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TriVida Corporation: Faster, Better Web Site Customization
via Networked Personalization

Preface

In their quest to gain new customers — and keep the ones they have — enterprises are racing to make their Web sites more compelling. To that end, enterprises are implementing Web personalization capabilities to quickly deliver information tuned to the individual interests of a specific Web site visitor.

Web personalization has so far come in two forms. The first is to let Web site visitors define the organization of a Web page and the information it shows. The second form utilizes personalization software, which uses company-defined rules or observation of a visitor's movement through the site to serve up a Web page or suggest a set of links that reflect the user's interests. The latter — software-based personalization — offers more personalization power and is less inclined to irritate the Web user. Web visitors do not have to spend time listing their interests, and the software can adjust to the evolution of a customer's interests over time.

However, such power comes at a cost. Personalization software is typically installed by each organization, on its own Web site, adding to an enterprise's hardware requirements and system administration burdens. In addition, because the software is deployed on an enterprise-by-enterprise basis, there is no easy way to share personalization capabilities across Web sites, even if the sites are business partners and would benefit from recommending links to each other's sites.

Recognizing the enterprise infrastructure burdens and alliance-constraining characteristics of current personalization software, TriVida™ Corporation is offering *SplashLink*™, a new way to implement Web personalization — via a Web-based personalization *service*. This Aberdeen *Profile* examines TriVida's offering and shows how TriVida customers can quickly gain rich Web personalization capabilities without the burdens imposed by on-site software.

Executive Summary

With all eyes on the bottom line, enterprises are implementing Web personalization. By letting customers personalize the look of a Web page, or by using software to recommend links that reflect the interests of individual customers, enterprises save their customers time and frustration. For example, if personalization software observes that customers who purchase a barbecue grill also buy barbecue sauces, the software will start recommending barbecue sauces on the barbecue grill information page. Better targeting the individual needs of each customer or prospect translates into more sales per customer — a significant revenue boost to corporations that serve thousands or millions of customers over the Web.

However — again eyeing the bottom line — enterprises want these valuable personalization capabilities to cost less in both time and money. Answering these calls, TriVida Corporation is offering its SplashLink service at www.splashlink.net. Depending on an enterprise's personalization needs, this Web-based personalization service gives enterprises a free (SplashLink Free) or a pay-as-you-go (SplashLink Net) alternative to the pay-up-front strategy of personalization software. TriVida's service improves on current personalization solutions in a variety of ways:

- *Rapid implementation:* Avoiding the software installation step, TriVida customers start by implementing the service: defining site categories and inserting several lines of code into their Web pages. Upon completion of these tasks, the TriVida engine begins offering recommended links tailored to individuals' interests, without requiring an initial "training" phase. This "instant-on" capability, allied with TriVida's cut-and-paste and point-and-click implementation steps, means TriVida customers can start using the service with little time investment.
- *Low infrastructure costs:* Because the TriVida product is a service, TriVida customers avoid the software license fees, in-house hardware costs, and system administration burdens of personalization software.
- *Cross-site personalization:* Due to TriVida's networked personalization model™, enterprises can share personalization capabilities across Web sites. Multiple Web sites that are related — for example, owned by the same company or selling related products — can now recommend cross-site links, thereby keeping user clicks and money "within the fold."

Put simply, TriVida's SplashLink service removes many of the time and money hurdles that have made personalization implementations so daunting in the past.

Product and Technology Overview

TriVida plans to offer two levels of the SplashLink service by the end of Q1 2000. The baseline service, called SplashLink Free, lets Web masters quickly personalize a

