A Social Networking Site for Scientists and Engineers

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Abstract
This effort focused on creating a social networking site for scientists and engineers. The social networking site allows customers of a specific company to network within their niche community. The company produces high purity metals, custom alloys, and non-metallic materials used in research and manufacturing. Since the supplies and materials that are used in this company are often unobtainable anywhere else in the world, they provide a customer base that is specialized. This social networking site is also available to users outside of the company’s customer base in hopes of creating new business opportunities. This was accomplished by signing up with an established collaboration tool and customizing it to the customer’s specific requirements.

1. Introduction

“A social network is a social structure made up of individuals (or organizations) called "nodes", which are tied (connected) by one or more specific types of interdependency, such as friendship, kinship, common interest, financial exchange, dislike, sexual relationships, or relationships of beliefs, knowledge or prestige”[7]. Social networking sites have exploded in the last few years, including Facebook, Myspace, and Twitter. Table 1 lists the number of unique visitors to these three sites for August and September of 2010.

<table>
<thead>
<tr>
<th>Social Media Sites</th>
<th>Aug 2010</th>
<th>Sep 2010</th>
</tr>
</thead>
<tbody>
<tr>
<td>Facebook</td>
<td>598.1</td>
<td>620.3</td>
</tr>
<tr>
<td>Twitter</td>
<td>95.9</td>
<td>101.9</td>
</tr>
<tr>
<td>MySpace</td>
<td>94.7</td>
<td>90.7</td>
</tr>
<tr>
<td>Total internet audience worldwide</td>
<td>1,285.4</td>
<td>1,294.8</td>
</tr>
</tbody>
</table>

Table 1: Number of visitors to top Networking Sites [4].

Social networking sites have significantly changed the way that people communicate today. Social networks allow individuals to connect electronically by signing on to a specific website and communicating via e-mail, blogs, forums, news feeds, instant messaging, pictures or video sharing etc. Users can connect with old classmates they haven’t seen in years, find love, exchange ideas, research information, among many other exchanges. Social networking can also be extremely beneficial in the business world. Users of social networks build relationships and trust with people in their networks. Customer relationship and trust building are important for businesses. Social networks can create a place for many users with a common goal, who would otherwise never communicate, to come together and discuss a certain topic or even find a solution to a common problem. Many companies have established a social presence in social networks, such as Facebook or Twitter, to connect to their existing and potential customers. As social network provides a direct means of communication between companies and their customers, companies can gain customer insight from topics discussed in their social networks, which can help them to improve their product and service offering.

Many of the popular social networking websites target large groups of individuals. Facebook and Twitter are available to the general public and are used for many different reasons like dating, networking, and friendship. LinkedIn is available to everyone but is a more specific networking website that is geared towards building business relationships.

The social networking site designed and constructed in this study is different from other networking sites because these users are customers of a specific company. This site enables advanced materials buyers, suppliers, and professionals in the R&D field to facilitate technical exchange of domain specific knowledge about advanced materials and to collaborate and nurture potential deals. The company has already established a trusted relationship with his customers and his suppliers. The company is further expanding their business by pooling their customer base that have similar interests in order to provide further business opportunities for all parties on the social networking site. Since these customers have
never networked amongst themselves, this gives them a chance to meet virtually and exchange ideas. These customers can then invite other professionals to join the site which will further expand the company’s network.

Other scientific sites such as LabRoots, ResearchGate, and BiomedExperts offer the ability to network within the scientific community but none of these offers a connection to a local company who will provide expertise in a field of specialized products and services. “LabRoots is a free, social networking site that enables scientists, engineers, and other technical professionals to connect, collaborate with, and learn from each other. LabRoots fosters world-wide scientific communication and incorporates the newest social networking technologies” [3]. ResearchGate claims to be the “Facebook for Scientists” [6]. “BiomedExperts - the first literature-based scientific social network - brings the right researchers together and allows them to collaborate online. Elsevier Inc. provides the BiomedExperts social network free of charge to researchers worldwide in an effort to increase collaborative biomedical research for the common good” [1]. None of these social networking sites is aimed to promote business opportunities.

