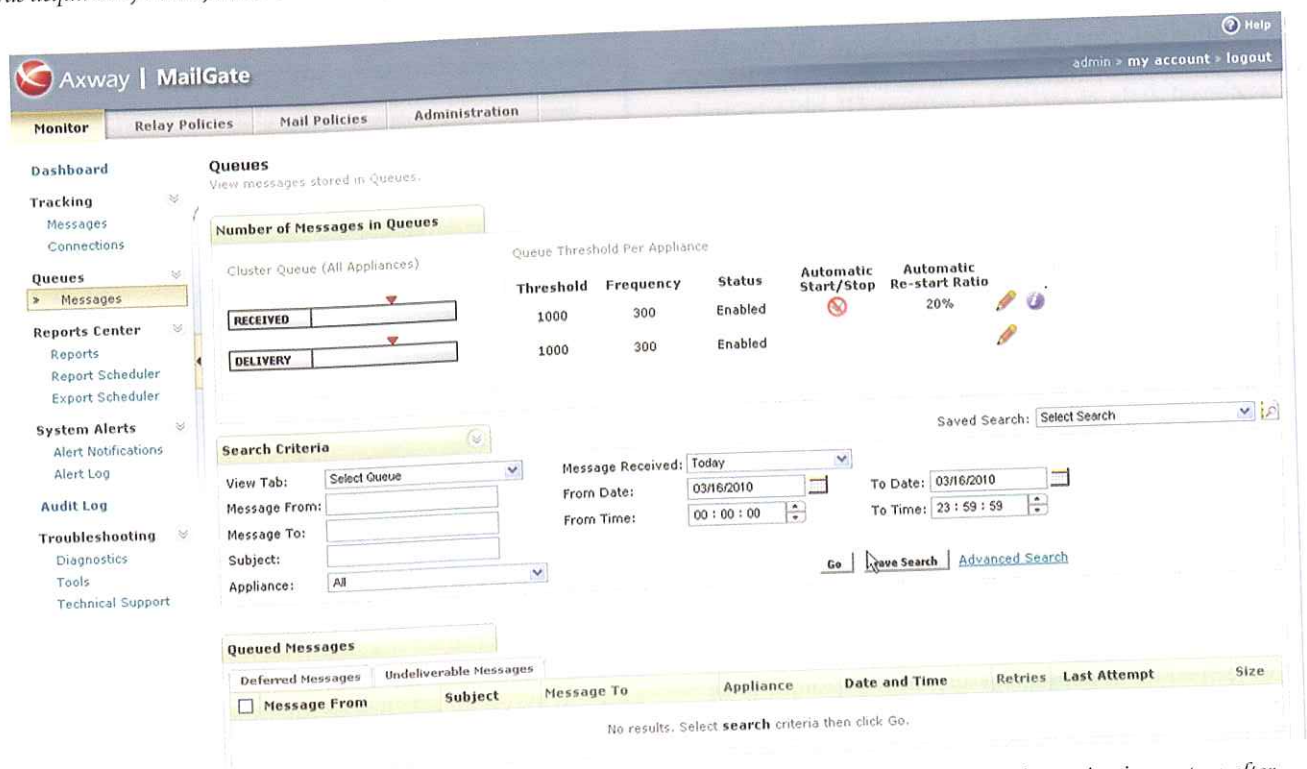

Figure 6. *The form page design template after redesign offers a consistent look, feel, and organization. The navigation system after redesign was changed to the top and left with a task-based information architecture. This navigation system helps the user rapidly access a page and get sufficient feedback about where he or she is in the hierarchy.*

approach (whereby menus are organized according to features and modules) to a task-based approach allowed users to complete common tasks in one place and get sufficient feedback when they entered data. Using nontechnical terminology and consistent labeling also improved user performance in the completion of tasks. Breadth in navigation

was preferred to depth in hierarchy, thereby allowing the users to access pages with fewer clicks. (See Figures 5 and 6.)

Design templates. To help developers use predefined design patterns, we designed several common templates, which increased the speed of prototyping and allowed

developers to use the templates without changing the design component of the page (layout, color palette, widget properties) when they needed to prototype without the user experience team's involvement. This method conserved precious time for the user experience group without their having to sacrifice quality.

The form page design template offers a consistent look, feel, and organization. Rational grouping of information and consistent behavior of widgets and terminology offer a better user experience.

User and customer reaction. Customer and user reaction was captured first in a validation usability test conducted before product release (8 participants and an 80% successful task completion rate) and in a benchmarked evaluation with the competitive product. The results were extremely positive. The customer reaction was then captured at the users conference and in a trade magazine product review (Ouellette, 2010) and confirmed the usability evaluation. The results of this approach also motivated the developers and marketing and sales professionals, which resulted in their increased interest in collaborating with the user experience team.

After its release, the product was extremely well received by the business community, industry analysts, and the professional press, and all underlined the ease of use of the product in their evaluations and ratings (Stephenson, 2008).

Conclusion

Even if a minor improvement to the usability of a product will improve user experience, all usability recommendations are not necessarily implemented unless they affect sales and improve customer productivity. By focusing on major areas of the product that needed significant usability improvement from the product development point of view (fewer pages, better product quality, bug-free application, and better supportability) and customer productivity (performing easy-to-do tasks in less time and without the need for costly user training, support, and maintenance), we were able not only to improve sales but also to gain credibility among our users, as the company dedicated itself to constantly improving its products' ease of use. In this endeavor, the process that we followed was the key to this usability success story.

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