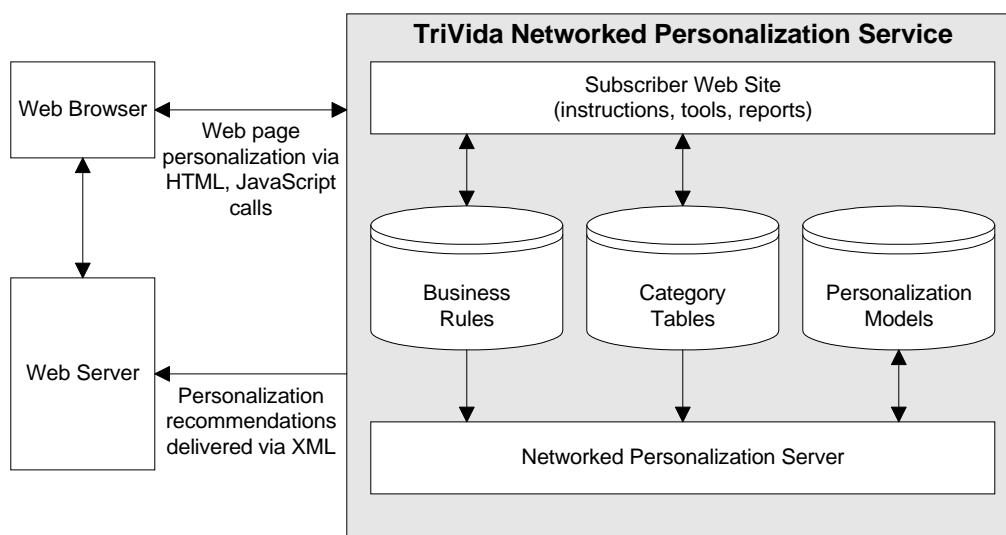
single site. TriVida's other service is called SplashLink Net. This enhanced service is designed for enterprises that need to personalize multiple sites, want to brand the personalization recommendations with a logo, or are looking for ways to more tightly integrate personalization with their systems. To gain more accurate personalization, enterprises can pass customer parameters, such as demographic information or purchase histories, to the SplashLink network. In addition, companies can capture the resulting recommendations using an XML feed, thereby delivering personalization to systems, not just Web pages, and allowing enterprises to study the personalization suggestions offline and in-depth.

Underpinning these two products are four technology components (Figure 1). The first is a Subscriber area on the splashlink.net Web site that enables users to learn about, interact with, and get reports on site-specific service activity. The Subscriber area includes wizard-driven instructions, as well as sample code and point-and-click forms to aid customers in their implementation. The Subscriber area's reports reveal the impact of the TriVida service on a customer's Web site, offering statistics such as how many unique customers have visited the site and how many visitors act on the recommended links by purchasing products.

The next component consists of code that customers use to link their Web site(s) to TriVida's service: HTML tags and JavaScript code.

The third and fourth components exist behind-the-scenes: the Networked Personalization Server and affiliated databases that work together to monitor Web behavior and then calculate and store the predictive models.

Figure 1: TriVida Networked Personalization Service Architecture



Source: Aberdeen Group, February 2000

The Heart of the TriVida System: The Networked Personalization Server

The Networked Personalization Server is the foundation of TriVida's offering. By recognizing customer behavior buried in Web clickstreams and other data sources, the Networked Personalization Server can predict Web site navigation patterns. This form of personalization is called predictive modeling, which differs from other means of personalization, such as business rules or collaborative filtering.

With business rules, business users define explicit personalization rules. For example, "If customer enters a New York City ZIP code, then display a list of New York City restaurants." Unfortunately, the implementers must continually monitor the system for changing behavior and change the rules accordingly. In addition, as the number of rules grows, users find it harder to maintain the system and may artificially limit the amount of personalization to keep the system under control.

Collaborative filtering adapts more easily to change than business rules; it infers behavior from user-defined preferences or observed customer behavior on the Web site. However, calculation time increases in proportion to the number of data points (i.e., users), so collaborative filtering systems may slow down if the number of tracked Web site visitors increases significantly.

As a rule, predictive modeling uses data mining techniques such as neural networks, genetic algorithms, and decision trees to discern hard-to-recognize patterns in large amounts of data. TriVida's server uses different data mining techniques to generate its predictions. By using online learning and mistake-based learning technologies, as well as multiplicative update algorithms, TriVida is able to offer predictive modeling that does not require initial training sessions, can adapt quickly to changing data, and can scale to handle large numbers of users.

The Networked Personalization Server learns by observing actual data. In contrast to some data mining technologies, it does not need to be trained offline to recognize patterns. Furthermore, it is very good at "unlearning" because it makes a prediction and then compares that prediction to the actual behavior. Incorrect predictions are therefore quickly removed from the system. The Networked Personalization Server further refines its recommendations by quickly learning what the irrelevant parameters are and giving more weight to the relevant parameters.