In comparison to other social networking sites, this business social network is a very domain specific Web site. Most people may not have a clue about what high performance corrosion resistant powder, or high purity tantalum is for. These are just some sample advanced materials that can be used by a variety of manufacturing industries. Regular consumers may not care about these but people who work in an industry that involves these kinds of specific advanced materials would benefit from joining this network. It is a challenge for them to find experts and suppliers of these materials. This site provides the market niche for scientists, engineers, subject matter experts, buyers and suppliers to exchange technical information about these advanced materials which is not offered by other scientific social networking sites.

Another objective of creating the site is to nurture deals creation. Other scientific social networking sites are aimed for pure information exchange. We are not aware of any of them that provide mechanisms to promote potential business opportunities among the members. Most of this site’s members are existing customers of the business. This audience will continue to be potential buyers. The company is launching this site to enable their customers to exchange information, get feedback from each other, be more educated, and make better business decisions. This customer insight in the specific advanced material domain is a unique offering by the company.

In addition, the company consists of a manageable size of membership, which make it easy for members to connect with each other. It offers a specific level of privacy by offering members the ability to become friends with someone only if they approve a friend’s request. ResearchGate allows any member to become a friend of another member without the approval process. BiomedExperts does not offer the ability for a member to create a customized profile as opposed to the site created in this study. BiomedExperts also limits their network to biomedical researchers where in this study the site is open to all scientists and engineers in various fields.

Our customer would like to leverage the benefits of social networks to connect with his customers. Section 2 describes the objectives and scope of the project. Section 3 describes the customer requirements. Based on the requirements, we described the resource selection and rationales in Section 4. Section 5 describes the architecture of the website. Section 6 discusses the revenue aspect of the website. Section 7 includes the customization, and Section 8 describes some possible marketing strategies.

The scope of this effort includes: (1) product research and recommendation for potential collaboration tooling used for the website and (2) design and development of the website. The final deliverable to the customer is a working social website that can be accessed live via the Internet.

2. Customer Requirements

Our customers recognized the benefit of social networks and the potential value to their business. They would like to create a social networking website where scientists and engineers can congregate and exchange ideas and/or ask questions to facilitate learning and help solve problems. The owner of the company receives numerous inquiries from all over the world asking questions about the materials used in his company. He felt that it would be beneficial to take all of the e-mail addresses he has accumulated and have these users all connect with each other via a social networking site.

The main requirements for the site are access control, privacy, collaborative ability, and ease of use. The website should be easy to navigate and not look too busy or confusing.

Access Control

According to the customer, scientists and engineers are very reserved socially and are not inclined to join a social networking website. Most also do not want too much personal information revealed about themselves. They may be more accepting of a social networking website where they know the owner of the site. Initially, users will be invited to join by an e-mail sent from the owner of the site who will be recognized by the potential member. As the site grows, users will be invited by friends or colleagues who are already members of the site.

Membership invitations will come from users of the site as opposed to a website that they have never heard of. New users are required to go through a one-time self registration process. They will be prompted to register with a user name, password, email address, birth date, etc. The site is open to anyone that would like to join and
members must join in order to participate in the conversations. Once users are registered, they are required to log in for each subsequent access.

The customer would like to be able to build a user directory of all the users that join the network. The customer would like to maintain the users’ information including their email addresses. This was important as it became a guiding factor during the social networking tooling selection. We ruled out the possibility of using Facebook as a candidate. Many companies have established group or fan pages on Facebook to connect their users with common interests together. However, the owner of these fan pages may or may not have access to their users’ email addresses. It was up to the privacy setting of the users to disclose the information they would like to share. Not everyone on Facebook shares his/her email address. Through the infrastructure provided by Facebook, fan page owners are able to communicate with their users via email, but they may not be able to retrieve the users’ email addresses due to different user’s privacy preferences. We will discuss more about other collaboration tooling selection in Section 4.

Privacy
The next user requirement was privacy. Each user will be able to create a user profile and include information such as their location, job title, special skills, phone number, etc. Since some of the users will not want as much information about themselves to be displayed, it will not be mandatory to enter this information on the site.

Each user will be able to view all other users’ profiles. Users will be able to search other profiles based on a certain keyword or keywords.

Collaborative Ability
The website also includes a discussion forum where users can post or answer questions to different forum topics. Users can start a forum topic if they have a certain topic they want to discuss or a question they want answered. Users can create blogs, groups, and events, as well as post photos and videos on the website.

Ease of Use
The website will provide an easy and friendly environment for the users. The website will be free to join and future profits will be made from advertising on the site.