Unlike collaborative filtering, the Networked Personalization Server's performance is not impacted by large numbers of users; instead, performance depends on the number of user attributes being tracked, such as gender and ZIP code. As long as customers do not try to track hundreds of attributes per user, the TriVida system should easily scale to handle millions of users.

Analyzing Data While Using Best Privacy Practices

The TriVida Personalization Service does its work by analyzing and storing data. The data it analyzes is typically clickstream information from TriVida-enabled Web

sites. However, implementers can easily add demographic data to the mix with a little additional coding. For example, by capturing customer data (e.g. gender, age, and ZIP code) from a registration Web page and passing it along as a set of parameters to the Networked Personalization Server, implementers can have TriVida act on patterns in customer profile data as well.

The TriVida data is stored in a database that sits behind the Networked Personalization Server. This database stores two kinds of information: Web user profiles and behavior models. By default, user profiles are persistent — that is, they track user preferences across multiple TriVida-enabled sites. Users can change this setting via a TriVida-supplied page called a Privacy Control Panel. Through the Privacy Control Panel, users can view the profile contents and select the level of personalization they prefer. They can opt out of the service, select some personalization options, or fully opt in, letting vendors identify them as return customers who are eligible for discounts and other special offers. If a user chooses to participate in the SplashLink service, the service still protects a user's anonymity; nothing is stored in the profile that enables the service to identify the specific individual.

Comparing these anonymous profiles against clickstream data, the Networked Personalization Server analyzes Web user behavior and stores the results as behavior models. TriVida does not store clickstream or other identifying data within the behavior models — just the algorithms that emerge from the data.

These privacy facilities — the Privacy Control Panel, the anonymous profile, and identification-free models — mean that TriVida is committed to best privacy practices. Aberdeen believes that this “good data citizen” attitude will accelerate acceptance of the TriVida service. Many enterprises want to leverage personalization but have so far been leery of using alternative technologies that raise the ire of privacy rights groups by not letting users control their own personalization options.

Implementing the Service

Implementers must follow three steps to put the service into operation:

1. *Categorize Web pages:* Implementers classify pages on a site into logical categories, thereby correlating Web pages to the site's offerings, such as products or information;
2. *Update Web pages:* Web masters link the Web site to the TriVida service by inserting calls to the Personalization Service within Web page HTML; and
3. *Define business rules:* If necessary, implementers define business rules, which prevent the Personalization Service from recommending links that make no business sense.

These three steps are described in greater detail below.

Categorize Web Pages

Web masters first load a set of site categories into TriVida, so that the service understands which links to recommend. Customers can enter the groupings using a variety of methods. Web masters of small and rarely changing sites can assign categories via a text box form on the splashlink.net Web site. Web masters of larger and more dynamic sites can avoid this type-and-click labor by defining the groupings in a comma-delimited file that is uploaded to TriVida, or by implementing dynamic pages using TriVida's auto-categorization feature. TriVida further streamlines this process by integrating categorization with Web site development systems, such as iCat's Web Store and Allaire's ColdFusion.

In the course of categorizing Web pages, Web masters must supply the following information: site ID, category name, category group, target URL, link text, image URL, and whether the category is a default category. Although it does not demand especially detailed information, this organizing process requires discipline, as enterprises must define a standard set of categories for their products or services.

Update Web Pages

To connect the Web site to the TriVida service, Web masters embed two types of code into their Web page HTML: an HTML tag to assist in user tracking, and an HTML tag or JavaScript to display personalized links. The tracking tag enables the Personalization Service to monitor a user's travels through the Web site. It contains two parameters: a TriVida-assigned site ID and a category ID that refers to that Web page or a set of related Web pages. As a user navigates through a Web site, each tagged page reports back to the TriVida server, documenting the journey a user takes through the site in real time.

Web masters insert HTML tags or JavaScript into Web pages on which they want the Personalization Service recommendations to appear. Of the two options — HTML and JavaScript — JavaScript offers more power because it can help format the recommendations. For example, to put a set of TriVida-recommended links to the right of a product description, a Web master could create a two-cell table on a Web page, then insert a product description in the left-hand cell and JavaScript in the right-hand cell. As different users arrive at the same page, the product description would remain the same, but the recommended links would differ, reflecting each user's specific interests. To make this process even easier, TriVida plans to integrate its "personalization tagging" with Web content management systems, starting with Allaire's ColdFusion.

Define Business Rules

Finally, business users may define business rules as exceptions and enhancements to Networked Personalization Server recommendations. These rules act as a business filter for the engine's recommendations, ensuring that the service does not

inadvertently recommend nonsensical links. For example, a bicycle business could define a rule that would prevent the service from recommending bicycle helmets after the customer purchased a bicycle helmet during a Web site visit.

Because these business rules use the previously defined categories as building blocks, Web masters define the rules by clicking on list boxes on the TriVida Web site. This process is easy if the rules are simple — but can become tedious if the rules are complex. Recognizing this logistical limitation, TriVida will let customers define business rules via an uploaded file in the future.

Pricing

The pricing model of the SplashLink Free service is simple. Users pay no money to TriVida; they simply invest time and money to generate categories and business rules. Customers using the enhanced SplashLink Net service pay a flat monthly fee, depending on a site's relative rank in clicks. This "relative rank" model means that TriVida customers will probably pay the same fee over time, even if the number of clicks increases. For example, a TriVida customer that remains in the top 20% of Web sites will pay the same monthly fee over time, even if the total number of clicks doubles in the course of a year.

Where TriVida Is Most Useful

Given that it is free, the baseline SplashLink Free service is especially attractive to small and midsize Web sites that want to add personalization capabilities but have so far balked at such services' high startup costs. Even enterprises that require the enhanced capabilities of SplashLink Net will probably find the service's pay-as-you-go pricing model less expensive than the software license and infrastructure costs of personalization software.

Yet there are other compelling reasons besides operational cost savings to shift to the networked personalization model. Multiple related sites, especially those owned by the same company, can use the service to create a "personalization pool," monitoring multiple Web sites as if they were one and thereby offering up personalization recommendations that span the Web sites as well. An example of such a confederation is a set of city-themed Web sites, which could make cross-site recommendations to travelers.

This "pooling" is accomplished by using a single TriVida site ID, so that sharing links requires agreement and coordination among sites. However, this is not an either/or proposition because sites do not have to choose between functioning as a stand-alone site or functioning as a member of a confederation. Using two site IDs — one a confederation site ID and the other an ID unique to the site — a Web site can share personalization capabilities on some pages while keeping the personalization of other pages entirely within a single Web site. Airline Web sites, for

example, could use this mechanism to personalize links between alliance partners while uniquely personalizing the Web pages for frequent flyer clubs.

Aberdeen Conclusions

Aberdeen has observed that forward-thinking enterprises are now looking to Web-based services as one way to decrease Web infrastructure pain. SplashLink is well situated to take advantage of that growing trend. By offering a personalization service rather than personalization software, TriVida lets companies gain personalization capabilities without having to add additional in-house infrastructure.

In addition, the TriVida service breaks down the “every enterprise is an island” model that has previously reigned in personalization. Alliances and partnerships play a large role in today’s business world. While still protecting an individual enterprise’s information, TriVida’s networked architecture gives enterprises the option of using multi-site Web personalization to strengthen business relationships.

No matter what their size or business model, enterprises will appreciate the Personalization Service’s speed of implementation. With its cut-and-paste examples, point-and-click interfaces, and online manual to guide implementers through the process, enterprises can very quickly start using the service. Put another way, the service is designed for implementers to “just do it” — an attitude that is refreshing to enterprises working on Internet time.

Given enterprises’ desire to serve their customers better, Web personalization — whether user-controlled, implemented via on-site software, or accessible through a network service — is here to stay. TriVida’s networked personalization model offers enterprises richer capabilities at a lower price of entry than was previously possible with on-site software. As a result, TriVida’s Networked Personalization Service deserves a serious look by enterprises looking to better serve their Web customers.

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February 2000*

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