Revenue
To keep the site running and make a profit, the customer would like to sell ad space on the website. Social Networking sites are great place to advertise. Table 2 shows the US social network ad revenues from 2009 – 2012. This site would target scientists and engineers and the products/services that are advertised should be geared towards them.

3. Resource Selection
There are many different resources available to help build a social networking website and they are available for a small fee. Our efforts first focused on whether to create a website from scratch or to choose one of the available resources and use it to build the website.

The customer’s requirement of having a forum discussion feature ruled out popular social networks such as Facebook, LinkedIn, Twitter etc as these networks do not provide this capability.

We recommend a website that can be customized to the customer’s needs. In the future, the site can change and grow with ease. We researched numerous possible collaboration tools during our product research. We recommended three different developmental tool options and presented a comparison chart to the customer (Table 3).

Our selection rationale was based on (1) our analysis of each of its capabilities against the customer’s requirements, and (2) the ease of maintenance. We did not consider any open source offerings as they tend to require more programming or administrative skills, which may create a maintenance concern to our customer in the future. As a result, we only considered commercial products for our customer.

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<td>Pro-39.95 per month</td>
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<td>Facebook</td>
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<td>Hosted Community,</td>
<td>Kickapps Feed</td>
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<td>Contract</td>
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</table>

Table 3: Comparison of social network site builder tools.

The three options were presented to the customer. Each of them has its pros and cons. The customer chose Ning because the price was affordable, they could have unlimited members on the site, it could be integrated with Facebook and Twitter, and it seemed easy to use. Ning is listed as the fifth most popular of all social networking sites in the eBiz April 2011 issue as shown below in Figure 1.

4. Customization of Site Developed

When you create a social networking site using Ning you can add features, customize its appearance, change profile questions, and change privacy options. All of these features use API’s of Ning platform. The Ning platform shown below in Figure 2 is a giant API (Application Programming Interface) with a built in ability to execute arbitrary code against it, and both the code and the API access will scale transparently with our networks needs.
Using Ning, you can add JavaScript and HTML code. This custom code tool is also being used to add Google Analytics. You can also add customized CSS to change the appearance of the social networking website.

The Ning website that was initially created needed to be customized to meet the customer’s requirements. Some features that were changed are:

- **Gifts** – Ning has a feature where each user can purchase gifts and send them to other users. This did not fit with the vision that was described for the website so it was disabled as shown in Figure 3.

![Figure 3: Gifts feature was inactivated](image)

- The appearance of the Tek-ex site was further customized using CSS to be more appealing to future members as shown below in Figure 4.

![Figure 4: CSS Customization.](image)

Now, make it unique

- **Basic Theme**
- **All Options**
- **Advanced**

Customize the appearance of your Ning network by adding your own Cascading Style Sheets (CSS) in the field below. Learn more about CSS.

- **Add CSS**
- **Learn More**
- **Remove**
- **Edit CSS**
- **Default Colors**
- **Customize CSS**

![Figure 4: CSS Customization.](image)

- **Membership** to the site will offer users the following:
  1. Collaborate with scientists, engineers, and other technical professionals
  2. Enhance your knowledge in your current field
  3. Explore new Job opportunities
  4. And Help you start your own business.
  5. Start networking today at [http://tek-ex.com](http://tek-ex.com)!
  6. Membership is FREE!

The invitation email was customized to provide a message to users with the above membership information. Figure 5 shows the e-mail message that potential members will receive.

![Figure 5: Membership e-mail potential members will receive.](image)

- The Ning site was connected to the custom domain name: [http://tek-ex.com](http://tek-ex.com).
- At the customer’s request, the birth date feature was removed to make the site more user friendly. Figure 6 shows how this was accomplished by not requiring members to provide their actual birthday.

![Figure 6: Members will not provide their actual birthday](image)

- Email addresses were loaded into Ning for those initial individuals that the customer would like to invite to join.

Figures 7 – 12 show various pages within the website. Figure 7 is the homepage that users will see when they log on to the website. Members can invite any other person to join the site by entering the potential members email address and sending an invite as shown in Figure 8. Each member can customize their individual page within the website. Figure 9 shows a couple examples of customized member pages. Figure 10 is a Forum Discussion that was created by a member asking other members for help with a specific question. Figures 11 and 12 show member information where Figure 11 is a list of all members which is available to all members. Figure 12 contains a list of all member names, profile addresses, emails, and locations. This information is only available to the owner of the site.
Figure 7: Home page site for scientists and engineers.

Figure 8: Page for inviting colleagues to join.

Figure 9: Customized member profiles.

Figure 10: Creation of a forum discussion.

Figure 11: Member directory.
Figure 12: Management view of all the members. Exporting member data is as easy as clicking a button. Member Data include the following: name, profile address, email, location and country.

5. Future Enhancement

5.1 Business Opportunities Monitoring
Nurturing business opportunities is one of the important rationale of creation of Tek-Ex. We used the existing Ning infrastructure and basic collaboration capabilities to build Tek-Ex. However, the current Web site can be enhanced with functionality specific for tracking business opportunities. A specific tab/area can be created in the Web site to promote business opportunities, the parties involved and track progress. It can be viewed as an area for interested parties to create private or side conversations. Privacy should be considered in the development of such a feature.

5.2 Marketing

A few marketing strategies are listed below that could be used to increase members and the traffic to the website.

Professional look and feel of website
Look and feel does matter. A web site with good look and feel can capture customers’ attention and improve a sense of trust that the website is well established. The customer can leverage professional graphic designers to create professional website logo or banners. There are numerous websites that provide logo or banner design services.

Leverage Google Search Engine Optimization (SEO)
It is important for the customer’s website to be searchable and rank at the top of the list on major search engines. Google has disclosed the basic information of what aspects affect website rankings. It is advantageous for our customer to leverage the knowledge when designing and populating the website content. For example, the customer may have a set of keywords that he focuses on his website. He may like to have his website show up in the search engine whenever end users search these keywords. There are Google SEO tools and plugins, developed by individual developers, that enable web site owners to optimize their website content and URL links based on the keywords that they would like others to search for. Most of these optimization tools are available for download (in both free and paid versions) from the internet. In additional to SEO plugin tools, back links are also very important in determining a website ranking. Back links refer to URL links that point to the customer’s website from other websites. It is similar to the mindset of a referral. Having more back links can improve the web site ranking. There are numerous websites that provide back links creation services. They usually cost from a few hundred dollars to a thousand dollars for these services.

Promote website with Facebook or LinkedIn page
Facebook is certainly the biggest social network among all others. Facebook enables users to create a commercial page to advertise their businesses. A lot of customers use a Facebook page as a means to drive traffic to their website. When a viewer sees a Facebook page that they like, they can click the “like” button to indicate his/her interest to receive the latest news from that page. The viewer’s action of liking the page is being broadcasted as the viewer’s new update in his/her social network. Similar to viral marketing, people in the viewer’s network may be inclined to check out the page and “like” it as well. Therefore, a Facebook page is a great vehicle to build a viewer base for driving traffic to a website.

Leverage AdWords for paid traffic
Traffic to a website can basically be categorized into three types: direct traffic, search engine (organic vs. inorganic) and referrals. Most new websites may not have a wide viewer base at the beginning. Direct traffic, which the viewers enter the website via direct URL link could be of a smaller percentage in the beginning when the website is newly launched. We discussed above that the customer can incorporate Google SEO strategy in the website to increase the website ranking. In addition, the customer can sign up for Google AdWords to pay for traffic. The customer can create advertisement campaigns in AdWords, and specify the maximum bid of “pay per click” to the website, and the maximum daily limit. The term “pay per click” refers to the paid traffic that a website owner is willing to pay for when a viewer clicks a link to enter his website. Each click costs money. The customer specifies what keywords are related to his website so that when viewers search these keywords; his advertisement will appear on the side panel of a Google
search result page. The ranking of where the customer’s advertisement is placed on a Google search result is relevant to the maximum bid he would like to pay. The higher the costs of the bid, the higher his advertisement will rank. It may be a good investment for our customer to launch a few campaigns for a couple of months to advertise this new site in the beginning. Once he is able to build a wider viewer base, he can discontinue the campaigns.

**Leverage Google Analytics to monitor website traffic**

Google Analytics is a free tool that enables website owners to monitor the displacement of website traffics. The analytics can track the types of traffic, the geographic locations of the viewers, the mostly viewed content of the website, the time they spend on each page etc. To leverage Analytics’ capability, a script is needed to be placed in every web page to enable detailed traffic monitoring of the website.

**References**


